Ministry for Primary Industries
Manatū Ahu Matua

A Review of Best Practice Management for Humane and Effective Vertebrate Pest Control

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Prepared for Ministry for Primary Industries
by Phil Cowan and Sam Brown, Landcare Research

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Requests for further copies should be directed to:

Publications Logistics Officer
Ministry for Primary Industries
PO Box 2526
WELLINGTON 6140

Email: brand@mpi.govt.nz
Telephone: 0800 00 83 33
Facsimile: 04-894 0300

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1 Summary

1.1 PROJECT

This project reviewed best practice documentation about humane and effective vertebrate pest control to inform work by the National Animal Welfare Advisory Committee (NAWAC) and the proposed Ministry For Primary Industries (MPI) Biosecurity Toolbox manager on guidelines for the use of traps or devices and hunting or killing of wild animals and animals in a wild state for the purposes of pest management. The specific objectives were to:

- Assess the available New Zealand best practice information on methods used to control vertebrate pest species in New Zealand and the need for guidance on aspects of use to limit animal welfare impacts; and,
- Identify needs for new best practice, or alignment of best practice, to ensure more humane vertebrate pest management in New Zealand.

Best practice information was sought from a range of agencies, organizations, and pest control companies and contractors for all vertebrate pests controlled by the Department of Conservation, the Animal Health Board and regional councils and the control methods used. Hunting and fishing were included when used primarily as control methods. Relevant organizations in Australia and the UK were also contacted.

We found that for most vertebrate pests in New Zealand there is some documentation about best practice use of control methods but, in relation to animal welfare, this is often limited to legal or commercial requirements and, for traps, to an indication of whether they have passed the NAWAC trap-testing guidelines. Gaps in coverage of both species and control tools were identified.

The key findings were that;

- The principles underlying improvement in animal welfare in pest management have been clearly defined but are not clearly articulated in one publicly accessible document.
- The existing in-house or publicly available documentation provides the basis for a systematic coverage of animal welfare considerations in vertebrate pest control in New Zealand. This would be enhanced by addressing the identified gaps in coverage of species and control tools.
- The New South Wales Department of Primary Industry Manual on Humane Pest Animal Control provides a good framework for the production of guidelines, Codes of Practice (COPs), and Standard Operating Procedures (SOPs) in a form suitable for inclusion in the pest management toolbox.
- The current lack of restrictions on the introduction of new traps and devices (except those involving toxins) for vertebrate pest control has potential negative welfare implications.

1.2 RECOMMENDATIONS

- As a minimum, a code of practice or framework document should be developed to make the principles underlying improvement in animal welfare in pest management available to practitioners.
- Principles for minimising animal welfare impacts should be incorporated into training for pest control managers and operators.
- A standard set of publicly available guidelines, COPs, and SOPs should be produced covering all aspects of the humane control of vertebrate pests in New Zealand.
- Any centralised system for making available COPs and SOPs for the humane control of vertebrate pests should be developed with input from its intended users, and be maintained by an appropriate and accountable organisation or representative.
- Additional resources should be provided to ensure the coverage of the guidelines, COPs, and SOPs includes all vertebrate pest animals and control tools.
- Responsibility for assessing traps using the NAWAC trap testing guidelines should be vested in an independent body that can provide endorsement that a trap has met the humaneness criteria in the guidelines. NAWAC should retain responsibility for revision and updating of the guidelines.
- Consideration should be given to restricting the sale of new traps and devices for vertebrate pest control until a welfare evaluation has been undertaken to the satisfaction of an appropriate regulatory or endorsing agency.

2 Introduction

Humane vertebrate pest control has been defined as the development and selection of feasible control programmes and techniques that avoid or minimise pain, suffering and distress to target and non-target animals in vertebrate pest control programmes (Humane Vertebrate Pest Control Working Group 2004). This definition implies two areas where the welfare impact of pest control should be considered – first, in the development of feasible control programmes and, second, in the selection of control techniques used.

The development of control programmes and techniques is important to improve animal welfare over time. However, the focus of this report is on the selection and application of control techniques. Different control strategies and techniques may have different welfare consequences through causing significantly different welfare impacts to achieve the same outcome (Warburton et al. 2012).

Much vertebrate pest management in New Zealand is guided by legislative requirements and Standard Operating Procedures (SOPs) for humane vertebrate pest control. These mainly focus on ensuring compliance with legislation (e.g., relating to use of toxins), operator health and safety, and efficient use of control methods. From a welfare perspective, the main function of Codes of Practice (COPs) and SOPs should be to ensure informed choice and then effective implementation to minimise welfare impacts on target and non-target species.

- The main organizations involved in vertebrate pest management in New Zealand are the Ministry for Primary Industries MPI (formerly MAF, providing national leadership and

coordination, enforcement and administering national pest programmes, and regulating pesticides, traps and devices), regional councils, the Environmental Protection Agency (formerly ERMA, regulating control tools and controls relating to hazardous substances and the introduction of new organisms), the Department of Conservation (DOC – several roles including conserving species and ecosystems and managing national parks, high country parks, forest parks, reserves, offshore islands, and historic sites), Land Information New Zealand (LINZ) and other Crown land managers such as the New Zealand Defence Force (pest management), Ministry of Health (role in managing potential impacts of control tools, e.g., vertebrate toxic agents, on human health and accountable for pest management under the Health Act), Ministry for the Environment (administers related legislation), National Pest Management Strategy management agencies such as the Animal Health Board (AHB), the National Pest Control Agencies (NPCA), Crown Research Institutes, pest control companies, community groups, and private land owners (Hellstrom et al. 2008).

The Animal Welfare Act 1999 (with its various amendments and orders) applies to acts of cruelty or ill-treatment committed against pests, wild animals, and animals in a wild state, but does not apply to hunting or killing of these animals. It also does not apply to the use of registered pesticides ("Vertebrate Toxic Agents") under the Agricultural Compounds and Veterinary Medicines Act. Trap checking requirements in the Animal Welfare Act, and the ability to restrict or prohibit the sale and use of traps and devices, allow restraints on these control methods with respect to their animal welfare impacts.

3 Background

MPI wished to review best practice documentation relating to humane and effective vertebrate pest control. The results of the review were to be used:

- to inform work by the National Animal Welfare Advisory Committee (NAWAC) in carrying out its functions relating to promoting the development of guidelines for the use of traps or devices and hunting or killing of wild animals and animals in a wild state for the purposes of pest management
- to inform the work of the proposed Biosecurity Toolbox manager.

4 Objectives

- To undertake a comprehensive review of available literature and online material, and consult with relevant organisations, to examine and assess the available New Zealand best practice information on methods used to control vertebrate pest species within New Zealand.
- To consider whether previous research, including operational research and work conducted overseas assessing the animal welfare impacts of pest control methods highlighted the need for guidance on particular aspects of use in order to limit animal welfare impacts.
- To provide comment or recommendations on areas of overlap or gaps, where there is a need for new best practice, or alignment of best practice, to ensure more humane vertebrate pest management.
- To present the review findings and recommendations at an agreed forum in Wellington.

5 Methods

A meeting was held on 23 November 2011 with MAF to agree on the methodology and scope of the documentation to be reviewed for the project. The scope of the project was agreed as:

- All vertebrate pests controlled by DOC, AHB, and regional councils (RC). If practicable, a check was to be made for vertebrate pests not controlled by these agencies but controlled by other groups (e.g., community conservation groups). The control methods considered were those that resulted in the deaths of pest animals both directly (e.g., toxins, kill traps) or indirectly (live capture and euthanasia).
- Hunting and fishing when used primarily as control methods, but not including recreational hunting and fishing.
- Limits placed by contracting agencies (DOC, AHB, RC) on the nature of control or control methods used by contractors.

Appendix 1 lists the agencies, organizations and pest control companies and contractors we contacted by phone and/or email seeking information and documentation relevant to the objectives of the project. The main types of documents sought included:

- Research reports and reviews
- Codes of practice (COPs)
- Best practice guidelines and manuals
- Standard operating procedures (SOPs)
- Decision support systems
- Contracts where the nature of control or control methods used is specified or restricted.

The web sites of related organizations in Australia and the UK were also searched for relevant information and key individuals contacted.

Vertebrates currently controlled as a pest species or included in regional pest management strategies as a potential threat are listed in Appendix 2, which was compiled from species listed in regional pest management strategies (RPMS) and species noted as pests by DOC and AHB. Appendix 2 also includes the methods most often used to control those species. Appendix 3 lists current New Zealand COPs and SOPs by vertebrate pest species. Appendix 4 provides a gap analysis of COPs and SOPs by vertebrate species. Appendix 5 lists COPs and SOPs produced by agencies outside New Zealand, but with relevance for species controlled in New Zealand. Web links to publicly available information are provided in Appendix 6.

6 Results

6.1 REVIEW AND CONSULTATION WITH RELEVANT ORGANISATIONS

6.1.1 Consultation with relevant organisations

New Zealand

DOC has an extensive set of internal COPs and SOPs supporting its management of vertebrate pests and an on-going programme to expand the documentation to all methods used (Appendix 3). Currently not all these documents are publicly available. The focus is primarily on mammals, but as DOC also has responsibility for pest fish there are some guidelines detailing control methods for these species.

NPCA has published a series of best practice and regulatory guides, largely focused on mammal pests and their control, but also dealing with one bird species, the rook. These guides are widely used by regional councils and pest control contractors throughout New Zealand.

AHB is currently developing a comprehensive guide to ground based control for possums and ferrets. This will be a companion guide to the existing SOP for aerial application of 1080, which is currently under review.

RCs do not generally produce their own COPs and SOPs but rather use or adapt those produced by NPCA, DOC, and NAWAC (for use of traps). The response of Otago Regional Council is provided below to illustrate this (Table 1).

Table 1 General Response from Regional Councils about COPs and SOPs used in Vertebrate Pest Control

Regional Councils as a rule do not produce animal welfare guidelines for vertebrate pest management but use industry guidelines from other organisations and as such meet all requirements of the Animal Welfare Act 1999. For toxins, information from the NPCA is used as well as label instructions and Material Safety Data Sheets. For trapping, the NPCA documents and the Animal Welfare Act are utilised. For shooting, operations staff must be licensed operators and follow the legislation that is relevant, which is the Arms Act and the associated arms code. While the arms code does not refer to animal welfare, it is the safe use of firearms that is highlighted. All Regional Council staff are well aware of the requirement for humane killing of any animal whether it be through the use of toxins, traps or shooting. Traps and shooting are directly related to the humane killing of animal pests, while staff operate under industry best practice recommendations for toxin use to prevent welfare issues e.g., sub lethal doses of toxins. The Department of Conservation toxin caution periods are followed at all times as per their consent conditions and these assist in the prevention of secondary poisoning of non-target animals. Most regional councils have SOPs that refer to animal welfare legislation, where applicable, and all regional councils maintains very high standards and aim to comply at all times in relation to animal welfare and the Act as part of their industry operations. Some councils hire out traps to the public and also sell products such as magtoxin for the fumigation of rabbit burrows. These transactions are always accompanied by instruction on usage and best practice user guideline handouts for the public.

Each regional council produces information on pest control for the public in the form of a brochure or web page. These generally contain some basic biological information on the pest; why it is considered a threat; and in some cases the control options available. Some of the regional councils loan out traps and/or provide toxic bait. These are usually provided with written advice about use, which, in the case of live traps, covers the need to check traps daily and to provide shelter, food and water for any live animals used to attract others for capture (e.g., magpies) and, in some cases, methods of killing pests.

MPI has produced various guidelines for registration of Vertebrate Toxic Agents (VTAs) and provided input into some of the NPCA documents.

Federated Farmers does not produce vertebrate pest management guidelines as such but rather contributes as necessary by commenting on those produced by other agencies such as the AHB, MPI or NPCA. In recent culls of moulting Canada geese in the South Island they worked in partnership with DOC and Fish and Game staff.

Pest Management Association of NZ, the Agricultural Chemical and Animal Remedies Manufacturers' Federation (Agcarm), and Fish and Game Council did not respond to our requests for information.

The four pest control contracting companies dealing with wild animal control that replied to the request all stated they had SOPs, but were reluctant to reveal details for commercial reasons:

> *"We do have our own internal SoPs which are compiled from previous knowledge, legislation and guidelines produced by the likes of DOC, AHB, etc. These are internal documents and not for use by other organisations."*

> *"I don't think our own SoPs would exceed (welfare) guidelines such as those from DOC or NPCA"*

> *"With most of our operations being carried out under contract for the AHB, the guidelines and processes we use tend to be those produced by the AHB. This would be especially pertinent with aerial control. NPCA publications are used from time to time and are regarded as being well put together and easily understood. Their publications on tracking requirements for VTA's, Possum and Ferret Traps, VTA requirements, Possum Monitoring, and legislation guide are some that have been distributed to our staff. A number of ERMA publications have also been distributed to staff from time to time. DOC Standard Operating Procedures are often referred to, especially when our operations involve DOC land and a formal Assessment of Environmental Effects is required."*

Excell (one of the four pest control contractors) noted that they used many guidelines and procedures from other organisations such as NPCA and AHB, and that most of their staff held Approved Handlers Certificates, Controlled Substances Licences for the toxins they use and the AHB National Certificate in Possum and Mustelid control. Excell would not provide details of the content of their SOPs for reason of commercial confidentiality, but their list of internal SOPs included:

- bird control using alpha-chloralose
- compliance monitoring
- trend monitoring of rabbits, wallabies and rooks
- driving
- cyanide baiting for possums
- ground baiting for rabbits
- ground baiting for wallaby
- hand broadcasting 1080 pellets
- bait stations and tree baiting for possums
- helicopter and fixed wing aircraft use
- landholder liaison
- making feratox bait bags
- operating m/c and ATV
- operating Gibson carrot cutters
- operating reliance cutters and screen

- wasp poisoning
- possum trapping
- mustelid trapping
- rook control
- rabbit fumigation
- shooting procedures
- small scale manufacture of 1080 baits for rabbit control
- small scale manufacture of pindone baits for rabbit control
- use of dogs
- chainsaw use
- working in an outdoor environment
- aerial bait application

New Zealand pest control products companies vary widely in the extent of public information provided to accompany their products. Most companies that are selling VTAs have links to Material Safety Data Sheets for the products and some kind of use guide. Some of the companies that also sell traps provide guidance for use, mention exclusion of non-target species, or that specific traps have met the NAWAC guidelines for humane trap testing (www.biosecurity.govt.nz/files/regs/animal-welfare/pubs/nawac/guideline09.pdf). There are several links to research papers of varying relevance to the control method being marketed.

Australia

While all Australian States have different sets of material, between them there is a comprehensive set of COPs and SOPs, particularly for the management of mammal pests (see 5.1.3; Appendix 2). They also have state-specific animal welfare legislation, some of which covers feral species.

The COPs and SOPs from New South Wales Department of Primary Industries (NSW DPI) are particularly good examples (but are currently unavailable as they are under revision).

The original seven COPs (of which those on rabbits, feral pigs, feral cats, feral goats, and feral horses are highly relevant to New Zealand) have met the requirements of the regulatory impact assessment process of the Commonwealth Office of Best Practice Regulation (OBPR), and subsequently been endorsed by Vertebrate Pests Committee (VPC), Australian Animal Welfare Committee (AusAWC) and its parent committee the Animal Welfare and Product Integrity Taskforce (AWPIT). The COPs are with the Primary Industries Standing Committee and subject to endorsement there, will go to the Ministerial Council (SCOPI) for national agreement. Ultimately there is nothing stopping states and territories adopting them (modified to meet local regulatory/statutory requirements as they are models) independently of any national agreement as the relevant statutory powers lie largely with the states/territories (D Dall, L Russell, pers. comms).

The SOPs, in contrast, are guide documents that can be amended by state agencies as they see fit for their jurisdiction.

Much publicly available advice available in Australia does not detail specific control methods, although welfare of both the pest species and non-target species is often mentioned as a factor to consider when planning pest control.

United Kingdom

In the UK, no single agency is responsible for advice on the welfare of wildlife management. Although guidance notes and best practice guides are available for some wildlife management techniques, they were not specifically written from an animal welfare perspective, apart from the snares code of practice (J Talling, pers. comm.). These guidance notes and documents are embedded in either Defra (Department of Environment, Food and Rural Affairs) webpages (http://www.defra.gov.uk/wildlife-pets/wildlife-management/) or Natural England webpages (http://publications.naturalengland.org.uk/publication/34015?category=23035). Although information on efficacy is given in these documents, no advice on humaneness is provided. With respect to traps there is very little information other than the UFAW guidelines for rodent control (www.ufaw.org.uk/documents/GuidanceonhumanecontrolofrodentsFeb2509V19.pdf) and the 2010 Pest Management Alliance UK 'Code of Best Practice – Humane Use of Rodent Glue Boards'. UK control methods are regulated, so they are supposedly used effectively, humanely, and safely. A general overview of the regulations and restrictions can be found at www.defra.gov.uk/wildlife-pets/wildlife-management/control-methods/.

6.1.2 Review of available information

Methods and registered VTAs used to control vertebrate pests in New Zealand comprise;

- Aerial poisoning using **1080**, **Pindone**
- Ground poisoning
  - Acute toxins
    - **Cyanide**
    - **Phosphorus**
    - **1080**
    - **Cholecalciferol**
    - **PAPP** (para-aminopropiophenone)
    - **Zinc phosphide**
    - **Sodium nitrite** (not yet registered in NZ)
    - **Alpha-chloralose**
    - **DRC-1339**
    - **Rotenone**
    - Powdered corn cob (Natural No Rats)
  - Anticoagulants
    - **Brodifacoum**

        - Flocoumafen
        - Coumatetralyl
        - Coumatetralyl+cholecalciferol (undergoing registration in NZ)
        - **Diphacinone**
        - Bromadialone
        - **Pindone**
- Shooting
        - Aerial (helicopter)
        - Ground shooting (with or without dogs)
- **Fumigation** (Aluminium and Magnesium phosphide, Chloropicrin, Methyl bromide, Carbon dioxide)
- Warren/roost destruction
- Trapping
        - **Kill trapping**
        - Live trapping
            - Cage/enclosure traps
            - **Leg-hold traps**
- Glue boards (banned except for specified situations)

SOPs are available for most of these methods but there is no complete species-by-method coverage. Those methods or VTAs that have been assessed in full or part for relative humaneness are highlighted in bold text. Gaps in coverage are noted in Appendix 4.

6.1.3 Pest management frameworks encompassing animal welfare

In Australia, the NSW DPI has led the way with a comprehensive manual of COPs and SOPs for pest animal control issued initially in 2005 and currently in the process of revision (G Saunders, pers. comm.). The pest animals covered currently are rabbits, foxes, pigs, wild dogs, cats, goats, deer, and horses. The manual includes some general topics, such as GEN001 Methods of Euthanasia, but the main sections of the manual deal with individual pest species in a standard way. For each pest species there is a Model Code of Practice for Humane Control followed by a set of Standard Operating Procedures. For rabbits, for example, the SOPs include:

- Inoculation of rabbits with Rabbit Haemorrhagic Disease Virus
- Ground baiting of rabbits with 1080
- Aerial baiting of rabbits with 1080
- Ground baiting of rabbits with pindone
- Diffusion fumigation of rabbit warrens
- Rabbit warren destruction by ripping

- Rabbit warren destruction using explosives
- Trapping of rabbits using padded-jaw traps
- Ground shooting of rabbits

The Model COP follows a standard format with a common introduction, background and definition of terms across all COPs that explain the aim of the COP and the relationship between the COP (which brings all the SOPs into a document that also specifies humane pest control strategies and their implementation) and the SOPs (which describe procedures for each control technique, including animal welfare issues). The COP encompasses all aspects of controlling a pest species including legislation, principles of best practice pest management, relevant biological information about the pest species, development of management plans, guidance on choosing the most humane and appropriate control technique, and how to most effectively implement management programmes.

Acceptability of a control technique with regard to humaneness is categorised in the SOPs as:

- Acceptable: considered humane when used correctly
- Conditionally acceptable: methods that by their nature may not be consistently humane. There may be a period of poor welfare before death
- Not acceptable: the welfare of the animal is very poor before death, often for a prolonged period.

This categorisation has been superseded by the scoring system developed in the model for assessing the relative humaneness of pest animal control methods (Sharp & Saunders 2011). The COPs and SOPs are currently under revision, to take account of this new system and the animal welfare impact assessments undertaken using the Sharp and Saunders model (also reported in Sharp & Saunders 2011).

In New Zealand, DOC's Animal Pest Framework (APF) is currently the system most similar to that promoted by the NSW DPI. The APF outlines the steps DOC staff must follow for a typical pest operation to help planning and enable best use of the DOC systems and resources. DOC supports the use of the framework by various staff training courses, pesticide information reviews, policy statements, general operational SOPs (e.g., consultation and notification SOP covering discussion on animal welfare of toxins), and species and method control techniques SOPs (e.g., aerial shooting of deer, kill trapping of feral cats, leg-hold trapping of possums, best practice advice on euthanasia of trapped vertebrate pests, pest eradication specific resources, contract specifications, use of dogs, pest fish inventory and monitoring).

6.1.4 Decision support systems

Decision Support Systems (DSS) are not commonly used to assist with welfare decisions (although some have been developed for livestock husbandry), and are also not common for vertebrate pests in general. The Landcare Research web site hosts a vertebrate pest control decision support system (http://pestdss.landcareresearch.co.nz/). The AHB's web site hosts a decision support system for possum control (http://possumdss.landcareresearch.co.nz) and a manual for ferret control. Each documents mostly technical and best practice use details of various control methods, and briefly discusses relative humaneness of various types of live

traps (principally by identifying those that have met the criteria in the NAWAC trap testing guidelines) but not toxins. A rabbit control Decision Support System is planned for development in 2012–13 (B Warburton, pers. comm.). Yeates (2010) developed a decision tree approach for ethical and welfare choices in pest management, which was adapted for island pest eradication (Cowan & Warburton 2011).

6.2 THE NEED FOR GUIDANCE ON PARTICULAR ASPECTS OF USE IN ORDER TO LIMIT ANIMAL WELFARE IMPACTS

Limiting the welfare impacts of vertebrate pest control on target animals primarily requires better information about the humaneness of control strategies and control methods so that robust advice can be provided to pest managers on choice of method and appropriate use.

6.2.1 Choice of method

Choice of strategy and/or control tool largely remains at the discretion of the person either authorising the pest control or implementing it, and animal welfare is only one consideration in this choice, along with efficacy, cost, environmental risk, practical considerations, and safety. A start has been made on compiling information to allow animal welfare to be considered in the choice of control tools (e.g., Fisher et al. 2010). The wider implications for animal welfare of choice of control strategy (e.g., periodic aerial poisoning vs annual maintenance control) have been defined for some time (Humane Vertebrate Pest Control Working Group 2004) but methods that allow managers to make informed choices are only now beginning to be explored (e.g., Warburton et al. 2012).

Welfare assessment of control methods involves either assessment of a control tool against a standard (as in the case of the current NAWAC guidelines for trap testing) or assessment of welfare impact using a scoring or rating system (which for lethal control tools may include an additional assessment of welfare impact of mode of death). The framework for assessing the relative humaneness of pest control methods developed recently by Sharp and Saunders (2011) adopts the latter approach and has been adapted for use in New Zealand (Fisher et al. 2010) and applied to a range of control methods.

The quality of any welfare assessment depends on available information. The Sharp and Saunders framework assesses welfare impact on each of the five generally accepted domains of potential welfare compromise (Mellor & Reid 1994) on a 5-point scale from no impact to extreme impact and from a duration of immediate to seconds to weeks. For lethal methods, level of suffering (after application of the method but before insensibility) is assessed on a 5-point scale from no impact to extreme impact, and time to insensibility from immediate to seconds to weeks.

The Fisher et al. (2010) assessment of a range of VTAs, kill and leg-hold traps, and burrow fumigants used in New Zealand revealed a wide range of areas where new or better information is needed to improve welfare assessment. For those control tools assessed, the most significant gaps for vertebrate toxins were information about time between onset of symptoms and loss of consciousness (i.e. duration of impact) and information on the level of consciousness during critical events such as convulsions and respiratory compromise. For fumigants, while improvement in the same sorts of information was thought valuable, more crucial issues for animal welfare were the relative inhumaneness of chloropicrin, and the lack of information about the welfare impacts of explosive methods for rabbit burrow destruction.

For leg-hold traps, the main constraints were that not all available traps had been tested against the NWAC guidelines, against some or all of the target species, and so for many species there was no or insufficient information about injury or stress to apply the welfare assessment framework. For the avicides, alpha-chloralose and DRC-1339, more information is needed on the degree to which the toxin affects consciousness and for DRC-1339, in particular, better information about the nature, progression, and duration of signs of poisoning. For the piscicide, rotenone, the main untested assumptions were that fish experience pain and distress in a similar way to mammals and that behaviours observed in fish exposed to rotenone were related to effects of the toxin.

For traps, welfare impacts would obviously be minimised by the use of traps that have passed the NAWAC trap testing guidelines. DOC SOPs for trapping generally recommend particular trap types that have passed these guidelines, and NPCA best practice guidelines (e.g., A4.4) cover a range of welfare issues associated with choice and use of traps, including noting whether or not particular traps have passed NAWAC guidelines. Landcare Research also provides on its web site a list of traps that have been tested and the outcome of those tests (www.landcareresearch.co.nz/research/pestcontrol/trapdesign/Welfare_performance.asp). Both the NPCA and Landcare Research information needs to be updated to incorporate traps tested since 2008.

6.2.2 Appropriate use

Welfare impacts of pest management may also be limited by aspects of use, such as appropriate siting of traps and bait stations; season and weather influences; frequency of trap checking; and appropriate pre-feeding, lures and baits. For example, focussing control in the non-breeding season may avoid collateral deaths of dependent young. But for some pests this creates issues of efficacy versus welfare. For example, much aerial control of possums and rodents takes place in winter, as efficacy (at least for possums) seems to be higher in that season than in other seasons (Veltman & Pinder 2001). However, the main possum-breeding season is April–June so that most adult females will be carrying young during winter and early spring. Consideration of the welfare impact on dependent young is not often considered in SOPs for small- to medium-sized mammal pests in New Zealand (perhaps because the main control method is broad-scale poisoning) but it is for the larger mammal pests such as goats (where shooting is the major control tool). For example, the NSW DPI COP for ground shooting of deer says shooting programme should not be undertaken when females are calving/fawning, and that if lactating females are inadvertently shot, effort should be made to find dependent young and kill them quickly and humanely. The NSW DPI SOPs for use of traps (e.g., for foxes and cats) suggest a similar need to avoid the breeding season and to deal humanely with any dependent young. By contrast, DOC SOPs for aerial and ground shooting only state that if lactating females are shot, efforts should be made to find dependent young and kill them quickly and humanely, and SOPs for trapping of possums and small mammals do not address this issue.

The widespread use of bait stations for pest management in New Zealand, particularly to dispense anticoagulant baits, poses potential welfare risks to a range of non-target species either through their ability to access toxic bait directly or through bait spillage on the ground or caching by target species. The detection of anticoagulant residues in a wide range of herbivorous non-target species, both native and introduced, highlights this issue (Fisher et al. 2004, 2011) and is currently driving research into improved design of ‘spill proof’ bait stations and the development of alternative bait matrices such as gels, which are less

susceptible to spillage. The current (2010) NPCA best practice guidelines for use of bait stations do not recommend one type of bait station over another. DOC guidelines for use of bait stations indicate general specifications: allow easy access, limit access by non-targets, protect bait from the elements, limit bait spillage, do not get blockages, hold up to 1.5 kg of bait, be easy to fill (and transport when establishing the network), be durable, and be designed for easy attachment. Although the guidelines provide examples of suitable bait stations they are not otherwise prescriptive.

6.3.1 Overlaps

Various agencies currently produce their own branded information on best practice for vertebrate pest control to meet their own needs or the needs of particular users. While there is some communication between agencies and some sharing of information there is still unnecessary duplication of effort and some inconsistency in the information and advice provided.

Ultimately, as noted above, the humaneness of a pest-control technique is highly dependent on its correct deployment which, in turn, depends on the training, skills and experience of the pest controller. DOC provides in-house training for their staff involved in vertebrate pest management. NPCA also offer training, particularly for possum control monitoring and rabbit control, the latter being a joint initiative with Otago Regional Council. A National Certificate in Pest Management has recently been developed by the Agriculture Industry Training Organisation. This qualification is for people who are involved in pest management, specifically possum pest control. The qualification has two parts: compulsory subjects, and 'electives' from which people can choose depending on their interests and job requirements. The compulsory subjects include compliance and using traps and toxins to control possums. Given the increase in community-driven conservation projects, for which pest control is usually a major activity, there are probably opportunities to extend the current audience for training in best practice pest management.

6.3.2 Gaps

DOC and NPCA, particularly, are gradually expanding their COP and SOP coverage of vertebrate pest control, so the incomplete coverage noted in Appendices 2 and 4 is being addressed, and the issues then are timeliness and availability of funding to complete coverage. The COPs developed in New Zealand to date are less comprehensive than those produced by the NSW DPI, and would benefit from the inclusion of additional material.

There are many traps available in New Zealand, and new ones appear regularly. There is currently no requirement that existing or new traps be assessed using the NAWAC guidelines, and NAWAC do not endorse traps that have passed the guidelines. They can recommend a ban on traps that fail but so far this has only been undertaken for leg-hold traps and glue-board traps for rodent control. This creates potential for unnecessary welfare impact. For example, some regional councils are still recommending Fenn traps for mustelid control and the Possum Master trap for possum control, despite both these traps failing the NAWAC trap testing guidelines.

The Animal Welfare Act requires live-capture (e.g., cage and leg-hold) to be checked daily within 12 h of sunrise. This is not required of kill traps: testing of kill traps against the NAWAC guidelines is voluntary, and the test is not absolute (i.e. it is designed to give 90%

confidence that traps that pass the test will perform below the lower threshold for failure 70% of the time and below the upper threshold 80% of the time). Thus even kill traps that meet the guideline impose an unquantified welfare impact on some target animals. In addition, compared with live-capture traps, kill traps have the disadvantage that non-target species may be killed by the trap or caught by the trap and die subsequently from injuries or lack of food and water (since kill traps do not need to be checked daily). These issues could be addressed by increasing the stringency of pass criteria for kill traps and/or requiring daily checking of kill traps that have not been tested against the criteria in the NAWAC guidelines, as for restraining traps.

Fisher et al. (2010) assessed the animal welfare impacts of the main control methods used in New Zealand. In addition to assessments conducted in Australia using the same framework, there is a significant body of information that can be used to allow and encourage pest managers to take welfare impacts fully into account in their choice of toxin. However, Fisher et al. (2010) did not assess *all* control methods, and in their report they make recommendations for further assessments and also for research to address gaps where there was insufficient information to make robust assessments (see 5.2). A complete assessment of all control methods would allow the identification and prioritisation of future research needed to address information gaps and deficiencies.

While mammal pest control is relatively well served by COPs and SOPs, best practice is less well developed for birds, reptiles, amphibians, and fish. There are currently few formal guidelines produced by the agencies primarily responsible for their control (Appendix 2), perhaps because most species are causing only localised problems, are present in small numbers, or have been identified as possible biodiversity or agricultural threats if they were to escape. Regardless, it would be beneficial to have best practice control methodology already established. For reptiles and amphibians there are various views about humane methods of euthanasia, particularly the use of hypothermia and freezing. The Australian and New Zealand Council for the Care of Animals in Research and Teaching produced a manual on the euthanasia of animals used for research purposes (ANZCCART 2001), which is currently under revision. Because of its focus, however, there may be circumstances where the proposed methods are impracticable in field situations.

Current legislation in New Zealand does not limit the use of traps or devices for vertebrate pest control except when those traps or devices have been declared prohibited or restricted as detailed in the Animal Welfare Act 1999. The potential welfare implications of this are that new traps and devices may be produced and sold regardless of their welfare impact until such time as they are prohibited. An example of this is the Rodenator, a device developed in the US but available (at least for a time) in New Zealand (www.rodenator.com/world-distributors/pestgard). It pumps gas down rabbit burrows, the gas is then ignited, and the ensuing explosion is presumed to kill rabbits in the burrow. In the UK, the use of any explosive other than ammunition for the purpose of killing or taking any wild animal is prohibited under section 11(1) of the Wildlife and Countryside Act 1981. Defra's understanding is that Rodenator and similar devices are covered by the term 'any explosive' and so are a prohibited method of killing wild animals (http://archive.defra.gov.uk/wildlife-pets/wildlife/management/documents/rodenator.pdf). A New Zealand example was the use of explosives to destroy a starling roost on a Wairarapa farm, the result of which was not just large numbers of dead birds but injured ones as well (Crombie 2001). The benefit of COPs and SOPs in improving animal welfare in vertebrate pest management needs therefore to be

accompanied by a mechanism that restricts the ease of marketing of new devices of unknown welfare impact.

The purpose of vertebrate pest control is not to control pests *per se* but to mitigate their impacts. Thus the outcome of any pest control operation needs to be defined at the outset, as does the change in the impacted resource resulting from pest control measured. This is best practice pest management planning and is clearly described in both the NSW DPI COPs and in DOC's APF. In terms of animal welfare costs it is critical that outcomes are achieved, otherwise large numbers of animals may have suffered for no significant gain (Cowan & Warburton 2011). There is significant room for improvement in New Zealand in the setting and measurement of outcomes, particularly in regional councils (Clayton & Cowan 2010). This could be achieved by more robust and widely used COPs that include, as in the NSW DPI COP, an overview of the principles of best practice pest management. Warburton and Norton (2009) suggest an additional improvement would be for pest control plans to be vetted in the same way that research proposals involving the use of animals are vetted by Animal Ethics Committees.

6.3.3 The MPI Toolbox project

One of the projects under the MPI-led Pest Management National Plan of Action (PMNPA) (www.biosecurity.govt.nz/files/biosec/consult/pest-management-final-print-version-022011.pdf) has an objective to improve overall practice in pest management by helping all participants to achieve their objectives by developing integrated toolbox management. Developing and sustaining all the tools needed for effective pest management is seen as a growing job and one that can no longer be left to ad hoc and disjointed approaches. Tools include physical control tools, like traps and poisons, monitoring tools, and best practice approaches and standards. The long-term vision in the PMNPA is that an integrated centralised toolbox will be accessible through one site and endorsed and used by all stakeholders. While this view of the 'toolbox' may change in its ultimate implementation (B Warburton, pers. comm.) the concept of a system of access to best practice documentation and advice will remain. Assuming it is implemented, the toolbox approach would seem to be the most effective approach to developing and making accessible a standard set of COPs and SOPs for vertebrate pest management or, less effectively or in the short term, to being simply a mechanism of linking to COPs and SOPs of existing pest management agencies.

6.3.4 The treatment of animal welfare in COPs, SOPs and guidelines

Although many of the pest management COPs and SOPs reviewed for this report make reference to animal welfare, the extent to which they do and the nature of the advice vary significantly among them. The NSW DPI COPs deal with welfare issues in the following standard ways. Each pest species COP contains:

- a background statement of the expectation that animal suffering (both target and non-target) associated with pest management should be minimised
- definitions of welfare, humane, humane vertebrate pest animal control, and best practice management
- a review of the principles of best practice pest management, including the statements that 'From an animal welfare perspective it is highly desirable that pest control programs affect a minimum number of individuals…', and 'The best strategy is to develop a control

plan which maximises the effects of control operations and reduces the need to cull large numbers of animals on a regular basis.'

- a discussion of choice of control techniques that states "To minimise suffering the most humane technique useable in any given situation must be employed. This will be the technique that causes the least amount of pain and suffering to the target animal with the least harm or risk to non-target animals, people, and the environment"
- a review of the comparative cost effectiveness, humaneness, and efficacy of control techniques for the particular pest species
- a list of relevant SOPs, applicable legislation, and sources of further information.

Each SOP contains a discussion of animal welfare considerations.

NPCA guidelines currently cover a limited range of pest species and control techniques, but this is largely a historical reflection of the original purpose of NPCA. NPCA C series public awareness publications do not mention pest animal welfare. Their A series best practice guides cover legal requirements, and make general statements about humaneness of various trap types and toxins in most guidelines, with the intention of supporting both selection and use for more humane control. The trapping guidelines (A4.1, A4.2) contain a set of welfare-related trapping principles:

- All animals must be captured with a minimum of injuries
- All animals must be captured with the minimum of distress
- Capture of non-target animals must be minimised, and
- All animals captured must be released, killed quickly or handled so as to minimise injuries and distress.

They also provide advice about various methods of euthanasia. Guideline A4.4 reviews available traps for possum and ferrets and identifies which have been assessed using the NAWAC trap testing guidelines.

DOC has an overarching internal statement of key implications for DOC of the Animal Welfare Act that presumably guides the treatment of animal welfare in documents in the APF. The APF covers animal welfare in a general way in terms of legal obligations, and SOPs for species and control methods also deal with welfare in terms of minimising risks, ensuring efficacy and humane euthanasia. Part of the APF involves shortlisting possible control methods from best practice, and this is assisted by Pesticide Information Reviews, which include a consideration of animal welfare and may provide advice on overall welfare rating of the pesticide based on published information (e.g., brodifacoum is given a low rating for humaneness). The APF is strongly geared to meeting DOC's requirements but it contains much of the information that would be needed to establish a publicly available set of COPs and SOPs for vertebrate pest control in New Zealand.

7 Conclusions

Through the information produced by various agencies that have developed in-house or publicly available documentation, New Zealand has the basis for a systematic coverage of animal welfare considerations in vertebrate pest control.

The Toolbox project in the MPI-led Pest Management National Plan of Action potentially provides a home for such best practice guidelines, COPs, and SOPs, although there are alternatives such as a widened role for the NPCA.

The NSW DPI Manual on Humane Pest Animal Control provides a good framework and internal structure for the production of guidelines, COPs, and SOPs in a standardised form suitable for inclusion in the pest management toolbox. Responsibility for maintenance and updating of the material would need to be agreed and resourced, regardless of its home.

While agencies and professionals involved in pest control provide training for their staff, pest control, at least for biodiversity protection, is increasingly being undertaken by community groups. Such groups are likely to have a high interest in animal welfare and pest management, but relevant information about it is limited in scope and availability. The New Zealand Qualifications Authority has recently embarked on a review of existing qualifications in order to collaboratively develop a national portfolio of agricultural qualifications at levels 1–6 that are strategic and needs based, focussed on outcomes, and flexible.

For most vertebrate pests in New Zealand there is some documentation about best practice use of control methods but, in relation to animal welfare, this is often limited to legal or commercial requirements and, for traps, to an indication of whether they have passed the NAWAC trap testing guidelines. Additional resources will be needed to address the gaps in coverage of both species and control tools. At present, information about best practice for control of bird, reptile, amphibian, and fish pests is poorly developed.

There is a significant body of existing information that can be used to allow and encourage pest managers to take welfare impacts fully into account in their choice of control tools. This would be enhanced by being made more widely available and by completing the assessment of control methods begun by Fisher et al. (2010), which would allow identification and prioritisation of future research needed to address information gaps and deficiencies.

The current lack of restrictions on the introduction of new traps and devices (except those involving toxins) for vertebrate pest control has potential negative welfare implications. Trap testing against NAWAC guidelines is voluntary and NAWAC does not endorse products. A change of approach to, perhaps, certification by some independent body (e.g., NPCA) might improve animal welfare by increasing use of approved traps and devices.

Better definitions of the desired outcomes of pest control and post-control monitoring and evaluation of change in the impacted resource are needed to minimise the failure rate of control operations and the associated pest animal deaths.

The principles underlying improvement in animal welfare in pest management have been clearly defined but, at present, these are not clearly articulated in one publicly accessible document. Such principles include the need to consider choice of method, use of method, adequate definition of desired outcomes, and subsequent monitoring against desired outcomes.

8 Recommendations

- Efforts to improve humane vertebrate pest control should be prioritised on the basis of actions that will deliver the greatest welfare gains. Highest priority should be given to

addressing those aspects of control that affect the most animals, are perceived to have the greatest welfare impact, and/or whose welfare impact is poorly documented.

- As a minimum, a code of practice or framework document should be developed to make the principles underlying improvement in animal welfare in pest management available to practitioners.
- Principles for minimising animal welfare impacts should be incorporated into training for pest control managers and operators.
- A standard set of publicly available guidelines, COPs and SOPs should be produced covering all aspects of the humane control of vertebrate pests in New Zealand. These should be structured in a similar way to those in the NSW DPI Manual of Humane Pest Animal Control.
- Any centralised system for making available COPs and SOPs for the humane control of vertebrate pests should be developed with input from its intended users, and be maintained by an appropriate and accountable organisation or representative. The Pest Control Toolbox proposed as part of the Pest Management National Plan of Action would, for instance, be an appropriate home.
- Additional resources should be provided to ensure the coverage of the guidelines, COPs and SOPs includes all pest animals controlled in New Zealand and provides a consistent treatment of welfare issues in pest control.
- Additional information on the welfare impacts of control tools should be provided to enable pest control managers and operators to make better-informed choice of control methods from a welfare perspective. This will require additional resources so that the modified Sharp and Saunders framework for assessing relative humaneness can be applied to all control tools used for vertebrate pest management in New Zealand.
- Responsibility for assessing traps using the NAWAC trap testing guidelines should be vested in an independent body that can provide endorsement that a trap has met the humaneness criteria in the guidelines. This may require a change in legislation. NAWAC should retain responsibility for revision and updating of the guidelines.
- Consideration should be given to restricting the sale of new traps and devices for vertebrate pest control until a welfare evaluation has been undertaken to the satisfaction of an appropriate regulatory or endorsing agency.

9 Acknowledgements

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Appendix 1 – Key agencies contacted

The following key agencies were contacted for relevant documentation:

- Department of Conservation (DOC)
- Animal Health Board (AHB)
- Ministry For Primary Industries (Food Safety Authority/ACVM)
- Pest Management Association of NZ (PMANZ)
- Pest management contractors
  - EPRO
  - EcoFX
  - Excell Biosecurity
  - Feral Animal Services
  - Tasman Pest Control
  - Valley Pest Control
  - Vector Free Marlborough
- Fish and Game Council
- Federated Farmers
- National Pest Control Agencies (NPCA)
- Agcarm
- AgITO
- Regional Council Biosecurity Managers
  - Greater Wellington
  - Northland
  - Taranaki
  - Marlborough
  - Auckland
  - Canterbury
  - Otago
  - Gisborne District
  - Tasman District Council
  - Horizons Regional Council
  - Bay of Plenty Regional Council
  - Environment Waikato
  - Hawke's Bay Regional Council

  - Environment Southland
- Australian Federal and State agencies website were searched for relevant documentation.
- Animal welfare researchers at FERA, UK, were contacted to provide information on relevant UK codes and guidelines.

Appendix 2 – Pest species controlled in New Zealand

Table A.1 List of vertebrate pest species either controlled in New Zealand or listed as potential future pests, and the methods used, or likely to be used, for their control. Most commonly used method (XXX), other methods (X). Numbers refer to footnotes.

Pest Species	Traps	Acute toxins	Anti-coagulant toxins	Shooting	Other
Mammals					
Red deer	X	1		XXX	
Sika deer	X	1		XXX	
Fallow deer	X	1		XXX	
Sambar deer	X	1		XXX	
Rusa deer	X	1		XXX	
White-tailed deer	X	1		XXX	
Wapiti	X	1		XXX	
Thar				XXX	
Chamois				XXX	
Feral Pig		2		XXX	
Feral Goat		X		XXX	
Feral cattle				X	Mustering, slaughter
Wild Horses				X	Mustering, re-homing, slaughter
Bennetts/redneck wallaby		X	3	X	
Dama wallaby		XXX	XXX	X	
Parma wallaby		XXX	XXX	X	
Brush tailed rock wallaby		XXX	XXX	X	
Swamp wallaby		XXX	XXX	X	
Feral cat	XXX	4			
Brushtail Possum	XXX	XXX	XXX		
Ferret	XXX	XXX	XXX		
Stoat	XXX	XXX	XXX		
Weasel	XXX	XXX	XXX		
Rabbit		XXX	XXX	XXX	
Hare				XXX	
Hedgehog	X		XXX		
Norway rat	XXX	XXX	XXX		
Ship rat	XXX	XXX	XXX		

Pest Species	Traps	Acute toxins	Anti-coagulant toxins	Shooting	Other
Kiore	XXX	XXX	XXX		
House mouse	XXX	XXX	XXX		
Birds (5)					
Canada goose				XXX	Moult cull
Rook		XXX		X	
Magpie	X			X	
Myna	X			X	
Eastern rosella	X			X	
Sulphur crested cockatoo	X			X	
Rainbow lorikeet	X			X	
Indian ring-necked parakeet	X			X	
Red vented bulbul	X			X	
Feral pigeon	X	X		X	
Feral goose		X		X	Hand Net
Peafowl		X		X	
Blackbacked Gull		X		X	
Reptiles (6)					
blue-tongued skink	X				
rainbow skink	X				
shingleback lizard	X				
red-eared slider turtle	X				
eastern water dragon	X				
bearded dragon	X				
Snaked necked turtle	X				
Amphibians					
Banjo frog		X			
Fish (7)					
Brown bullhead catfish	X	X			Drain ponds, Electro-fishing, Netting
Koi carp	X	XXX			Drain ponds, Electro-fishing,

Pest Species	Traps	Acute toxins	Anti-coagulant toxins	Shooting	Other
					Netting
Perch	X	X			Drain ponds, Electro-fishing, Netting
Rudd	X	X			Drain ponds, Electro-fishing, Netting
Tench	X	X			Drain ponds, Electro-fishing, Netting
Gambusia	X	X			Drain ponds, Electro-fishing, Netting
Gudgeon	X	X			Drain ponds, Electro-fishing, Netting
Orfe	X	X			Drain ponds, Electro-fishing, Netting
Caudo (Phallocerus)	X	X			Drain ponds, Electro-fishing, Netting
Goldfish	X	X			Drain ponds, Electro-fishing, Netting

Footnotes

1. Toxins are rarely used for deer control, except occasionally on populations infected with bovine tuberculosis.

2. New pig baits and toxins are being developed by the Invasive Animals Cooperative Research Centre, Australia. These may be registered in New Zealand at some future date.

3. Brodifacoum has been used ‘off label’ for wallaby control.

4. Para-aminpropiophenone (PAPP) is registered for use in NZ as a toxin for cats and stoats..

5. Toxin use for birds is restricted to DRC-1339 and alpha-chloralose.

6. Glue boards may be used for lizard capture in exceptional circumstances (e.g., border incursions).

7. Rotenone is the only toxin currently registered for fish control in New Zealand.

Appendix 3 – Relevant New Zealand and overseas codes of practice, standard operating procedures and guidelines

Table A.2 New Zealand and overseas codes of practice, standard operating procedures and guidelines

Document	Organisation	Document Type	Document Source
Amphibians			
MPI – Banjo frog response	MPI	Operational	http://www.biosecurity.govt.nz/files/biosec/pubs-media/pubs/surveillance/issue-27-2/surveillance-27-2.pdf
Birds			
Alphachloralose for Bird Control	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Alphachloralose powder	ACP	Species SOP	http://www.pestoff.co.nz/Labels/LabelV9536.pdf
Bird Control paste	ACP	Species SOP	http://www.pestoff.co.nz/Labels/LabelV4001.pdf
Cats			
DOCDM-799086 Feral cat control overview	DOC	Species COP	Internal Document
A11: Feral and Stray Cats - Monitoring and Control, a Preliminary Guideline Towards Good Practice	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
DOCDM-29437 Cats – kill trapping SOP	DOC	Species SOP	Internal Document
DOCDM-29439 Cats – leg hold trapping SOP	DOC	Species SOP	Internal Document
DOCDM-29441 Cats – cage trapping SOP	DOC	Species SOP	Internal Document
DOCDM-339853 Cat restrain system 1 – Leg hold trapping	DOC	Species SOP	Internal Document
DOCDM-339854 Cat restrain system 2 – Cage trapping	DOC	Species SOP	Internal Document
Deer			
DOCDM-453484 Deer repellent fact sheet	DOC	Operational	Internal Document
OLDDM-781271 Deer Control Policy Statement	DOC	Policy	Internal Document

Document	Organisation	Document Type	Document Source
Best Practice – aerial shooting deer	DOC	Species SOP	Internal Document
Best Practice – ground shooting deer	DOC	Species SOP	Internal Document
Dogs			
Conservation Dog/Handler Team Standard Operating Procedure	DOC	Operational	http://www.doc.govt.nz/upload/documents/science-and-technical/sops/dog-handlers/sop-conservation-doghandler-team.pdf
DOCDM-749423 Conservation Dog Handler Team SOP	DOC	Operational	Internal Document
Fish			
docdm-799083 Pest fish control overview	DOC	Species COP	Internal Document
docdm-23925 Pest fish eradication – hand-laying or aerial application of rotenone	DOC	Species SOP	Internal Document
docdm-756153 Pest Fish Inventory and Monitoring Best Practice Protocols	DOC	Species SOP	Internal Document
olddm-763299 Freshwater fisheries training module	DOC	Operational	Internal Document
Goats			
docdm-799085 Goat control Overview	DOC	Species COP	Internal Document
Best Practice – aerial shooting of goats	DOC	Species SOP	Internal Document
Best Practice – ground shooting of goats	DOC	Species SOP	Internal Document
docdm-105129 Goat control – ground hunting by individual hunters	DOC	Species SOP	Internal Document
docdm-544806 Goat control – team (WOD) hunting	DOC	Species SOP	Internal Document
DOCDM-294389 goat hunting – compiled contract	DOC	Operational	Internal Document
DOCDM-607549 ECBOP Goat Hunting Contract Template 2010	DOC	Operational	Internal Document

Document	Organisation	Document Type	Document Source
Feral goat control by ground shooting SOP	GWRC	Species SOP	Internal Document
Pest Animal DLE – Feral goats brochure	NRC	Species SOP	http://www.nrc.govt.nz/Resource-Library-Summary/Publications/Pest-animals/Feral-goats/Feral-goats/
Lagomorphs			
A5: Pest Rabbits – Monitoring and Control	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
A7: Pest Hares -– Monitoring and Control	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
Best Practice – aerial shooting rabbits and hares	DOC	Species SOP	Internal Document
Best Practice – ground shooting rabbits and hares	DOC	Species SOP	Internal Document
DOCDM-569427 Rabbit eradication best practice	DOC	Species SOP	Internal Document
Pest Animal DLE – Hares brochure	NRC	Species SOP	http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-animals/Hares/
Rabbit Control in Urban Areas	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Rabbit Control Using Pindone Rabbit Pellets	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
The Hare	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
The Rabbit	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Use of Fumigants to Control Rabbits	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Pest Animal DLE – Rabbits Brochure	NRC	Public brochure	http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-animals/Rabbits/
Rabbits and Hares Control Brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
Urban rabbits brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
Magpies			
Magpie control using firearms SOP	GWRC	Species SOP	Internal Document

Document	Organisation	Document Type	Document Source
The Magpie	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Pest Animal DLE – Magpie brochure	NRC	Public brochure	http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-animals/Magpies/
Multiple species			
ACVM Registration Information Requirements for vertebrate toxic agents including vertebrate pest control products	NZFSA	Operational	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
ACVM Registration Standard And Guideline For Efficacy Of Vertebrate Pesticides	NZFSA	Operational	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
ACVM Registration Standard And Guideline For The Chemistry Of Vertebrate Toxic Agents	NZFSA	Operational	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
ACVM Standard for Vertebrate Toxic Agents	NZFSA	Operational	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
Adverse Event Reporting Programme for Vertebrate Toxic Agents: Guidelines	NZFSA	Operational	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
Bait Devices Definitions	NZFSA	Operational	http://www.foodsafety.govt.nz/elibrary/industry/Bait_Devices-Chemicals_Medicines.htm
Data assessment report for animal welfare: Vertebrate toxic agent	NZFSA	Operational	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
Data assessment report for efficacy: Vertebrate toxic agent	NZFSA	Operational	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
DOCDM-22655 Status List of vertebrate pesticides	DOC	Operational	Internal Document
docdm-232655 - AEC application flow chart	DOC	Operational	Internal Document
DOCDM-235083 Animal Pests Framework	DOC	Operational	Internal Document
DOCDM-25413 Pesticide Information Reviews	DOC	Operational	Internal Document

Document	Organisation	Document Type	Document Source
DOCDM-297881 Animal Pests Framework Step Explanations	DOC	Operational	Internal Document
docdm-442078 Wildlife Health Management	DOC	Operational	Internal Document
DOCDM-458538 Best practice for eradication – a review of IEAG advice	DOC	Operational	Internal Document
DOCDM-736407 PAGRA SOP Appendix 4.4 Pesticide Information Review Template	DOC	Operational	Internal Document
Labelling and advertising guide for vertebrate toxic agents requiring registration	NZFSA	Operational	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
Vertebrate toxic agent registration and best practice tips	NZFSA	Operational	http://www.foodsafety.govt.nz/elibrary/industry/Vertebrate_Toxic-Points_Help.htm
DOCDM-530518 Operational Policy for welfare of pest animals in firearm and live capture operations	DOC	Operational COP	Internal Document
docdm-97398 Use of second generation anticoagulants on public conservation lands	DOC	Operational policy	Internal Document
DOC's animal welfare act obligations	DOC	Operational policy	Internal Document
OLDDM-781105 Summary of the Animal Welfare Act 1999 and key implications for DOC	DOC	Operational policy	Internal Document
A13: Responsible use of bait stations: an operator's guide	NPCA	Operational SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
DOCDM-22832 Consultation and Notification of Pest Operations SOP	DOC	Operational SOP	Internal Document
DOCDM-51573 Field Trials for Animal Pest Operations SOP	DOC	Operational SOP	http://www.doc.govt.nz/upload/documents/conservation/threats-and-impacts/pest-control/SOPs/sop-animal-pest-ops-field-trials.pdf

Document	Organisation	Document Type	Document Source
DOCDM-95492 Pesticide Use SOP	DOC	Operational SOP	Internal Document
DOCDM-95676 Preparing an Assessment of Environmental Effects SOP	DOC	Operational SOP	Internal Document
Night shooting SOP	GWRC	Operational SOP	Internal Document
Standard Operating Procedures for managing animal pests	DOC	Operational SOP	http://www.doc.govt.nz/publications/science-and-technical/doc-procedures-and-sops/managing-animal-pests/standard-operating-procedures/
B1: Legislation Guide: User guide to legislation relating to terrestrial pest control	NPCA	Policy	http://www.npca.org.nz/index.php/publications/b-regulatory
docdm-512023 Code of Ethical Conduct for the Manipulation of Live Animals, as defined under the Animal Welfare Act 1999	DOC	Policy	Internal Document
Review of Level of Protection for Some New Zealand Wildlife - Public Discussion Document	DOC	Policy	http://www.beehive.govt.nz/Documents/Files/wildlife%20protection%20discussion%20doc.pdf
A Guide to Self Help Possum Pest Control Areas	HBRC	Public brochure	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Animal Pest Control Methods & Poisons	HBRC	Public brochure	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
C5: Cholecalciferol – Its use for Possum and Rodent Control	NPCA	Public brochure	http://www.npca.org.nz/index.php/publications/c-public-awareness
C7: Brodifacoum: its use for possum and rodent control in forests and farmland	NPCA	Public brochure	http://www.npca.org.nz/index.php/publications/c-public-awareness
Feral animals brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
Intensive pest animal management – baiting + trapping timetable	AC	Public brochure	http://www.arc.govt.nz/environment/biosecurity/pest-animals/guidelines-for-intensive-pest-animal-control.cfm

Document	Organisation	Document Type	Document Source
Intensive pest animal management - choosing the right bait	AC	Public brochure	http://www.arc.govt.nz/environment/biosecurity/pest-animals/guidelines-for-intensive-pest-animal-control.cfm
Intensive pest animal management – setting up grids	AC	Public brochure	http://www.arc.govt.nz/environment/biosecurity/pest-animals/guidelines-for-intensive-pest-animal-control.cfm
Intensive pest animal management – traps	AC	Public brochure	http://www.arc.govt.nz/environment/biosecurity/pest-animals/guidelines-for-intensive-pest-animal-control.cfm
Outcome monitoring	AC	Public brochure	http://www.arc.govt.nz/environment/biosecurity/pest-animals/am-i-succeeding.cfm
Pest control techniques and tools brochure	DOC	Public brochure	http://www.doc.govt.nz/conservation/threats-and-impacts/animal-pests/methods-of-control/techniques-and-tools/
Planning animal control operations template	AC	Public brochure	http://www.arc.govt.nz/environment/biosecurity/pest-animals/planning-your-pest-animal-control.cfm
Result monitoring guidelines	AC	Public brochure	http://www.arc.govt.nz/environment/biosecurity/pest-animals/am-i-succeeding.cfm
Use of Repellents for Animal Pest Control	HBRC	Public brochure	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
2011-01-How Humane are our Pest Control Tools – Final Report	MPI	Research	http://www.biosecurity.govt.nz/about-us/our-publications/technical-papers#how-humane-are-our-pest-control-tools
Vertebrate Toxic Agents: Summary of the 2008 ‘Slice of Life’ Review	NZFSA	Research	http://www.foodsafety.govt.nz/elibrary/industry/Vertebrate_Toxic-Chemicals_Medicines.htm
A14: Aerial 1080 Control of Possums & Rabbits: Standard Operating Procedures for Regional Government	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
A4.1: Leghold Traps - A guideline for capturing possums, ferrets and feral cats using leghold traps	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
A4.2: Kill Traps – A guideline to trap possums, ferrets, stoats and feral cats using kill traps	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series

Document	Organisation	Document Type	Document Source
A4.4: Possum and Ferret Traps: A report to inform and advise users of trapping products	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
DOCDM-232352 Animal Pest Control Methods Training Course	DOC	Training	http://www.doc.govt.nz/getting-involved/get-trained/field-based-courses/animal-pest-control-methods/
DOCDM-809847 Development Matters Catalogue	DOC	Training	Internal Document
National Certificate in Pest Management with strands in Avian Pest Control, Mustelid Pest Control, Possum Pest Control, Rabbit Pest Control, and Rodent Pest Control (Level 3)	AgITO	Training	http://agito.ac.nz/qualifications/pest-control
Mustelids			
docdm-799084 Ferret control overview	DOC	Species COP	Internal Document
docdm-799087 Stoat control overview	DOC	Species COP	Internal Document
A8: Pest Mustelids – Monitoring and Control	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
Mustelids	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Ferret neophobia to traps	AHB	Research	http://www.pestcontrolresearch.co.nz/docs-trapping/neophobiatotraps.pdf
NAWAC trap assessment for possums and ferrets – Possum Master and Holden multikill trap	MPI	Research	http://www.pestcontrolresearch.co.nz/docs-trapping/humanenesssentinel.pdf
docdm-29433 FERRET control – Kill trapping	DOC	Species SOP	Internal Document
Ferret trapping best practice	AHB	Species SOP	http://www.ahb.org.nz/Portals/0/Guidelines,%20SOPs,%20Manuals/Best%20Practice%20Ferret%20Control%20Manual%202010.pdf
docdm-29448 (2) Stoat control – Kill trapping	DOC	Species SOP	Internal Document
docdm-29855 DOC 200 trap – Stoats, Rats, hedgehogs	DOC	Species SOP	Internal Document

Document	Organisation	Document Type	Document Source
docdm-29856 DOC 150 trap – Stoats, Rats, hedgehogs	DOC	Species SOP	Internal Document
Pest Animal DLE – Mustelids Brochure	NRC	Public brochure	http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-animals/Mustelids/
DOC 200 fact sheet – Mustelid control	GWRC	Species SOP	http://www.gw.govt.nz/pest-animals-2/
Mustelid control brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
Myna			
Pest Animal DLE – Myna brochure	NRC	Species SOP	http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-animals/Myna/
Non-Target species			
DOCDM-61641 Bait and carcass breakdown monitoring guideline	DOC	Operational SOP	http://www.doc.govt.nz/upload/documents/conservation/threats-and-impacts/pest-control/SOPs/guideline-bait-and-carcass-monitoring.pdf
C2: Protect Your Animals from 1080	NPCA	Public brochure	http://www.npca.org.nz/index.php/publications/c-public-awareness
C3: 1080 and Dogs Don't Mix Brochure	NPCA	Public brochure	http://www.npca.org.nz/index.php/publications/c-public-awareness
Veterinary and Clinical Treatment of Vertebrate Pesticide Poisoning – a Technical Review	AHB	Research	http://www.ahb.org.nz/Portals/0/Guidelines,%20SOPs,%20Manuals/R10613VeterinaryandClinicalTreatmentofPoisoning.pdf
Pigs			
A10: Feral Pigs – a review of monitoring and control techniques	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
Best Practice – aerial shooting pigs	DOC	Species SOP	Internal Document
Best Practice – ground shooting pigs	DOC	Species SOP	Internal Document
DOCDM-294351 pig hunting – compiled contract	DOC	Operational	Internal Document
Trapping to control feral pigs brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
Possum			
docdm-799088 Possum control overview	DOC	Species COP	Internal Document

Document	Organisation	Document Type	Document Source
A1: Possum Population Monitoring Using the Trap-Catch Method	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
A2: Possum Population Monitoring Using the WaxTag Method	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
A3: Private Land Owners' Guide to Possum Control- Control tools and techniques	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
Cage Traps	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Cyanide	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
docdm-29778 Possum control – Bait Stations using 1080 Cereal pellets	DOC	Species SOP	Internal Document
docdm-29781 Possum control – bait stations using 1080 paste	DOC	Species SOP	Internal Document
docdm-29782 Possum control – bait stations using kiwicare no possums® 1080 gel bait	DOC	Species SOP	Internal Document
docdm-29784 Possum control – bait stations using 1080 carrot or apple baits	DOC	Species SOP	Internal Document
docdm-29789 Possum control – Bait Stations using encapsulated cyanide (feratox®)	DOC	Species SOP	Internal Document
docdm-29794 Possum control – bait stations using feracol	DOC	Species SOP	Internal Document
docdm-29797 Possum control – hand broadcast of 1080 cereal bait	DOC	Species SOP	Internal Document
docdm-29808 Possum control – handlaying cyanide paste	DOC	Species SOP	Internal Document
docdm-29810 Possum control – handlaying phosphorus paste	DOC	Species SOP	Internal Document

Document	Organisation	Document Type	Document Source
docdm-29812 Possum control – bait bags using 1080 paste	DOC	Species SOP	Internal Document
docdm-29827 Possum control – bait bags using encapsulated cyanide (feratox®)	DOC	Species SOP	Internal Document
docdm-29830 Possum control – bait bags using feracol®	DOC	Species SOP	Internal Document
docdm-341728 Possum control – aerial application of 1080 cereal pellets	DOC	Species SOP	Internal Document
docdm-341732 Possum control – aerial application of 1080 carrot bait	DOC	Species SOP	Internal Document
Leg Hold Traps	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Philproof Bait Stations	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Possum Control - Performance Monitoring	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Talon and Pestoff (Brodifacoum)	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
"Timms" Kill Traps	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
The Possum	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
NAWAC trap assessment for possums and ferrets – Sentinel and Possum Master trap	MPI	Research	http://www.pestcontrolresearch.co.nz/docs-trapping/humanenesssentinel.pdf
C6: Cyanide – Its use for Possum Control	NPCA	Public brochure	http://www.npca.org.nz/index.php/publications/c-public-awareness
Pest Animal DLE – Possums Brochure	NRC	Public brochure	http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-animals/Possums/

Document	Organisation	Document Type	Document Source
Possum information brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
Possum trapping for fur recovery brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
Animal control SOPs from the GWRC Bio Officer Induction Manual	GWRC	Operational SOP	Internal Document
DOCDM-293144 Trap catch possum monitoring – compiled contract	DOC	Operational SOP	Internal Document
DOCDM-95710 Possum Hunters Using Cyanide Paste or Traps SOP	DOC	Operational SOP	Internal Document
A12: Auditing of Possum Monitoring Operations	NPCA	Operational	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
DOCDM-296431 Possum control using average residual catch rate – compiled contract	DOC	Operational	Internal Document
DOCDM-96720 DOC Possum Trapping Permit	DOC	Operational	Internal Document
OLDDM-515757 trap waxing procedure	DOC	Operational	Internal Document
Trapping Permit – possums	GWRC	Operational	Internal Document
Reptiles			
Euthanasia of Reptiles in New Zealand: Current Issues and Methods	DOC	Species SOP	http://srarnz.org.nz/Portals/srarnz/Files/Gatrell_Kirk_Euthanasia_Reptiles.pdf
Rodents			
docdm-799089 Rat control over view	DOC	Species COP	Internal Document
docdm-103712 Rat kill trapping	DOC	Species SOP	Internal Document
docdm-29375 Rat control – aerial application of 1080 cereal bait	DOC	Species SOP	Internal Document
docdm-29378 Rat control – 1st generation anti-coagulants in bait stations	DOC	Species SOP	Internal Document

Document	Organisation	Document Type	Document Source
docdm-29380 Rat control – 2nd generation anti-coagulants in bait stations	DOC	Species SOP	Internal Document
docdm-29384 Rat control–- Bait Stations using 1080 Cereal Baits	DOC	Species SOP	Internal Document
docdm-29390 Kill trapping for rat control	DOC	Species SOP	Internal Document
DOCDM-839096 Best practice for rat eradication -bait stations	DOC	Species SOP	Internal Document
DOCDM-839098 Rodent eradication best practice- aerial broadcast	DOC	Species SOP	Internal Document
DOCDM-839099 Best practice for eradication- Rats hand broadcast	DOC	Species SOP	Internal Document
Pest Animal DLE – Rats brochure	NRC	Public brochure	http://www.nrc.govt.nz/Environment/Weed-and-pest-control/Pest-animals/Rats/
Rodents Brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
Rooks			
Rooks Brochure	GWRC	Public brochure	http://www.gw.govt.nz/pest-animals-2/
A6: Pest Rooks - Monitoring and Control	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
The Rook	HBRC	Species SOP	http://www.hbrc.govt.nz/ReadAboutIt/EnvironmentTopics/tabid/244/ItemId/283/Default.aspx
Tahr			
DOCDM-488177 Himalayan Tahr Control Plan	DOC	Policy	Internal Document
Best Practice – aerial shooting tahr	DOC	Species SOP	Internal Document
Best Practice – ground shooting tahr	DOC	Species SOP	Internal Document
DOCDM-138973 Canterbury Otago Aerial Thar Control Best Practice	DOC	Species SOP	Internal Document
Wallabies			

Document	Organisation	Document Type	Document Source
A9: Wallabies – Monitoring and Control	NPCA	Species SOP	http://www.npca.org.nz/index.php/publications/a-best-practice/157-a-series
Best Practice – aerial shooting wallaby	DOC	Species SOP	Internal Document
Best Practice - ground shooting wallaby	DOC	Species SOP	Internal Document

NB SOPs and publicly available guidance have been included from the Hawke's Bay Regional Council (HBRC), Northland regional Council (NRC) and the Greater Wellington Regional Council (GWRC) as typical examples of the guidelines produced by regional councils.

Appendix 4 – Gap analysis of SOPs and guidelines for the use of control tools for vertebrate pest control

[Blank cell = no information. 'No' = tool may be used but no specific information found; Yes = SOP or manufacturers' guidelines for use available]

Table A.3 Acute toxins

Pest Species	Aerial poisoning using 1080 or Pindone	Cyanide	Phosphorus	1080	Cholecalciferol	PAPP (para-aminopropiophenone)	Zinc phosphide	Sodium nitrite (not yet registered in NZ)	Alpha-chloralose	DRC-1339	Rotenone – Aerial and ground application
Mammals											
Red deer				Yes*[1]							
Sika deer				Yes*[1]							
Fallow deer				Yes*[1]							
Sambar deer				Yes*[1]							
Rusa deer				Yes*[1]							
White-tailed deer				Yes*[1]							
Wapiti				Yes*[1]							
Thar											
Chamois											
Feral Pig											
Feral Goat				Yes*							
Feral cattle											
Wild Horses											
Bennetts/redneck wallaby	Yes	Yes*		Yes[1]							

Pest Species	Aerial poisoning using 1080 or Pindone	Cyanide	Phosphorus	1080	Cholecalciferol	PAPP (para-aminopropiophenone)	Zinc phosphide	Sodium nitrite (not yet registered in NZ)	Alpha-chloralose	DRC-1339	Rotenone – Aerial and ground application
Dama wallaby	Yes	Yes*		Yes[1]							
Parma wallaby				Yes*[1]							
Brush tailed rock wallaby				Yes*[1]							
Swamp wallaby				Yes*[1]							
Feral cat				No		No					
Brushtail Possum	Yes	Yes	Yes	Yes	Yes		Yes*				
Ferret											
Stoat						Yes*					
Weasel											
Rabbit	Yes		Yes	Yes							
Hare											
Hedgehog											
Norway rat	Yes[1]			Yes[1]	Yes*[1]						
Ship rat	Yes[1]			Yes[1]	Yes*[1]						
Kiore	Yes[1]			Yes[1]	Yes*[1]						
House mouse	Yes[1]				Yes*[1]						
Birds											
Canada goose											

Pest Species	Aerial poisoning using 1080 or Pindone	Cyanide	Phosphorus	1080	Cholecalciferol	PAPP (para-aminopropiophenone)	Zinc phosphide	Sodium nitrite (not yet registered in NZ)	Alpha-chloralose	DRC-1339	Rotenone – Aerial and ground application
Rook										Yes	
Magpie									Yes		
Myna									Yes[1]		
Eastern rosella											
Sulphur crested cockatoo											
Rainbow lorikeet											
Indian ring-necked parakeet											
Red vented bulbul											
Feral pigeon									Yes[1]		
Feral goose											
Peafowl									No	No	
Blackbacked Gull									Yes		
Reptiles											
Blue-tongued skink											
Rainbow skink											
Shingleback lizard											
Red-eared slider turtle											

Pest Species	Aerial poisoning using 1080 or Pindone	Cyanide	Phosphorus	1080	Cholecalciferol	PAPP (para-aminopropiophenone)	Zinc phosphide	Sodium nitrite (not yet registered in NZ)	Alpha-chloralose	DRC-1339	Rotenone – Aerial and ground application
Eastern water dragon											
Bearded dragon											
Snaked necked turtle											
Amphibians											
Banjo frog											
Fish											
Brown bullhead catfish											Yes[1]
Koi carp											Yes[1]
Perch											Yes[1]
Rudd											Yes[1]
Tench											Yes
Gambusia											Yes[1]
Gudgeon											Yes[1]
Orfe											Yes[1]
Caudo (Phallocerus)											Yes[1]
Goldfish											Yes[1]

* Guide for use produced by product manufacturer

[1] Guidelines not species specific

Table A.4 Anticoagulant toxins (use restricted to mammals)

Pest Species	Brodifcaoum	Flocoumafen	Coumatetralyl, Coumatetralyl+cholecalciferol	Diphacinone	Bromadialone	Pindone
Mammals						
Red deer						
Sika deer						
Fallow deer						
Sambar deer						
Rusa deer						
White-tailed deer						
Wapiti						
Thar						
Chamois						
Feral Pig						
Feral Goat						
Feral cattle						
Wild Horses						
Bennetts/redneck wallaby						
Dama wallaby						
Parma wallaby						
Brush tailed rock wallaby						
Swamp wallaby						
Feral cat						
Brushtail Possum	Yes					Yes
Ferret				Yes		

Pest Species	Brodifcaoum	Flocoumafen	Coumatetralyl, Coumatetralyl+cholecalciferol	Diphacinone	Bromadialone	Pindone
Stoat						
Weasel						
Rabbit						Yes
Hare						
Hedgehog						
Norway rat	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]
Ship rat	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]
Kiore	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]
House mouse	Yes[1]	Yes[1]	No	Yes[1]	Yes[1]	

[1] Guidelines not species specific

Table A. 5 Shooting, trapping and other methods

	Shooting		Trapping			Other methods					
Pest Species	Aerial (helicopter)	Ground shooting (with or without dogs)	Kill trapping	Cage/enclosure traps	Leg-hold traps	Fumigation (Aluminium and Magnesium phosphide, Chloropicrin)	Warren/roost destruction	Mustering	Netting, Drainage, Electro-fishing	Freezing, hydrochloric acid	Hand/net capture
Mammals											
Red deer	Yes[1]	Yes[1]		No							
Sika deer	Yes[1]	Yes[1]		No							
Fallow deer	Yes[1]	Yes[1]		No							
Sambar deer	Yes[1]	Yes[1]		No							
Rusa deer	Yes[1]	Yes[1]		No							
White-tailed deer	Yes[1]	Yes[1]		No							
Wapiti	Yes[1]	Yes[1]		No							
Thar	Yes[1]	Yes[1]									
Chamois	No	No									
Feral Pig	Yes	Yes		Yes							

	Shooting		Trapping			Other methods					
Pest Species	Aerial (helicopter)	Ground shooting (with or without dogs)	Kill trapping	Cage/enclosure traps	Leg-hold traps	Fumigation (Aluminium and Magnesium phosphide, Chloropicrin)	Warren/roost destruction	Mustering	Netting, Drainage, Electro-fishing	Freezing, hydrochloric acid	Hand/net capture
Feral Goat	Yes	Yes		No				No			
Feral cattle	No	No						No			
Wild Horses	No	No						No			
Bennetts/redneck wallaby	Yes[1]	Yes[1]									
Dama wallaby	Yes[1]	Yes[1]									
Parma wallaby	Yes[1]	Yes[1]									
Brush tailed rock wallaby	Yes[1]	Yes[1]									
Swamp wallaby	Yes[1]	Yes[1]									
Feral cat		No	Yes	Yes	Yes						
Brushtail Possum		Yes	Yes	Yes	Yes						
Ferret			Yes		Yes						
Stoat			Yes	Yes							

	Shooting		Trapping			Other methods					
Pest Species	Aerial (helicopter)	Ground shooting (with or without dogs)	Kill trapping	Cage/enclosure traps	Leg-hold traps	Fumigation (Aluminium and Magnesium phosphide, Chloropicrin)	Warren/roost destruction	Mustering	Netting, Drainage, Electro-fishing	Freezing, hydrochloric acid	Hand/net capture
Weasel			Yes								
Rabbit	Yes	Yes			Yes	Yes	No				
Hare	Yes	Yes									
Hedgehog			Yes								
Norway rat			Yes[1]								
Ship rat			Yes[1]								
Kiore			Yes[1]								
House mouse			Yes								
Birds											
Canada goose											
Rook	No	No									No
Magpie		Yes					No				

	Shooting		Trapping			Other methods					
Pest Species	Aerial (helicopter)	Ground shooting (with or without dogs)	Kill trapping	Cage/enclosure traps	Leg-hold traps	Fumigation (Aluminium and Magnesium phosphide, Chloropicrin)	Warren/roost destruction	Mustering	Netting, Drainage, Electro-fishing	Freezing, hydrochloric acid	Hand/net capture
Myna		Yes		Yes							
Eastern rosella		No		No							
Sulphur crested cockatoo											No
Rainbow lorikeet											No
Indian ring-necked parakeet											No
Red vented bulbul											No
Feral pigeon											No
Feral goose											
Peafowl											No
Blackbacked Gull		No		No							
Reptiles											

	Shooting		Trapping			Other methods					
Pest Species	Aerial (helicopter)	Ground shooting (with or without dogs)	Kill trapping	Cage/enclosure traps	Leg-hold traps	Fumigation (Aluminium and Magnesium phosphide, Chloropicrin)	Warren/roost destruction	Mustering	Netting, Drainage, Electro-fishing	Freezing, hydrochloric acid	Hand/net capture
Blue-tongued skink											
Rainbow skink											
Shingleback lizard				No							No
Red-eared slider turtle				No							No
Eastern water dragon				No							No
Bearded dragon				No							No
Snaked necked turtle				No							No
Amphibians											
Banjo frog				No							No
Fish											
Brown bullhead catfish											
Koi carp										No	No

	Shooting		Trapping			Other methods					
Pest Species	Aerial (helicopter)	Ground shooting (with or without dogs)	Kill trapping	Cage/enclosure traps	Leg-hold traps	Fumigation (Aluminium and Magnesium phosphide, Chloropicrin)	Warren/roost destruction	Mustering	Netting, Drainage, Electro-fishing	Freezing, hydrochloric acid	Hand/net capture
Perch											
Rudd											
Tench									No		
Gambusia									No		
Gudgeon									No		
Orfe									No		
Caudo (Phallocerus)									No		
Goldfish									No		

[1] Guidelines not species specific

Appendix 5 – Overseas control guidelines relevant to vertebrate pest species found in New Zealand

Table A.6 Overseas control guidelines

Document	Document source
Bird	
bir-001.pdf Shooting of pest birds	NSW DPI SOP Draft Policy- public release late 2012
bir-002.pdf Trapping of pest birds	NSW DPI SOP Draft Policy- public release late 2012
Cats	
cat-001.pdf Ground shooting of feral cats	NSW DPI SOP Draft Policy- public release late 2012
cat-002.pdf Cage trapping of feral cats	NSW DPI SOP Draft Policy- public release late 2012
cat-003.pdf Leg hold trapping of feral cats	NSW DPI SOP Draft Policy- public release late 2012
cat-cop.pdf model code of practice for the humane control of feral cats	NSW DPI SOP Draft Policy- public release late 2012
Deer	
dee-001.pdf Ground shooting of wild deer	NSW DPI SOP Draft Policy- public release late 2012
Dogs	
gen-002.pdf The care and management of dogs used in the control of pest animals	NSW DPI SOP Draft Policy- public release late 2012
Goats	
goa-001.pdf Ground shooting of feral goats	NSW DPI SOP Draft Policy- public release late 2012
goa-002.pdf Aerial shooting of feral goats	NSW DPI SOP Draft Policy- public release late 2012
goa-003.pdf Mustering of feral goats	NSW DPI SOP Draft Policy- public release late 2012
goa-004.pdf Trapping of feral goats	NSW DPI SOP Draft Policy- public release late 2012
goa-005.pdf Use of Judas goats	NSW DPI SOP Draft Policy- public release late 2012
goa-cop.pdf model code of practice for the humane control of feral goats	NSW DPI SOP Draft Policy- public release late 2012
Hares	

Document	Document source
har-001.pdf Ground shooting of hares	NSW DPI SOP Draft Policy- public release late 2012
Horses	
hor-001.pdf Ground shooting of feral horses	NSW DPI SOP Draft Policy- public release late 2012
hor-002.pdf Aerial shooting of feral horses	NSW DPI SOP Draft Policy- public release late 2012
hor-003.pdf Mustering of feral horses	NSW DPI SOP Draft Policy- public release late 2012
hor-004.pdf Trapping of feral horses	NSW DPI SOP Draft Policy- public release late 2012
hor-cop.pdf model code of practice for the humane control of feral horses	NSW DPI SOP Draft Policy- public release late 2012
Multiple Species	
ANZCART - Euthanasia of Animals Used for Scientific Purposes	http://www.adelaide.edu.au/ANZCCART/resources/
Code of practice for the capture and marketing of feral animals in Western Australia	http://www.agric.wa.gov.au/objtwr/imported_assets/content/pw/ah/welfare/codeofpractice_feralanimals.pdf
Development of a model code of practice and standard operating procedures for the humane capture, handling or destruction of feral animals in Australia	http://www.environment.gov.au/biodiversity/invasive/publications/humane-control.html
Development of model standard operating procedures for the humane research of pest animals in Australia	http://www.environment.gov.au/biodiversity/invasive/publications/threat-abatement-projects/46217-pest-research-code.html
gen-001.pdf methods of euthanasia	NSW DPI SOP Draft Policy- public release late 2012
EU - Humane Trapping Standards	http://ec.europa.eu/environment/biodiversity/animal_welfare/hts/pdf/final_report.pdf
Perception of pain associated with 1080 poisoning	http://test3.dec.wa.gov.au/images/stories/westernshield/perception_of_pain_associated_with_1080_poisoning.pdf
res-001.pdf live capture of pest animals used in research	NSW DPI SOP Draft Policy- public release late 2012
res-002.pdf restraint and handling of pest animals used in research	NSW DPI SOP Draft Policy- public release late 2012
res-003.pdf holding and transportation of pest animals used in research	NSW DPI SOP Draft Policy- public release late 2012
res-004.pdf marking of pest animals used in research	NSW DPI SOP Draft Policy- public release late 2012

Document	Document source
res-005.pdf measurement and sampling of pest animals used in research	NSW DPI SOP Draft Policy- public release late 2012
Pigs	
pig-001.pdf trapping of feral pigs	NSW DPI SOP Draft Policy- public release late 2012
pig-002.pdf aerial shooting of feral pigs	NSW DPI SOP Draft Policy- public release late 2012
pig-003.pdf ground shooting of feral pigs	NSW DPI SOP Draft Policy- public release late 2012
pig-004.pdf use of judas pigs	NSW DPI SOP Draft Policy- public release late 2012
pig-005.pdf poisoning of feral pigs with 1080	NSW DPI SOP Draft Policy- public release late 2012
pig-cop.pdf model code of practice for the humane control of feral pigs	NSW DPI SOP Draft Policy- public release late 2012
Western Australia 1080 pig baiting.pdf	http://www.agric.wa.gov.au/objtwr/imported_assets/content/pw/vp/fer/fpigtext.pdf
Western Australia Guideline – pig trapping	http://www.agric.wa.gov.au/objtwr/imported_assets/content/pw/vp/fer/fn036_2003.pdf
Possum	
Tasmanian Animal Welfare Guidelines for Brush-tail Possums	http://www.dpiw.tas.gov.au/inter,nsf/Attachments/LBUN-7T3284/$FILE/Animal%20Welfare%20Guidelines%20-%20Brush-tail%20Possums.pdf
Rabbits	
rab-001.pdf inoculation of rabbits with Rabbit Haemorrhagic Disease Virus (RHDV)	NSW DPI SOP Draft Policy- public release late 2012
rab-002.pdf ground baiting of rabbits with 1080	NSW DPI SOP Draft Policy- public release late 2012
rab-003.pdf aerial baiting of rabbits with 1080	NSW DPI SOP Draft Policy- public release late 2012
rab-004.pdf ground baiting of rabbits with Pindone	NSW DPI SOP Draft Policy- public release late 2012
rab-005.pdf diffusion fumigation of rabbit warrens	NSW DPI SOP Draft Policy- public release late 2012
rab-006.pdf rabbit warren destruction by ripping	NSW DPI SOP Draft Policy- public release late 2012
rab-007.pdf rabbit warren destruction using explosives	NSW DPI SOP Draft Policy- public release late 2012
rab-008.pdf trapping of rabbits using padded-jaw traps	NSW DPI SOP Draft Policy- public release late 2012

Document	Document source
rab-009.pdf ground shooting of rabbits	NSW DPI SOP Draft Policy- public release late 2012
rab-cop.pdf model code of practice for the humane control of rabbits	NSW DPI SOP Draft Policy- public release late 2012
Rodents	
Guiding principles in the Humane Control of Rats and Mice	http://www.ufaw.org.uk/rodents.php
Model code of practice for the humane control of rodents 2011.doc	NSW DPI SOP Draft Policy- public release late 2012

Appendix 6 – Web links to publicly available information on codes of practice and standard operating procedures for vertebrate pest control

Table A.7 Web links to publicly available information

Organisation/ Relevant information	Web site
Australian Organisations	
ACT pest management	http://www.tams.act.gov.au/play/pcl/pestsandweeds
Australian Department of Agriculture, Fisheries and Forestry - animal welfare guidelines	http://www.daff.gov.au/animal-plant-health/welfare/nccaw/guidelines/pest
Australian pesticides and vet medicines	http://www.apvma.gov.au/
Australia's biodiversity publication list	http://www.environment.gov.au/biodiversity/publications/index.html#ferals
Development of model standard operating procedures for the humane research of pest animals in Australia	http://www.environment.gov.au/biodiversity/invasive/publications/humane-control.html
Methods for the field euthanasia of cane toads	http://www.environment.gov.au/biodiversity/invasive/publications/pubs/can001-euthanasia-cane-toads.pdf
Northern Territories Department of Environment	http://www.nretas.nt.gov.au/plants-and-animals/animals/feral
NSW Department of Primary Industries	http://www.dpi.nsw.gov.au/agriculture/pests-weeds/vertebrate-pests
Problems with current animal protection - sentient animals slipping through the net	http://www.daff.gov.au/animal-plant-health/welfare/aaws/aaws_international_animal_welfare_conference/problems_with_current_animal_protection_-_sentient_animals_slipping_through_the_net
Queensland Department of Primary industry	http://www.dpi.qld.gov.au/4790_9154.htm
Review: Welfare Outcomes Of Leg-Hold Trap Use In Victoria	http://www.dpi.vic.gov.au/agriculture/about-agriculture/publications-resources/review-welfare-outcome-of-leg-hold-trap-use/leg-hold-trap-use-chapters-1-6
South Australia Biosecurity	http://www.pir.sa.gov.au/biosecuritysa/nrm_biosecurity/weeds_and_pest_animals_links
South Australia Department of Environment and Natural Resources	http://www.environment.sa.gov.au/Plants_Animals/Animal_welfare/Codes_of_practice/Codes_of_practice_for_the_humane_destruction_of_wildlife

Organisation/ Relevant information	Web site
Tasmania Animal Welfare Act	http://www.thelaw.tas.gov.au/tocview/index.w3p;cond=;doc_id=63%2B%2B1993%2BAT%40EN%2B20120302000000;histon=;prompt=;rec=;term=
Tasmania Department of Primary Industries	http://www.dpiw.tas.gov.au/inter.nsf/Home/1?Open
Tasmania's Animal Welfare Standards and Guidelines	http://www.dpiw.tas.gov.au/inter.nsf/WebPages/LBUN-7VR442?open
Victoria Department of Primary Industries	http://www.dpi.vic.gov.au/agriculture/about-agriculture/animal-health-and-welfare/animal-welfare/humane-vertebrate-pest-control
Western Australia – Department of Environment	http://www.dec.wa.gov.au/content/view/6803/1629/
Western Australia COP for capture of feral animals	http://www.agric.wa.gov.au/objtwr/imported_assets/content/pw/ah/welfare/codeofpractice_feralanimals.pdf
Wild harvest of Australian native animals	http://www.environment.gov.au/biodiversity/wildlife-trade/wild-harvest/index.html
Australian and New Zealand Council for the Care of Animals in Research and Teaching (ANZCCART)	http://www.adelaide.edu.au/ANZCCART/resources/
New Zealand National Organisations	
DOC – Animal pest Control course	http://www.doc.govt.nz/getting-involved/get-trained/field-based-courses/animal-pest-control-methods/
1080 the facts	http://www.1080facts.co.nz/1080_research
Agricultural Industry Training Organisation (AgITO) pest control course	http://agito.ac.nz/qualifications/pest-control
Animal Health Board (AHB)	http://www.ahb.org.nz/
DOC – Animal pest SOP's	http://www.doc.govt.nz/publications/science-and-technical/doc-procedures-and-sops/managing-animal-pests/
DOC – Animal pests	http://www.doc.govt.nz/conservation/threats-and-impacts/animal-pests/
DOC – dog handler teams	http://www.doc.govt.nz/publications/science-and-technical/doc-procedures-and-sops/conservation-dog-handler-teams/
DOC – Hunting	http://www.doc.govt.nz/parks-and-recreation/hunting/
Organisation/ Relevant information	**Web site**

DOC – kiwi aversion training for dogs	http://www.savethekiwi.org.nz/dogsandkiwi
Fish and Game New Zealand	http://www.fishandgame.org.nz/environment
MPI	http://www.biosecurity.govt.nz/pests/animals
MPI - Banjo Frog	http://www.biosecurity.govt.nz/pests/banjo-frog
National Possum Control Agencies (NPCA)	http://www.npca.org.nz/index.php/publications
New Zealand Food Safety Authority (NZFSA)	http://www.foodsafety.govt.nz/industry/acvm/vertebrate-toxic-agents/documents.htm
Review of Level of Protection for some wildlife	http://www.beehive.govt.nz/Documents/Files/wildlife%20protection%20discussion%20doc.pdf
The Society for Research of Amphibians and Reptiles in New Zealand (SRARNZ)	http://srarnz.org.nz/Home/SRARNZ_Links.aspx
Vertebrate pest control decision support system	http://pestdss.landcareresearch.co.nz/Home/BestPractice
New Zealand pest control companies	
Animal Control products	http://www.pestoff.co.nz/our-products
Coastal Pest Solutions - bird control	http://www.coastalpestsolutions.co.nz/pest-bird-control
Connovation	http://www.connovation.co.nz/
Kiwicare	http://www.kiwicare.co.nz/pest/products/
Pest Control Research	http://www.pestcontrolresearch.co.nz/research.htm
Pest Management Services (No pests)	http://www.nopests.co.nz/?page_id=1060
Trappers Cyanide	http://www.traps.co.nz/for-sale.asp
The Pest Management Association of New Zealand	http://www.pmanz.co.nz/default.aspx
New Zealand Regional Councils	
Auckland Council	http://www.arc.govt.nz/environment/biosecurity/pest-animals/planning-your-pest-animal-control.cfm
Bay of Plenty Regional Council	http://www.boprc.govt.nz/environment/pests/pest-animals/
Organisation/ Relevant information	**Web site**

Environment Canterbury	http://ecan.govt.nz/advice/your-land/plant-animal-pests/pages/default.aspx
Environment Southland	http://www.es.govt.nz/environment/pests/animals/
Gisborne Regional Council	http://www.gdc.govt.nz/animal-pests/
Greater Wellington Regional Council	http://www.gw.govt.nz/pest-animals-2/
Hawke's Bay Regional Council	http://www.hbrc.govt.nz/WhatWeDo/PestControl/tabid/161/Default.aspx
Horizons Regional Council	http://www.horizons.govt.nz/about-us/publications/managing-our-environment/publications-pest-plants-and-animals-2/
Marlborough District Council	http://www.marlborough.govt.nz/Environment/Biosecurity/Pest-Animals.aspx
Northland Regional Council	http://www.nrc.govt.nz/Environment/Weed-and-pest-control/
Otago Regional Council	http://www.orc.govt.nz/Information-and-Services/Pest-Control/
Peafowl control options - Horizons Regional Council	http://www.envirolink.govt.nz/PageFiles/640/971-HZLC81_Peafowl%20Control.pdf
Taranaki Regional Council	http://www.trc.govt.nz/Pest-animals/
Tasman District Council	http://www.tasman.govt.nz/environment/pests-weeds/pest-animals/
Waikato Regional Council	http://www.waikatoregion.govt.nz/Services/Regional-services/Plant-and-animal-pests/Animal-pests/