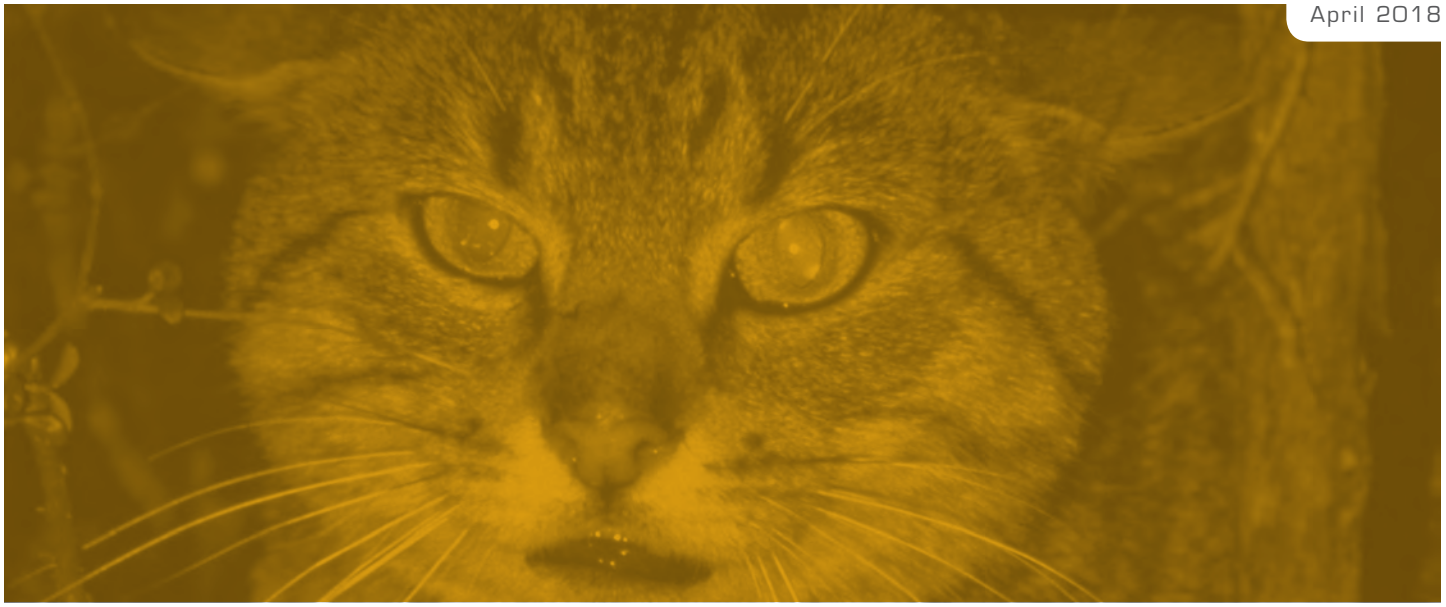
April 2018



A11

FERAL AND STRAY CATS

MONITORING AND CONTROL, A PRELIMINARY GUIDELINE TOWARDS GOOD PRACTICE

PRODUCED BY National Pest Control Agencies

ABOUT NPCA

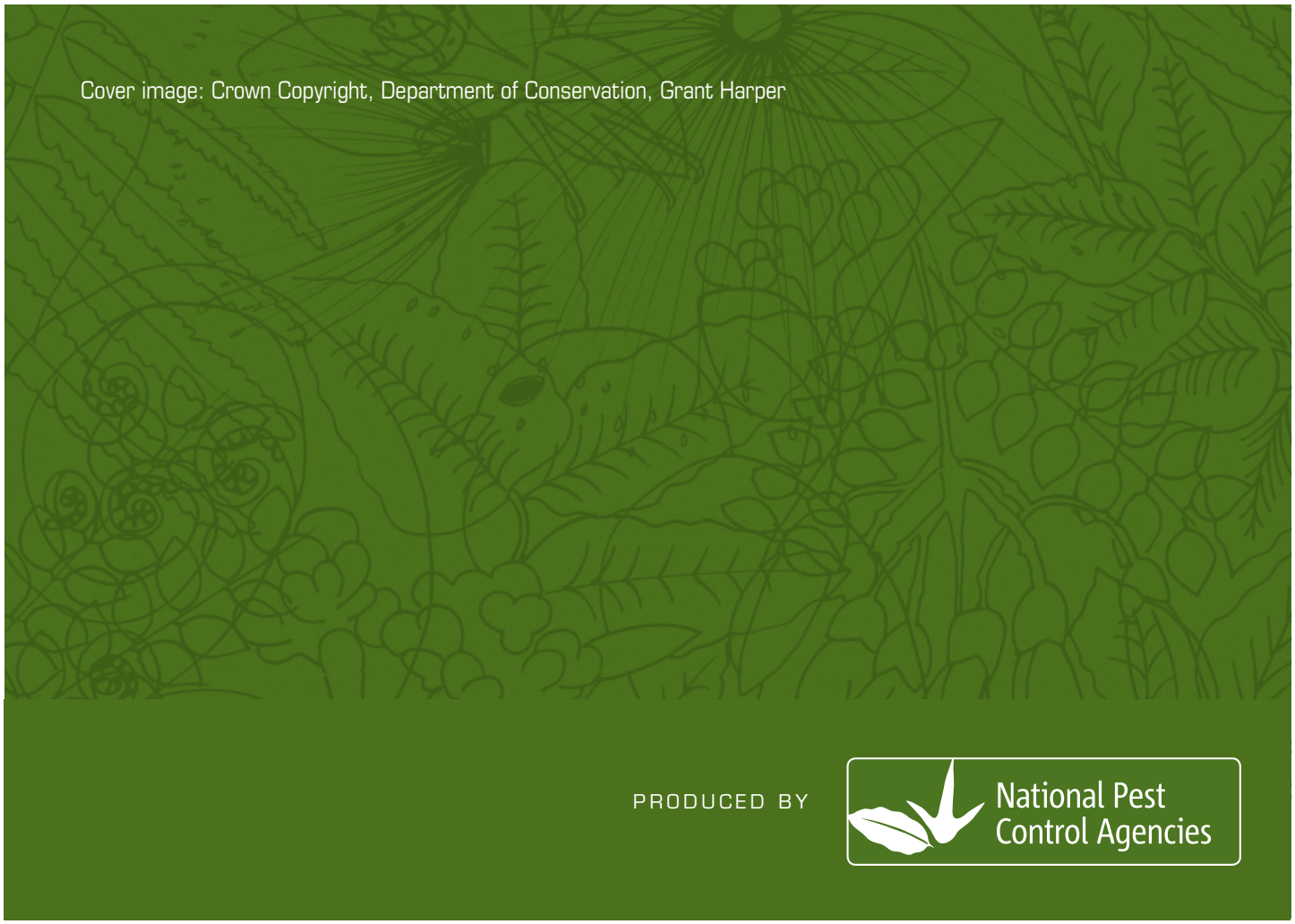
This document was published by NPCA (National Pest Control Agencies) which, until part way through 2018, provided a co-ordinating forum for agencies and stakeholders to address vertebrate animal pest control in New Zealand. In 2018 its role was largely taken over by the Ministry for Primary Industries.

PUBLICATIONS

Most of NPCA's publications on animal pest control were partially updated in April 2018 and transferred to the library section of the Ministry for Primary Industries' 'BioNet' online portal. The updates reflect the transfer and also acknowledge the change in the regulatory regime during 2017 and 2018, while not fully incorporating these changes in the interim, pending further reviews of the publications. Written by experienced practitioners, the main titles cover:

- best practice guidelines on controlling and monitoring vertebrate pests; and
- information about relevant regulations.

The transferred publications can be found at www.bionet.nz/library



Cover image: Crown Copyright, Department of Conservation, Grant Harper

PRODUCED BY National Pest Control Agencies

FERAL AND STRAY CATS

MONITORING AND CONTROL, A PRELIMINARY GUIDELINE TOWARDS GOOD PRACTICE

Published April 2018

National Pest Control Agencies
c/- info@bionet.nz

ISBN: 978-1-877474-87-3

This guide may be updated from time to time, so please check that your version is current by checking the publications section on **www.bionet.nz/library** or contacting info@bionet.nz.

AMENDMENTS IN THIS EDITION

This April 2018 edition has been updated as part of an interim generic review of most NPCA publications. The purpose is twofold.

» Firstly, to reflect the substantial change in the regulatory regime relating to Health and Safety and use of VTAs (Vertebrate Toxic Agents) in the workplace, which now both sit under the Health and Safety at Work Act 2015, and associated regulations.

» Secondly, to change links to other NPCA publications and contact details now that NPCA's publications have been transferred to the BioNet portal, run by the Ministry for Primary Industries.

The full nature of the regulatory changes have NOT been fully captured here, and users are directed to the source legislation and website information provided by the various administering agencies.

This interim review is intended to be followed up more fully in due course.

CONTENTS

PART 1. INTRODUCTION

1.1 Purpose

This guideline was commissioned by the National Pest Control Agencies (NPCA) to provide a background overview of the pest cat problem in New Zealand, with practical guidance on how to monitor feral cat populations, and carry out feral cat control.

The primary audience is field staff and contractors responsible for designing, implementing and monitoring feral cat control programmes. Community groups, land holders and land managers who have a need to manage feral cat populations will also find the document a useful source of practical guidance.

1.1 Scope

This guideline should be considered preliminary. It is a 'living' document that will be periodically reviewed and updated in response to feedback and to the availability of new research findings.

1.2 Layout

The guideline is divided into three parts:

1. **Knowing the feral and stray cat pest.**

   The basic biology and general habits of feral and stray cats are described to provide a basis for determining the nature and timing of monitoring and control. Impacts on primary production and native ecosystems are also discussed.

2. **Monitoring.**

   The techniques to best inform management about the population status of cats in a given area are described and discussed. It is notoriously difficult to obtain a reliable estimate of cat abundance so this section is more an information piece than a specific set of guidelines.

3. **Control.**

   Information and guidelines are provided on approaches for controlling feral and stray cats.

1.3 Acknowledgements

The NPCA would like to acknowledge Shaun Ogilvie, John McIlroy and Charles Eason for their work in creating this preliminary guideline. The Department of Conservation is acknowledged for publishing a number of current best practice information sheets on trapping systems for cats. Alastair Fairweather and Darren Peters are acknowledged for their work in the development of these systems, and for allowing the information sheets for each of the trapping systems to be reproduced at the end of this guideline.

PART 2. KNOWING THE FERAL AND STRAY CAT PEST

2.1 Definitions of Cat Categories Used in This Guideline

Domestic cat. A pet or house cat living in close connection with a household where its requirements are intentionally provided by humans. Domestic cats may still impact on native fauna by their predatory activities, but do not rely on hunting for food. Reproduction is usually manipulated by humans.

Stray cat. This is a cat that relies only partly on humans for provision of its ecological requirements. Stray cats may obtain food or shelter that has been provided intentionally or otherwise by humans. This category includes animals kept on farms for rodent control, dumped animals and cats living in urban fringe situations such as garbage dumps. Reproduction in these populations is not usually manipulated by humans.

Feral cat. This is a free-living cat that has minimal, or no reliance on humans, and which survives and reproduces in self-perpetuating populations.

Individual cats can potentially move between each category during their lifetimes.

2.2 History and Distribution of Cats in New Zealand

Cats (*Felis catus*) were deliberately introduced to New Zealand from 1769 onwards by European explorers. For example, Captain Cook gave two cats to Maori at Tolaga Bay on his first voyage to New Zealand. Other explorers, too, would have gifted or left cats in New Zealand. As ships visiting New Zealand carried cats to control on-board rat and mice infestations, some unintentional release of cats would undoubtedly also have occurred.

However, cats were not recorded as feral until at least 50 years later.[1] Feral cats probably became established in the North Island by the 1830s and in the South Island by the 1840s. By the 1860s they were reported as being numerous in the Canterbury area. After rabbits were introduced, cats spread further when farmers deliberately released them onto their properties to try and control the rabbits. Cats were also introduced to many offshore islands by sealers, whalers, farmers and others. While many of these populations have since died out or been eradicated, feral cats do remain on more than 10 of New Zealand's offshore islands.[2]

Worldwide, cats are kept as pets and to control rodents. They are found across virtually all latitudes, including many islands. Feral populations have often established from domestic pets. Within New Zealand, cats are widespread in the North, South and Stewart Islands. They range from fully feral, to reliant on human settlements for food, to fully domestic (see 2.1, Definitions). They are found living in a range of terrestrial habitats from sand dunes to tussocks, exotic or native forests and scrub, and from sea level to 3000 m.

[1] Gillies and Fitzgerald 2005
[2] Parkes & Murphy 2003

2.3 Physical characteristics

It is thought that the cat was originally domesticated from the African wild cats in Egypt more than 4000 years ago.

Within New Zealand, feral cats tend to fall into one of six distinctive coat patterns: striped tabby (the basic type), blotched tabby, black, grey, ginger and tortoiseshell, and all can have white patches on the body. The most dominant patterns are the two tabby and black coat colours.

Cats have sensitive hearing, being able to hear frequencies up to 65 kHz. They have well-developed night vision (with a green eyeshine). They can see colour in daylight but do not usually respond to colours. The activity patterns of cats ranges from diurnal to nocturnal, depending on season, habitat and the presence of a litter. Some can be active throughout the whole 24 hour period. Some sexual dimorphism is apparent, with female cats weighing around 70-80% of the weight of male cats.

2.4 Home Ranges

The home range of cats depends largely upon three factors – cat density, prey density and habitat type, although other factors can also affect it. Feral cats are usually solitary and sparsely distributed, with measured home ranges in excess of 200 ha. Domestic cats maintain a much smaller home range compared to feral cats. In times of prey scarcity, home range size increases as cats are forced to travel further for food resources. Cats will tolerate some overlap between home ranges, but maintain a core area that will be aggressively defended.

Kin groups will sometimes be established, especially in areas such as farm buildings or food waste dumps. These are often female kin groups, with a single male included or a number of males loosely associated with the group. Young males are driven out of the group as they near sexual maturity. Home range boundaries are marked using scent glands, claw sharpening on particular trees, spraying urine and leaving scats in conspicuous places.

While domestic cats usually bury their scats within their own territory, they often leave them unburied when further afield. More often than not, feral cats also leave their scats unburied, depositing them on clumps of grass or in conspicuous areas along tracks. Scats are usually dark in colour and generally consist of three to six round-to-elongate segments, containing the remains of whatever food has been recently consumed – fur, feathers and bones.

2.5 Food

Cats are well known predators. In mainland New Zealand, where there is a range of (introduced) mammal species present, cats feed predominantly on rabbits and rodents. Birds do make up a part of the diet and reptiles are important prey species at low latitudes. Other species preyed upon include invertebrates, frogs and fish; however, these are less common. Diet depends a lot on the cat's habitat. In forested or agricultural areas rabbits can be a dominant part of the diet, with possums, stoats, hedgehogs and carrion also comprising a small component.

On Stewart Island and offshore islands where prey availability is often limited, cat diet tends to rely heavily on rodents, especially ship rats or kiore rather than Norway rats. Juvenile Norway rats are taken but adults are often left as they can be very aggressive towards

predators. In these island locations, birds make up a much larger component of the diet compared to mainland populations. Seabirds and passerines (perching birds) commonly fall victim to cat predation and the species taken can vary considerably in size. In Central Otago and the McKenzie Basin, lizards and skinks are frequently preyed upon. Invertebrates are also taken, but usually only larger species such as weta, black field crickets and cicadas. Small or juvenile cats often eat more invertebrates and smaller prey, possibly because they have not developed the hunting skills of adult cats.

As well as being expert predators, cats are also opportunistic scavengers and will scavenge dead carcasses. They can contribute to the spread of some livestock diseases. Interestingly, healthy feral cats do not need access to drinking water as they obtain all they require from the prey they eat. However, in times of prey scarcity, or when suckling young, some drinking water is required.

2.6 Reproduction

Sexual maturity is reached at around eight to twelve months of age. The gestation period for cats is typically 65 days. Most kittens are born between spring and autumn and more than one litter per year is common. Feral cats have smaller litters compared to domestic cats, producing a maximum of five kittens, but often not all of these survive. Pregnant and lactating cats are often found from October to April or May, however some cases of pregnant or lactating feral cats found in winter have been recorded.

The kittens of feral cats reach 500g in around five to six weeks. Feral cats keep their kittens in the den where they were born until this weight is attained and then move to temporary dens, staying only a matter of days at each. Thereafter, feral kittens grow much more slowly compared to domestic kittens.

2.7 Population Densities

Population densities of feral cats vary greatly in New Zealand, as elsewhere in the world. Estimates for different habitats in New Zealand range from 0.17 to 5.6 cats per square km.[3]

2.8 Benefits and Negative Impacts on the New Zealand Environment

Feral cats potentially benefit New Zealand as predators on rabbits and rodents. It has been noted in many areas that rabbit and rodent numbers increase dramatically upon cat eradication; conversely, the numbers of these pest species are kept stable and relatively low in the presence of cats.

Apart from this potential benefit to the environment, feral cats mainly cause negative impacts.

Feral cats have been pinpointed as playing key roles in both the local and widespread decline of native birds and, in some cases, their extinction.[4] This effect is particularly evident on islands, one example being the accelerated extinction of the Little Barrier Snipe on Little Barrier Island. They have also played a role in the decline of native lizards and invertebrates,[5] in particular in the Central Otago and McKenzie Basin areas.

---

[3] Gillies and Fitzgerald 2005

[4] Morgan *et al.* 1995, Thomas *et al.* 1998

[5] Thomas *et al.* 1998

Many offshore islands in New Zealand are used in recovery programmes for threatened native bird species; however, the presence of cats, regardless of density, is highly detrimental to this effort. Thus, a large amount of money and effort is spent eradicating cats as well as other introduced mammals from these environments. The cat eradication programme that occurred on Little Barrier Island took over 4 years to remove just 100 cats.[6]

KEY INFORMATION SOURCE

For more detailed information on cats in New Zealand, an invaluable resource is *The Handbook of New Zealand Mammals* 2nd edition (2005) edited by C. King.

[6] Thomas *et al.* 1998

PART 3. MONITORING

IMPORTANT NOTE: It is difficult to obtain a reliable estimate of cat abundance. Therefore, this section is largely an information piece rather than a specific set of guidelines.

3.1 Why Monitor?

As cats are a key predator species in New Zealand, monitoring of feral cat populations is one component of successful cat management. A good monitoring regime can help managers protect native species or restore natural ecosystem equilibrium to an area.

However, monitoring of feral cat populations is not generally common practice in New Zealand and may not always be necessary if suitable alternative approaches are taken. This is reflected in the fact that the Department of Conservation (DoC) doesn't have a cat monitoring protocol. The cat control done by DoC is largely done for the protection of biodiversity, so the success of cat control is measured indirectly through the survival rate and population increase of, for example, native species being protected. As feral cats are a very difficult species to monitor, this approach taken by DoC makes considerable sense.

Monitoring is carried out to provide information for:

a) assessing the need for a cat control programme, and

b) assessing the success of any cat control work undertaken.

The reasons for undertaking cat control and the expected outcomes of such control need to be carefully considered when managing any pest cat population problem. In many cases, the approach taken by DoC, to monitor the survival of species being protected by cat removal, might be a better approach than monitoring the cats directly.

KEY INFORMATION SOURCES

The two references below are useful information sources for feral cat monitoring.

Mitchell, B., Balogh, S. (2007) *Monitoring Techniques for Vertebrate Pests – Cats*. Online at: https://www.pestsmart.org.au/wp-content/uploads/2010/03/Monitoring-techniques-for-vertebrate-pests---cats.pdf

Forsyth, D.M., Robley, A.J., Reddiex, B. (2005) *Review of methods used to estimate the abundance of feral cats.* Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Melbourne.

3.2 How to Approach Monitoring

The objective of monitoring is to measure abundance of the given species. There are two types of abundance measures – absolute and relative.

Absolute abundance is the number of animals estimated to be present, based on direct sighting or trapping of individuals, and is usually expressed as a density i.e. number of animals per area.[7] Unfortunately, absolute abundance estimates can be expensive and may be unnecessary for a lot of pest management decisions.[8] The expensive nature of absolute abundance measurement is particularly heightened for cats, as they are often solitary, can be nocturnal, and also display cryptic behaviour.[9]

Relative abundance measures are therefore more likely to be applicable for cat monitoring. Where sign such as tracks or scats are counted, it gives a relative index of the population density.[10] It is assumed that this index is positively related to cat abundance, for example, more tracks will mean a higher density of cats. However, for non-solitary species a positive relationship may not always be the case and sometimes saturation can be reached (which is when 100% of monitoring devices give a positive result) at high abundances.[11] It is this reason which makes indices of relative abundance more suitable for feral cat monitoring, due to the solitary nature of many cats;[12] meaning saturation of indices by feral cats is less likely.

A range of monitoring methods are summarised below. In Australia, the two most commonly used techniques are track counts and spotlight counts.[13]

It should be noted that there are limitations to all the methods in regards to feral cat behaviour and activity pattern. Therefore, it would be a good idea to use at least two of the methods in combination to give the best chance of reliably estimating population abundance. Each method does have limitations, so careful planning, and knowledge of the survey area and home range of the cats to be surveyed is important. As summed up by Sargent *et al.* (1998), the “secretive habits of most carnivore species and the low density of most carnivore populations preclude accurate, precise, and inexpensive estimation of population size”. Feral cats are no exception.

3.3 Techniques for Monitoring Feral Cat Populations

3.3.1 Spotlight Counts

Spotlight counts are a commonly used method for estimating population density or population size.[14] We would suggest this type of monitoring take place at night, from half an hour after sunset to half an hour before sunrise,[15] as follows:

[7] Schwarz & Seber 1999, Forsyth *et al.* 2005
[8] Warburton *et al.* 2004
[9] Gillies & Fitzgerald 2005
[10] Schwarz & Seber 1999
[11] Forsyth *et al.* 2005
[12] Gillies & Fitzgerald 2005
[13] Forsyth *et al.* 2005
[14] Edwards *et al.* 2000
[15] Mitchell & Balogh 2007

1. Drive a vehicle slowly along a track or a road, with one or two observers using spotlights from either the roof or the tray of the vehicle to see cats.[16]
2. Sweep spotlight arcs of 180° ahead of the vehicle[17] to detect eye shine – cat eye shine is generally green.[18]
3. Upon sighting an animal, stop the vehicle and use binoculars to confirm that it is a cat[19] and estimate the distance from the vehicle.
4. Record sightings. A sample count sheet that can be used with this method is available in Appendix 1.
5. Calculate cat density as the number of individuals spotted per km^2 of area covered with the spotlight.

It is useful to be aware that there are a number of considerations that can influence spotlight counts of feral cats. Activity patterns of feral cats can range from diurnal to nocturnal, depending on weather conditions, season and presence of a litter;[20] thus, spotlighting can miss cats that are not active during the night hours.[21] Animals may not look at the spotlight, and feral cats are not known to follow roads, which is typically the route taken by vehicles when spotlighting.[22] Ability to spot feral cats is affected by terrain and vegetation cover through space and time. Feral cats are relatively small, solitary and sparsely distributed within home ranges[23] and may move away from spotlights.

3.3.2 Track Counts

This monitoring method can be used for any animal that leaves tracks or imprints; however, it is particularly effective for elusive animals such as cats.[24]

1. Establish transects, generally along roads or pathways that can be accessed in any conditions. The transects should ideally cover a large proportion of the area being surveyed.
2. Make sand plots at least every hundred metres along the transects and mark the GPS coordinates of each on a map.
3. To undertake a track count, prepare a plot surface of fine sand or similar material to ensure that any tracks left by cats will have a good chance of being identified. The simplest method is to use sand, either taken to the plot site or similar material already at the site, raked to create a smooth surface. To enhance the likelihood of cat visitation, meat bait can be left in the centre of each plot.
4. Count and record identified cat tracks against each sand plot.
5. Counts should generally be repeated for three consecutive mornings, with the sand being smoothed again after each count.
6. Calculate cat density as the number of individuals tracked per km^2 of area surveyed with the tracking plots.

---

[16] Short *et al.* 1997
[17] Jones & Coman 1982, Ralls & Eberhardt 1997
[18] Jones & Coman 1982
[19] Ralls & Eberhardt 1997
[20] Gillies & Fitzgerald 2005
[21] Edwards *et al.* 2000
[22] Edwards *et al.* 2000
[23] Gillies & Fitzgerald 2005
[24] Mitchell & Balogh 2007

As individual cats can theoretically visit multiple plots, there could be a lot of error around densities estimated using this method. However, the method will be particularly useful for showing large reductions in cat density associated with a control programme, by comparing track counts before and after cat control (as per Part 4 below).

Monitoring using tracking is relatively easy to set up and use, comparatively inexpensive compared with other monitoring methods, ideal for solitary animals such as feral cats, and animal behaviour is not altered by detection.[25] Example cat footprints are shown in Figure1 below. The toe pads are arranged almost in a semicircle in front of the large central pad and claw marks are not usually visible.[26]

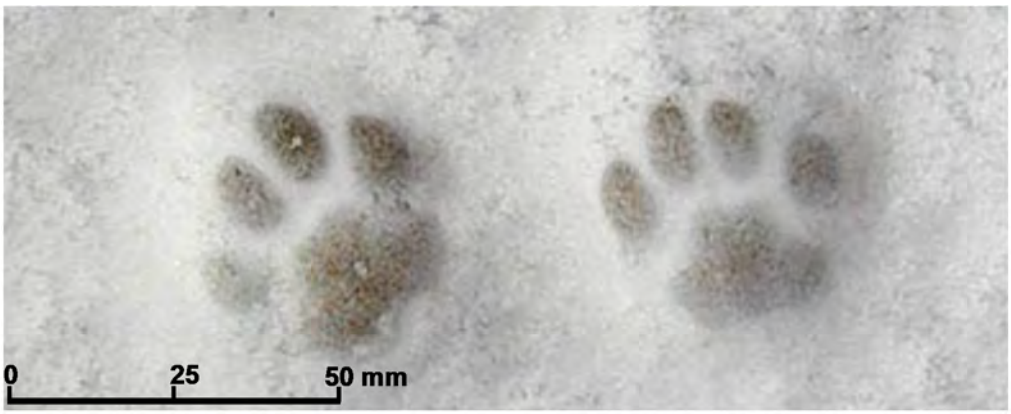


Figure 1. Example cat footprints.

3.3.3 Tracking Tunnels

A variation of the above track count method is the use of tracking tunnels[27] for feral cats. A tunnel typically comprises a wooden or solid base, a tray and a cover. The tray is divided into three compartments – a central compartment that contains an ink pad and paper compartments on either side.[28] The size of the opening at either end of the tunnel needs to be large enough so cats enter, although the size of openings for many tracking tunnels is determined by what non-target species need to be excluded.[29]

The same basic idea follows as for the track counts, whereby:

1. Transects are established as described above.
2. Tunnels are set up at a maximum of 100-metre intervals along the transects. Tunnels are usually baited with meat bait.
3. The species of interest enters the tunnel, crosses over the ink pad and leaves identifiable footprints on the paper.
4. When tunnels are checked, the tracked paper is removed and dated, and new paper is laid in its place.

---

[25] Mitchell & Balogh 2007
[26] Triggs 2004
[27] Domigan & Hughey 2008, Moylan & Hudson 2008
[28] King *et al.* 1994
[29] Domigan & Hughey 2008

5. As with the track count method, counts should be repeated at least three consecutive mornings and the cat density calculated in the same way.

Positioning of the tunnels is an important factor. The open ends of the tunnels should be protected from rain so the paper is not affected and the ink not diluted, as this can affect identification of tracks.

Benefits of this method include the relative ease to set up and use; the low cost, depending on the tunnel type used; and the ability to remove the papers and identify the tracks at a later more convenient time. The method also produces generally good results in relation to the target species.[30]

Drawbacks to using tracking tunnels include the repeated entry of a single individual - a problem that can be exacerbated by baiting[31]- and that the large bulky tunnels are labour-intensive to set up and can require tracks to be cut to set them along.[32]

3.3.4 Live Capture Trapping

Methods for live capture trapping are described in detail in Part 4.3.

1. Transects are established as described above.
2. Capture traps are set up, as described in detail in Part 4.3, at a maximum of 100-metre intervals along the transects.
3. As with the track count method, counts should be repeated at least three consecutive mornings and the cat density calculated in the same way.

3.3.5 Mark-Recapture

The basis of this monitoring method is the capture, unique marking and release, then recapture of individuals.[33] The size of the population (N) can then be estimated from the proportion of marked animals that are recaptured, based on the following formula:

N = CM / R

Where

M = the number of individuals marked in the first capture

C = total number of individuals captured in second capture

R = number of individuals in second capture that are marked

There are various other mark-recapture models available. A relevant discussion can be found in Buckland *et al.* (2000). Some key assumptions must be met:

a) All individuals have equal probability of capture and recapture,

b) Capture does not affect survival rate, and

c) Marks or tags are not lost or overlooked.

---

[30] King *et al.* 1994
[31] King *et al.* 1994
[32] Domigan & Hughey 2008
[33] Buckland *et al.* 2000

A drawback to mark-recapture is the time and labour intensive nature of this method. Also depending on factors such as season, the catch per unit effort can be variable.[34] It has also been noted that cats can be reluctant to enter enclosed spaces.[35] Cats may also be difficult to recapture, which would violate assumption number 1 above.

3.3.6 Scat Counts

Scat counts is another potentially useful monitoring method for feral cats.[36] Scats are collected and identified from size, shape and odour,[37] and much useful information can be obtained about diet.[38] It is non-invasive and does not alter animal behaviour. However, with this method, it can be difficult to find scats and then to confirm that they are cat scats. This method may therefore be most useful if conducted in parallel with another monitoring method, such as identification of species from hair, camera traps or DNA identification from scats.[39]

3.3.7 DNA Analysis

Difficulties arising from reliable scat identification as a population abundance estimator can be overcome using molecular scatology[40] – the extraction and replication of DNA material from cells deposited with the faeces.[41] DNA can also be extracted from hair samples[42] caught on barbed wire[43] or glue patch traps[44] deliberately set for this purpose.

There are a number of advantages to using this method:

- Species, individual and even gender can be unequivocally identified, improving the accuracy of abundance estimates,[45]
- It is a non-invasive method,[46] compared with blood or tissue samples,[47]
- Animals do not need to be observed depositing the scat or hair,[48]
- Comparatively small amounts of DNA are required,[49]
- Setting hair capture traps is quick and easy,[50]

---

[34] Mitchell & Balogh 2007
[35] Forsyth *et al.* 2005
[36] Davison *et al.* 2002
[37] Farrell *et al.* 2000, Davison *et al.* 2002, Triggs 2004
[38] Hansen & Jacobsen 1999
[39] Davison *et al.* 2002
[40] Hansen & Jacobsen 1999, Farrell *et al.* 2000
[41] Davison *et al.* 2002
[42] Mills *et al.* 2000
[43] Mowat & Strobeck 2000
[44] Mowat & Paetkau 2002
[45] Piggott & Taylor 2003
[46] Mitchell & Balogh 2007
[47] Hansen & Jacobsen 1999
[48] Piggott & Taylor 2003
[49] Mowat & Paetkau 2002
[50] Mowat & Strobeck 2000

- Information about diet and even home range can be obtained.[51]

However, scat collection for feral cats is still problematic, as mentioned above. To achieve the best molecular scatology results, fresh scat (less than one week old) are required[52] as after this, degradation occurs,[53] yet age of samples cannot always be controlled. Seasonal differences brought about largely by weather, humidity and rainfall can affect the quality of DNA able to be extracted from faecal collections[54] and DNA material from scats and hair is often of low quantity or quality.[55]

Probably the most important consideration is that DNA analysis is highly technical and, therefore, can be expensive, especially for low quality DNA from scats. Despite all of this, molecular analyses from even degraded DNA can yield useful population monitoring information.

3.3.8 Camera Trapping

A monitoring method that has become more popular in the last decade is camera trapping,[56] where a photograph is taken when an animal triggers a sensor, usually an active or passive infra-red sensor.[57] Camera trapping has not been widely used for population abundance estimates of feral cats,[58] but rather for large game and large wild cats such as snow leopards or tigers.[59] It is now described as a mainstream tool in conservation and ecology, with uses ranging from the discovery of new species to abundance estimation.

Karanth & Nichols (1998) used a capture-recapture model based on being able to identify individuals. By contrast, Carbone *et al.* (2001) suggest that the number of days for a camera to capture a photograph is useful for estimating population density of species which are not individually identifiable. As feral cats tend to be solitary, often nocturnal and sometimes cryptic in their behaviour,[60] and individuals are not always identifiable, the use of indirect abundance estimates, such as camera trapping, can be useful - particularly in conjunction with another indirect monitoring method such as track counts, as behaviour and activity patterns are unlikely to be disturbed by these indirect methods.

Care needs to be taken in the design and set-up of camera trap monitoring, and a pilot study can be invaluable. A key assumption made when carrying out camera trapping is that all animals have the same probability of being captured, especially when using a capture-recapture technique. Thus, grid sizes must be set to encompass the smallest home range size, to avoid gaps in the data collected.[61] Social structure of cat populations in the survey area needs to be considered, as feral cats can aggressively defend their territory or, alternatively, have loosely associated kin groups.[62] Knowledge of the terrain, vegetation cover, the camera field of view and flash strength, weather conditions and length of battery

---

[51] Piggott & Taylor 2003
[52] Piggott 2004
[53] Davison *et al.* 2000
[54] Piggott 2004
[55] Piggott & Taylor 2003
[56] Rowcliffe & Carbone, 2008
[57] Jackson *et al.* 2005
[58] Forsyth *et al.* 2005
[59] Karanth & Nichols 1998
[60] Gillies & Fitzgerald 2005
[61] Jackson *et al.* 2005
[62] Gillies & Fitzgerald 2005

life, are amongst the factors that need to be known prior to setting up a monitoring study. Nevertheless, if these factors are worked out, it appears that camera trapping could be a highly useful tool for monitoring population abundance of feral cats.

There are an increasingly large number of commercial camera traps now available, often sold as wildlife monitoring devices for monitoring game animal species such as deer. A search of the internet will quickly elucidate potential sources and pricings.

3.3.9 Bait-Take

This method involves relating the amount of bait (usually non-toxic) taken in a set study area to abundance of feral cats. This gives an index of relative abundance.[63] This method can also be used when a toxic baiting operation has occurred to give an estimate of kill success.[64] For example when toxic bait take reduces to near zero, it is assumed that most of the cats have been removed.

There are some problems when using bait-take as a relative abundance index. Some animals are known to cache bait, giving an overestimation of population abundance.[65] In the case of feral cats, bait may be taken to feed young cats. Burrows *et al.* (2003) used cyanide transects to estimate relative abundance of feral cats in the Gibson Desert, Western Australia. They found that bait-take by feral cats was largely influenced by season and prey availability, making it an unreliable technique.

Problems can also be encountered when species other than cats take bait,[66] again reducing reliability of this method. Animals can learn behaviours related to baits, potentially avoiding taking bait or, conversely, seeing it as an “easy” food source. Animals may take more bait per individual than is anticipated, artificially inflating estimates of population abundance and, again, decreasing reliability. Bait-take as a method for estimating feral cat population abundance does not appear to be particularly robust or reliable.

[63] Forsyth *et al.* 2005
[64] Burrows *et al.* 2003
[65] Van Polanen Petel *et al.* 2001
[66] Forsyth *et al.* 2005

PART 4. CONTROL

4.1 How to Approach Feral Cat Control

The toolbox of techniques for controlling stray cat populations is quite limited.

To ensure a successful outcome, a number of factors are important when planning feral cat control.

- Knowledge of the cat population and whether it is predominantly a scavenging or hunting population can influence the success of certain control methods, as can density of cats at a site, and trapping effort.[67]
- Seasonal fluctuations in weather and prey abundance and, therefore, cat hunger are also important;[68] if prey is abundant, food lures may not be effective, decreasing the success of control.

Previous research[69] has shown that trapability of feral cats varies depending on whether the population being targeted is predominantly a scavenging or hunting population. Short *et al.* (2002) found that scavenging cats, i.e. those around rubbish tips, towns, workshops or associated with human dwellings, were easier to catch using cage traps compared to cats living and hunting in the bush. Leg-hold traps may be more effective for control of hard-to-catch cats than cage traps.[70]

Season is an important consideration when trapping feral cats. Molsher (2001) found higher trapping rates occurred in late autumn to early winter, whereas Short *et al.* (2002) found captures were highest in the first half of the year. Weather is obviously related to season and periods of poor weather can result in poor cat catches.

4.2 Techniques for Control of Feral Cats

A number of techniques are documented as having been used for feral cat management. These include:

- cage traps,[71]
- leg-hold traps,[72]
- exclusion fencing,[73]
- shooting,
- dogging with shooting, and
- the use of toxins, specifically 1080, within New Zealand. PAPP is more recently also available for feral cat control.

---

[67] Short *et al.* 2002
[68] Keedwell & Brown 2001
[69] Short *et al.* 2002
[70] Sharp & Saunders 2004b
[71] Veitch 2001, Sharp & Saunders 2004a
[72] Veitch 2001, Sharp & Saunders 2004b
[73] Sharp & Saunders 2004b

Here, we give guidelines for the use of capture traps and kill traps as these are currently the most commonly used methods for controlling feral cat populations. These methods can be enhanced with lures, such as food, olfactory or social scents, and visual lures.[74]

4.3 Capture Traps

Capture traps usually capture animals live and can be divided into two broad categories, leg-hold traps and cage traps. Both types of capture traps are in common use for management of feral and stray cats in New Zealand.

The Animal Welfare Act 1999 requires that traps be checked daily within 12 hours of sunrise as follows[75].

36 Obligation to inspect traps

(1) A person who, for the purpose of capturing alive a mammal, bird, reptile, or amphibian, sets a trap or causes a trap to be set must inspect that trap, or cause a competent person to inspect that trap, within 12 hours after sunrise on each day the trap remains set, beginning on the day immediately after the day on which the trap is set.

(2) A person who, for the purpose of capturing alive a mammal, bird, reptile, or amphibian, sets a trap or causes a trap to be set must –

(a) remove, or cause to be removed, any live animal found in that trap; or

(b) attend properly to the care of any such animal or, without delay, kill the animal.

Leg-hold traps have further restrictions described in the Animal Welfare (leg-hold traps) Order 2007 as follows.

8 Restriction on use in certain areas of all leg-hold traps from 1 January 2008

Unless the use of the trap is pursuant to and in accordance with the conditions of an approval given under clause 10, no person may use a leg-hold trap —

(a) within 150 metres of any dwellinghouse (but excluding a hut on public conservation land) without the express permission of the occupier; or

(b) in any area where there is a probable risk of catching a companion animal.

4.3.1 Leg-hold Traps

Restricted traps should not be used (Animal Welfare (leg-hold traps) Order 2007). Either No. 1 unpadded jaw or 1.5 soft catch traps coil spring traps are suitable. Supplier information for these traps can be found in Appendix 2, DOC Feral Cat Restraining System 1.

A length of elastic ‘bungy’ cord may be incorporated into the anchor chain () to act as a shock absorber to reduce the likelihood of the animal dislocating or fracturing its leg when caught.

---

[74] Molsher 2001, Short *et al.* 2002

[75] This is the wording passed in the May 2015 amendment.

The three basic variations in the way that coil spring traps can be set are described and illustrated in Appendix 2. They are:

- blind set
- double walk-through set
- set in a specially-designed tunnel such as the Scott Theobold (ST) Chimney Tunnel.

A key factor when deciding which set type to use is the likely capture of valuable non-target species. For example, the ST Chimney Tunnel would be a prudent choice in areas where kiwi are known to be present.

4.3.2 Cage Traps

Cage traps are the preferred technique for use in urban/residential areas because:

- fewer injuries are likely to result compared to leg-hold traps
- if domestic cats are trapped, they can be released unharmed
- if required, trapped feral cats can be transported away from the area to be destroyed humanely
- the Animal Welfare (leg-hold traps) Order 2007 requirements make leg-hold trapping in urban areas impractical.

Cage traps are generally made of wire mesh and have a trigger device that closes the entrance of the trap when activated by the entry of a cat. Cats are notably cautious about entering enclosed spaces, therefore a trap size suitable for cats should be selected. While there are a number of trap types commercially available, here we describe using the Havahart Model 1089 cage trap.

Supplier information and detailed instructions and illustrations for using this capture trap can be found in Appendix 3, DOC Restraining System 2 at the back of this guideline.

Identifying Captured Cats as Feral

It is important that captured cats are correctly identified as feral, especially if conducting a control operation in an urban or residential area where domestic cats are present.

- *Presence of collar*. Firstly check for a collar and any attached tags that could indicate the animal is a domestic pet.
- *Behaviour*. Cats can become very distressed and aggressive when caged, even domestic pets, although this behaviour may be more extreme in a feral cat, and domestics can be comparatively easy to handle.
- *Physical form*. In the absence of collars, and when aggressive distressed behaviour is being displayed, there are some differences in physical form between feral and domestic cats. Feral cats in good physical condition have overall increased muscle development, being especially noticeable around the head, neck and shoulder region. They are predominantly short-haired, with coat colour ranging across all of those seen for domestic cats – ginger, tortoise shell, black, grey and tabby – and, while some white markings may be present, for example on the paws or chest, completely white feral cats are very rare.

If conducting a control operation in an urban or residential area, it is advisable to notify the public and ask owners to keep domestic cats indoors during times when the cages will be open, i.e. overnight, to reduce the chance of capturing a domestic cat.

4.4 Kill Traps

Kill traps are trapping systems where a cat is lured to a meat bait and then triggers the trap, which closes over its neck, killing it by occlusion of the carotid arteries. Kill traps have the advantages of not needing to be checked daily and despatching the animal quickly. They should only be used in situations where it is unlikely that domestic cats would be trapped.

There are a number of commercially available kill traps. The following three types of trapping systems are described in the appendices:

- Belisle Super X 220 trap in an ST-type chimney tunnel.
- Elevated Steve Allen SS cat trap with an access ramp.
- Elevated Timms trap with an access ramp.

Each of these kill trapping systems has passed draft National Animal Welfare Advisory Committee (NAWAC) standards for humane kill of feral cats. Each system has also been specifically designed to reduce the likelihood of non-target kills.

Supplier information and detailed instructions and illustrations for using each of these kill trap systems can be found in Appendices 4, 5 and 6 at the back of this guideline.

4.5 A Note on Toxins

Two toxins exist for feral cat control in New Zealand.

1. **0.1% 1080 Feral Cat Bait: (Animal Control Products)**
   * A fish meal/polymer pellet for use by the Department of Conservation only. Controlled Substances License (CSL) required.
2. PredaSTOP for feral cats (PAPP). CSL required. Despite limited industry experience with this product, the performance standard sheet (DOC) provides some guidance on good practice http://www.doc.govt.nz/get-involved/run-a-project/our-procedures-and-sops/managing-animal-pests/abridged-status-list/ .

Toxin use subject to label requirements and other applicable legislation. For more information refer the WorkSafe www.worksafe.govt.nz

4.5.1 Health and Safety Considerations

Health and safety of operators should be an important consideration. Handling of caged cats can be dangerous and appropriate protective equipment should be worn i.e. heavy leather gloves, and appropriate equipment used i.e. a catching pole. All operators should have up-to-date tetanus immunisation in case of bites or scratches. Cats can carry other diseases which are transmittable to humans, such as ringworm or toxoplasmosis. Hands should be thoroughly washed after any handling of cats, carcasses or associated equipment.

For more information refer the WorkSafe www.worksafe.govt.nz

REFERENCES CITED

Buckland, S.T., Goudie I.B.J., Borchers D.L. (2000). Wildlife population assessment: Past developments and future directions. Biometrics 56: 1 – 12.

Burrows, N.D., Algar, D., Robinson, A.D., Sinagra, J., Ward B., Lidelow, G. (2003). Controlling introduced predators in the Gibson Desert of Western Australia. Journal of Arid Environments 55: 691 – 713.

Davison, A., Birks, J.D.S., Brookes, R.C., Braithwaite, T.C., Messenger, J.E. (2002). On the origin of faeces: morphological versus molecular methods for surveying rare carnivores from their scats. Journal of Zoology, London 257.

Domigan, I.R., Hughey, K.F.D. (2008). Trapping tunnel design incorporating behavioural preferences of stoats. New Zealand Journal of Zoology 35: 243 – 250.

Edwards, G.P., de Preu, N.D., Shakeshaft, B.J. and Crealy, I.V. (2000). An evaluation of two methods of assessing feral cat and dingo abundance in Central Australia. Wildlife Research 27: 143–149.

Farrell, L.E. Roman, J., Sunquist, M.E. (2000). Dietary separation of sympatric carnivores identified by molecular analysis of scats. Molecular Ecology 9: 1583 – 1590.

Forsyth, D.M., Robley, A.J., Reddiex, B. (2005). Review of methods used to estimate the abundance of feral cats. Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Melbourne.

Gillies, C., Fitzgerald, M.B. (2005). Feral cat. Pages 308-326 in King, C. M., editor. The Handbook of New Zealand Mammals. Oxford University Press, Melbourne.

Hansen, M.M., Jacobsen, L. (1999). Identification of mustelid species: otter (*Lutra lutra*), American mink (*Mustela vison*) and polecat (*Mustela putorius*), by analysis of DNA from faecal samples. Journal of Zoology 247: 177 – 181.

Jackson, R.M., Roe, J.D., Wangchuk, R., Don O., Hunter. D.O. (2005). Surveying Snow Leopard Populations with Emphasis on Camera Trapping: A Handbook. The Snow Leopard Conservancy, Sonoma, California, 73pp.

Jones, E., Coman, B.J. (1982). Ecology of the feral cat, *Felis catus* (L.), in South-East. Australian Wildlife Research 9: 409–420.

Karanth, K.U., Nichols, J.D. (1998). Estimation of tiger densities in India using photographic captures and recaptures. Ecology 79: 2852–2862.

Keedwell, R. J., Brown, K. P. (2001). Relative abundance of mammalian predators in the upper Waitaki Basin, South Island, New Zealand. New Zealand Journal of Zoology 28:31–38.

King, C.M., O'Donnell, C.F.J., Phillipson, S.M. (1994). Monitoring and control of mustelids on conservation lands Part 2. Field and workshop guide. Department of Conservation Technical Series No. 4. Wellington, New Zealand.

King, C.M. (2005). The Handbook of New Zealand Mammals 2nd edition edited by C. M. King. Oxford University Press. ISBN 0195584775. 630pp.

Mitchell, B., Balogh, S. (2007). Monitoring techniques for vertebrate pests. Feral cats. NSW Department of Primary Industries and Bureau of Rural Sciences, Natural Heritage Trust.

Mills, L.S., Citta, J.J., Lair, K.P., Schwartz, M.K., Tallmon, D.A. (2000). Estimating animal abundance using non-invasive DNA sampling: promise and pitfalls. Ecological Applications 10: 283–294.

Molsher, R.L. (2001). Trapping and demographics of feral cats (*Felis catus*) in Central New South Wales. Wildlife Research 28: 631–636.

Morgan, D.R., Eason, C.T., Hough, S.J., Ryan, C. (1995). The development of a toxic bait and baiting strategy for feral cats. DoC Research & Development Series 209, 34-41.

Mowat, G., Paetkau, D. (2002). Estimating marten (*Martes Americana*) population size using hair capture and genetic tagging. Wildlife Biology 8: 201–209.

Mowat, G., Strobeck, C. (2000). Estimating population size of grizzly bears using hair capture, DNA profiling and mark-recapture analysis. Journal of Wildlife Management 64: 183–193.

Parkes, J., Murphy E. (2003). Management of introduced mammals in New Zealand. New Zealand Journal of Zoology 30, 335–359.

Piggott, M.P. (2004). Effect of sample age and season of collection on the reliability of microsatellite genotyping of faecal DNA. Wildlife Research 31: 485–493.

Piggott, M.P., Taylor, A.C. (2003). Remote collection of animal DNA and its applications in conservation management and understanding the population biology of rare and cryptic species. Wildlife Research 30: 1–13.

Ralls, K., Eberhardt, L.L. (1997). Assessment of abundance of San Joaquin kit foxes by spotlight surveys. Journal of Mammalogy 78(1): 65 – 73.

Rowcliffe, J.M., Carbone, C. (2008). Surveys using camera traps: are we looking to a brighter future? Animal Conservation 11: 185-186.

Sargent, G.A., Johnson, D.H., Berg, W.E. (1998). Interpreting carnivore scent-station surveys. Journal of Wildlife Management 62(4) 1235 – 1245.

Schwarz, C.J., Seber, G.A.F. (1999) Estimating animal abundance: review iii. Statistical Science 14: 427–456.

Sharp, T. and Saunders, G. (2004a). Trapping of feral cats using cage traps. Standard Operating Procedure CAT002-1 - Humane pest animal control, NSW Department of Primary Industries, Orange, NSW, Australia.

Sharp, T. and Saunders, G. (2004b). Trapping of feral cats using padded-jaw traps. Standard Operating Procedure CAT003-1 - Humane pest animal control, NSW Department of Primary Industries, Orange, NSW, Australia.

Short, J., Turner, B., Risbey, D. (2002). Control of feral cats for nature conservation. iii. Trapping. Wildlife Research 29: 475–487.

Short, J., Turner, B., Risbey, D.A. and Carnamah, R. (1997). Control of feral cats for nature conservation. ii. Population reduction by poisoning. Wildlife Research 24: 703–714.

Thomas M., Wright D.A., Mason J.R., Briden K.W. (1998). Use of bait stations for possum and feral cat control. DoC Science for Conservation 86, 22.

Triggs, B. (2004). Tracks, scats and other traces – a field guide to Australian Mammals. Oxford University Press. ISBN 0195550994. 340pp.

Warburton, B., Barker, R., Coleman, M. (2004). Evaluation of two relative abundance indices to monitor brushtail possums in New Zealand. Wildlife Research 31, 397-401.

Additional Useful References

Allen, L., Engeman, R., Krupa H. (1996). Evaluation of three relative abundance indices for assessing dingo populations. Wildlife Research 23: 197 – 206.

Anderson, D. R. (2001). The need to get the basics right in wildlife field studies. Wildlife Society Bulletin 29: 1294–1297.

Bider, J. R. (1968). Animal activity in uncontrolled terrestrial communities as determined by a sand transect technique. Ecological Monographs 38: 269–308.

Buckland, S.T., Anderson, D.R., Burnham, K.P., Laake, J.L. (1993). Distance Sampling: Estimating Abundance of Biological Populations. Chapman and Hall, London.

Carbone, C., Christie, S., Conforti, K., Coulson, T. (2001). The use of photographic rates to estimate densities of tigers and other cryptic mammals. Animal Conservation 4: 75–79.

Clapperton, B.K., Eason, C.T., Weston, R.J., Woolhouse, A.D., Morgan, D.R. (1994). Development and testing of attractants for feral cats, *Felis catus* L. Wildlife Research 21: 389–399.

Dickman, C.R. (1996). Overview of the impacts of feral cats on Australian native fauna. Australian Nature Conservation Agency.

D'Eon, R.G., Serrouya, R., Smith, G., Kochanny, C.O. (2002). GPS Radiotelemetry error and bias in mountainous terrain. Wildlife Society Bulletin 30(2): 430 – 439.

Di Orio, A.P., Callas, R., Schaefer, R.J. (2003). Performance of two GPS telemetry collars under different habitat conditions. Wildlife Society Bulletin 31: 372–379.

Diefenbach, D.R., Conroy, M.J., Warren, R.J., James, W.E., Baker, L.A., Hon, T. (1994). A test of the scent-station survey technique for bobcats. Journal of Wildlife Management 58: 10–17.

Edwards, G.P., Piddington, K.C., Paltridge, R.M. (1997). Field evaluation of olfactory lures for feral cats (*Felis catus*) in Central Australia. Wildlife Research 24: 173–183.

Lyver P. (2000). Identifying mammalian predators from bite marks: a tool for focusing on wildlife protection. Mammal Review 30: 31 – 44.

Meek, P.D., Jenkins, D.J., Morris, B., Ardler, A.J., Hawksby, R.J. (1995). Use of two humane leg-hold traps for catching pest species. Wildlife Research 22: 733–739. 25.

Moylan, S., Hudson, M. (2008). Rodent and mustelid monitoring for Otari Wiltons Bush. October 2007 and January 2008 monitors. Greater Wellington Regional Council 15 pp.

Risbey, D.A., Calver, M., Short, J. (1997,) Control of feral cats for nature conservation. I. Field tests of four baiting methods. Wildlife Research 24: 319–326.

Stander, P.E. (1998), Spoor counts as indices of large carnivore populations: the relationship between spoor frequency, sampling effort and true density. Journal of Applied Ecology 35: 378–385.

Thomas, M.D. (1999). Feasibility of using wax-blocks to measure rodent and possum abundance and changes in population size. Science for Conservation 127C: 39 – 48.

Thomas, M.D., Brown, J.A., Maddigan, F.W., Sessions, L.A. (2003). Comparison of trap-catch and bait interference methods for estimating possum densities. New Zealand Plant Protection Society 56: 81 – 85.

Twyford, K.L., Humphrey, P.G., Nunn, R.P., Willoughby, L. (2000). Eradication of feral cats (*Felis catus*) from Gabo Island, south-east Victoria. Ecological Management and Restoration 1: 42–49.

Van Dyke, F.G., Brocke, R.H., Shaw, H.G. (1986). Use of road track counts as indices of mountain lion presence. Journal of Wildlife Management 50: 102–109.

Van Polanen Petel A.M., Marks, C.A., Morgan D.G. (2001). Bait palatability influences the caching behaviour of the red fox (*Vulpes vulpes*). Wildlife Research 28: 395 – 401.

Veitch, C.R. (2001). The eradication of feral cats (*Felis catus*) from Little Barrier Island, New Zealand. New Zealand Journal of Zoology 28:1:1-12.

Warburton, B., Poutu, N. (2002). Effectiveness of three trapping systems for killing feral cats. DOC Science Internal Series 50, Department of Conservation, Wellington, NZ.

Warburton, B., Poutu, N. (2003). Evaluation of the effectiveness of the Belisle Super X220 for killing feral cats. Landcare Research Contract Report LC0304/039, Landcare Research Ltd., Lincoln, NZ.

Warburton, B., Poutu, N., Domigan, I. (2002). Effectiveness of Timms traps for killing feral cats. Landcare Research Contract Report LC0203/008, Landcare Research Ltd., Lincoln, NZ.

APPENDIX 1. EXAMPLE COUNT SHEET FOR SPOTLIGHTING

Date:		Site:	Page: of
Start time:		Start Odometer:	Observer:
Finish time:		Finish Odometer:	Driver:
Spotlight power (Volts, Watts):		Position: Roof-mounted Sitting hand-held	
Temperature ºC:		Wind: nil light medium strong	Direction:
Cloud cover %:		Moon visibility: 0 1/4 1/2 3/4 Full	
Last rain: >week ago this week yesterday today now			
Transect section	**Cat (Y/N)**	**Distance from vehicle (m)**	**Comments**

APPENDIX 2. DOC FERAL CAT RESTRAINING TRAP SYSTEM 1

The *DOC Feral Cat Restraining Trap System 1* best practice information sheet is reproduced on the following pages courtesy of the copyright holder, Department of Conservation

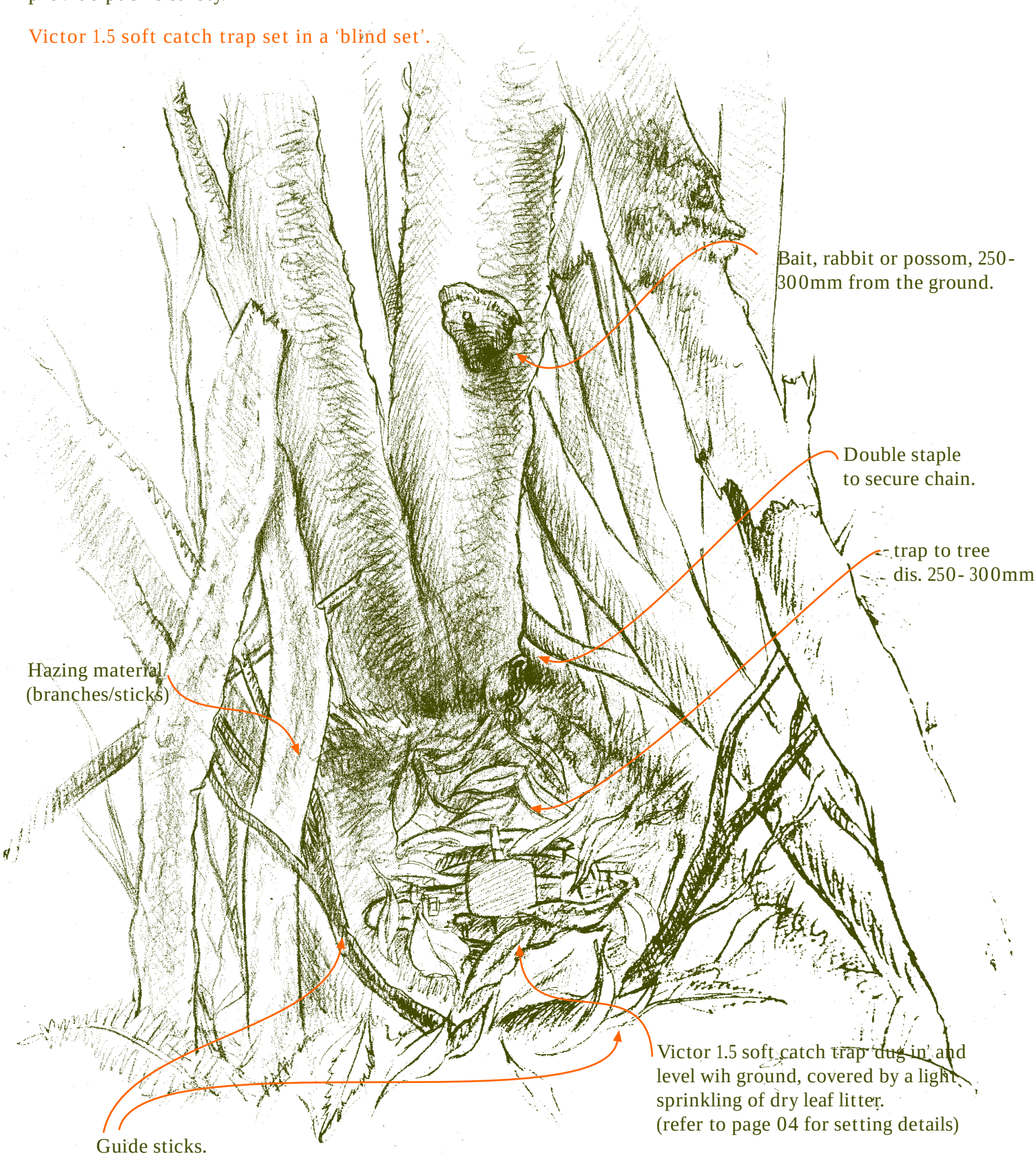
PREDATOR TRAPS
Doc series trapping systems

Current Best Practice
Feral Cat Restraining Trap System 1

Department of Conservation
Te Papa Atawhai

These Department of Conservation 'current best practice' set designs, must be used with Victor 1.5 soft catch traps.
These sets are designed to exclude non target species, guide target species and provide public safety.

Victor 1.5 soft catch trap set in a 'blind set'.

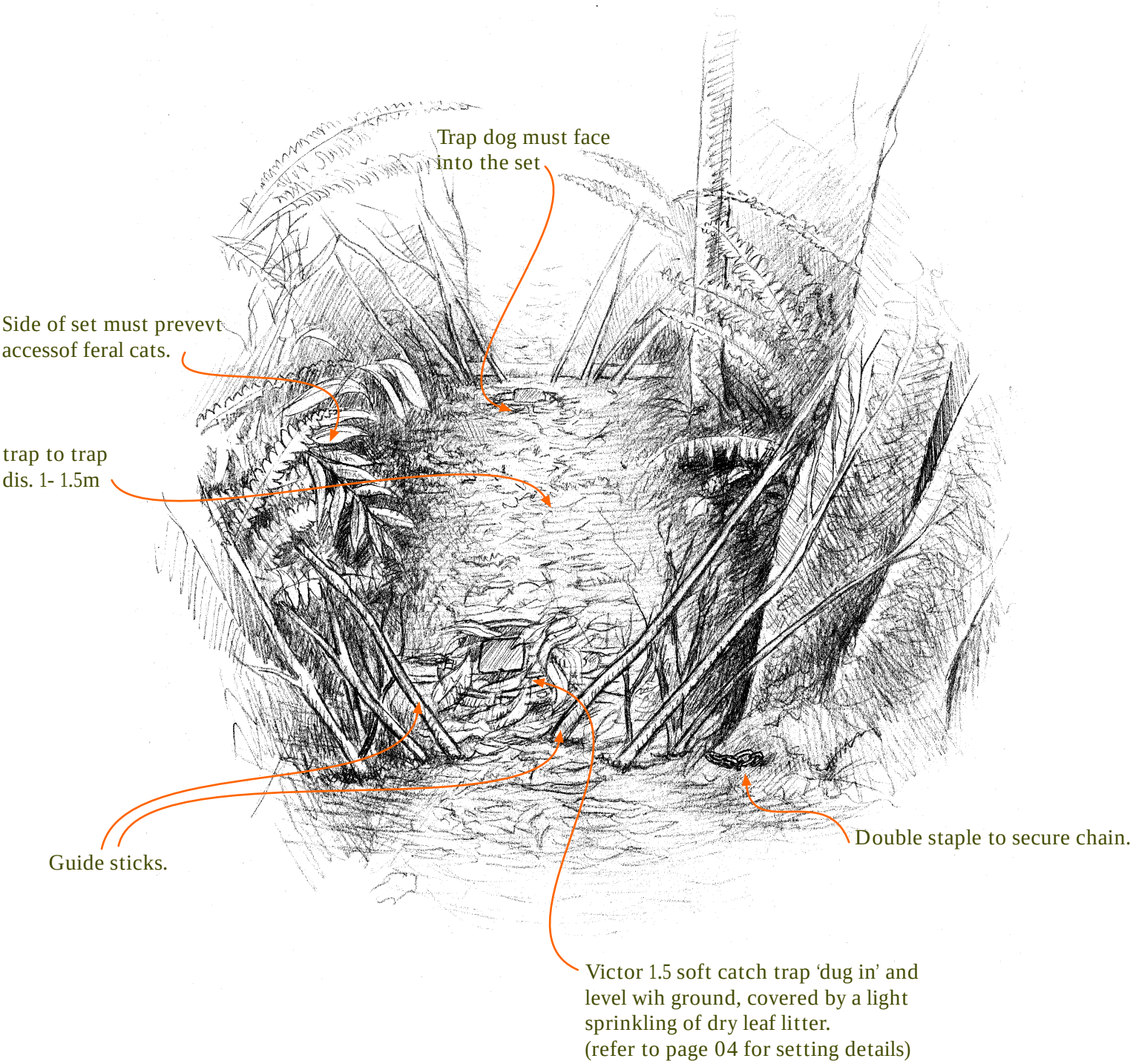


Drawings: Phil Waddington

Current Best Practice
Feral Cat Restraing Trap System 1

Department of Conservation
Te Papa Atawhai

Victor 1.5 soft catch traps set in a 'double walk-through set'.

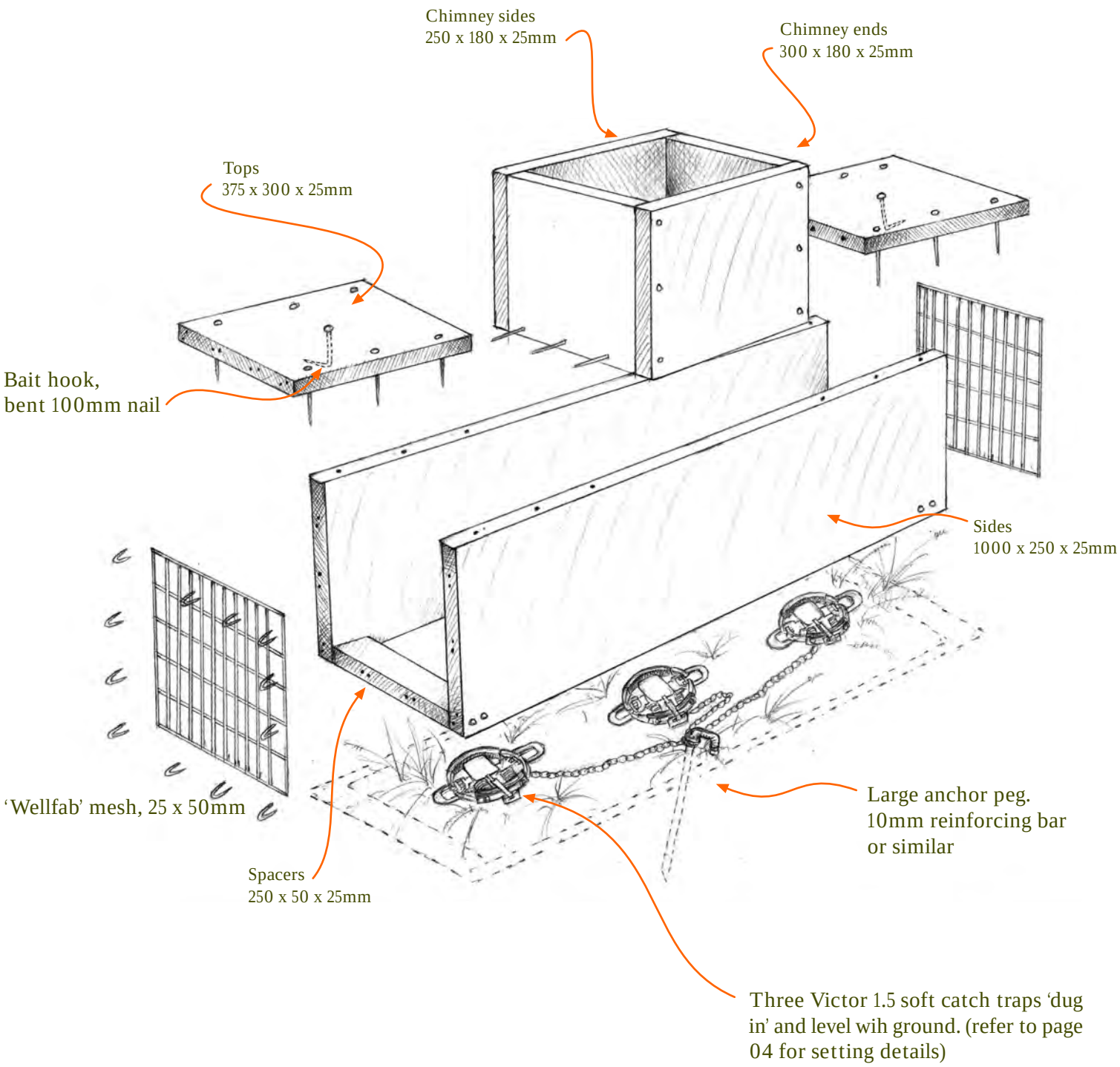


Drawings: Phil Waddington

Current Best Practice
Feral Cat Restraing Trap System 1

Department of Conservation
Te Papa Atawhai

Scott Theobold (ST) 'chimney' tunnel for three Victor 1.5 soft catch traps.



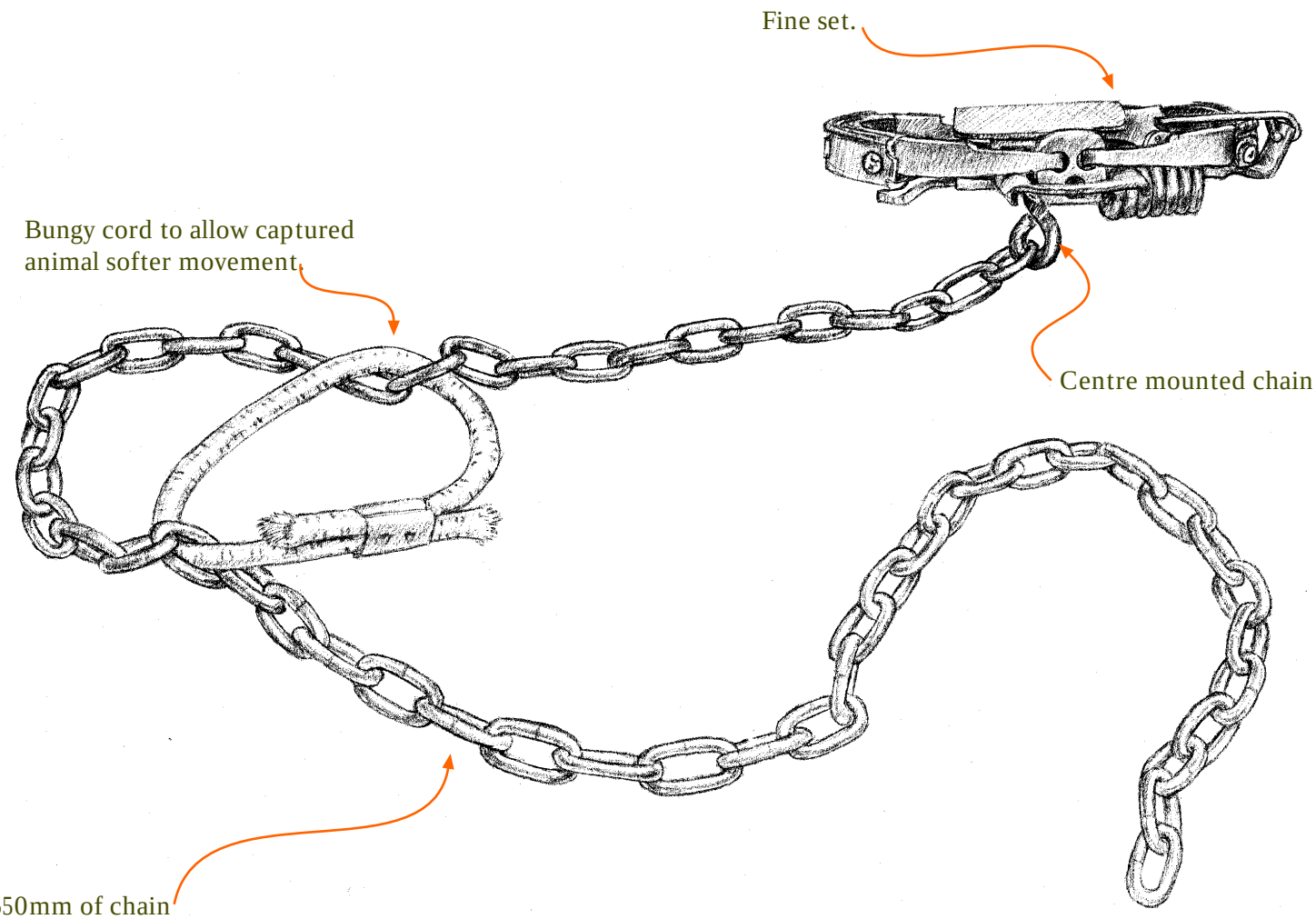
Drawings: Phil Waddington

Current Best Practice
Feral Cat Restraining Trap System 1

Department of Conservation
Te Papa Atawhai

Victor 1.5 soft catch trap: Setting details.

All Victor 1.5 soft catch traps must be configured in the way shown here to meet DOC current best practice.



Drawings: Phil Waddington

PREDATOR TRAPS
Doc series trapping systems

Trap Purchase/ Information

Department of Conservation
Te Papa Atawhai

Trap Purchase

Victor 1.5 soft catch traps are available in New Zealand from:

MS Woodcraft Ltd.
128 Marine Pde Mt Maunganui,
Tauranga
T| 07 575 5920 F| 07 574 8910

Pest Management Services
T| 0800 111 nopest F| 04 293 1456
E| general@nopest.co.nz
A| P.O. Box 121 Waikanae.
Kapiti 6454, N.Z

Wood Tunnel Purchase

Wood tunnels can be purchased from:

Haines Pallet Co. Ltd.
T| 04 568 6898 F| 04 5686480
E| haines.pallets@paradise.net.nz
A| 111 Hutt Park Road, Seaview.

Advice and contacts

Predator control advice, trap development contacts and feedback.

Alastair Fairweather
Department of Conservation
Animal and Plant Pests
Research Development & Improvement
T| 07 8580013 F| 07 858 0001
E| afairweather@doc.govt.nz
A| 1st Floor
Vero House
127 Alexandra Street,
PO Box 112
Hamilton

Darren Peters
Department of Conservation
National Predator Control
Research Development & Improvement
T| 04 471 3256 F| 04 471 3279
E| dpeters@doc.govt.nz
A| P.O. Box 10-420
65 Victoria Street
Wellington.

APPENDIX 3. DOC FERAL CAT RESTRAINING TRAP SYSTEM 2

The *DOC Feral Cat Restraining Trap System 2* best practice information sheet is reproduced on the following pages courtesy of the copyright holder, Department of Conservation

PREDATOR TRAPS
Doc series trapping systems

Current Best Practice
Feral Cat Restraining Trap System 2

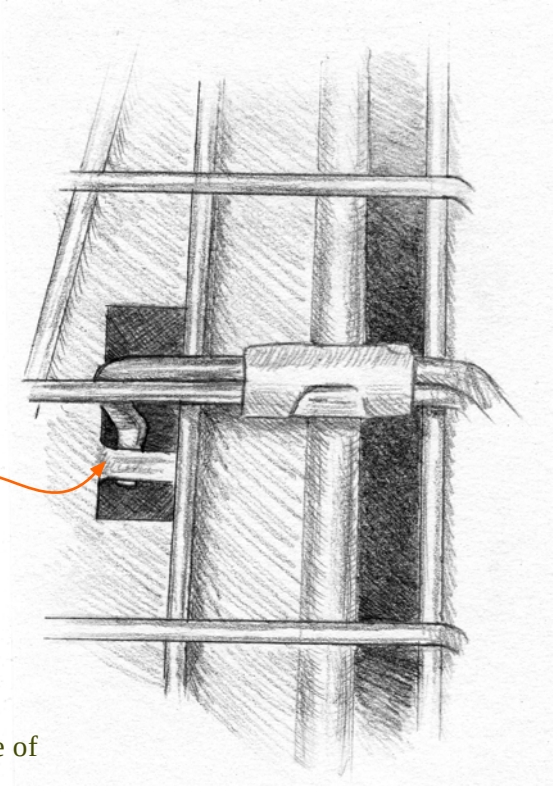
Department of Conservation
Te Papa Atawhai

This Department of Conservation 'current best practice' set design, must be used with Havahart model 1089 cage traps.
This set is designed to exclude non target species, guide target species and provide public safety.
These setting instructions must be followed to meet these standards.

Step one
Bait trap as shown in diagram.

Step two
Site and peg trap firmly to ground.

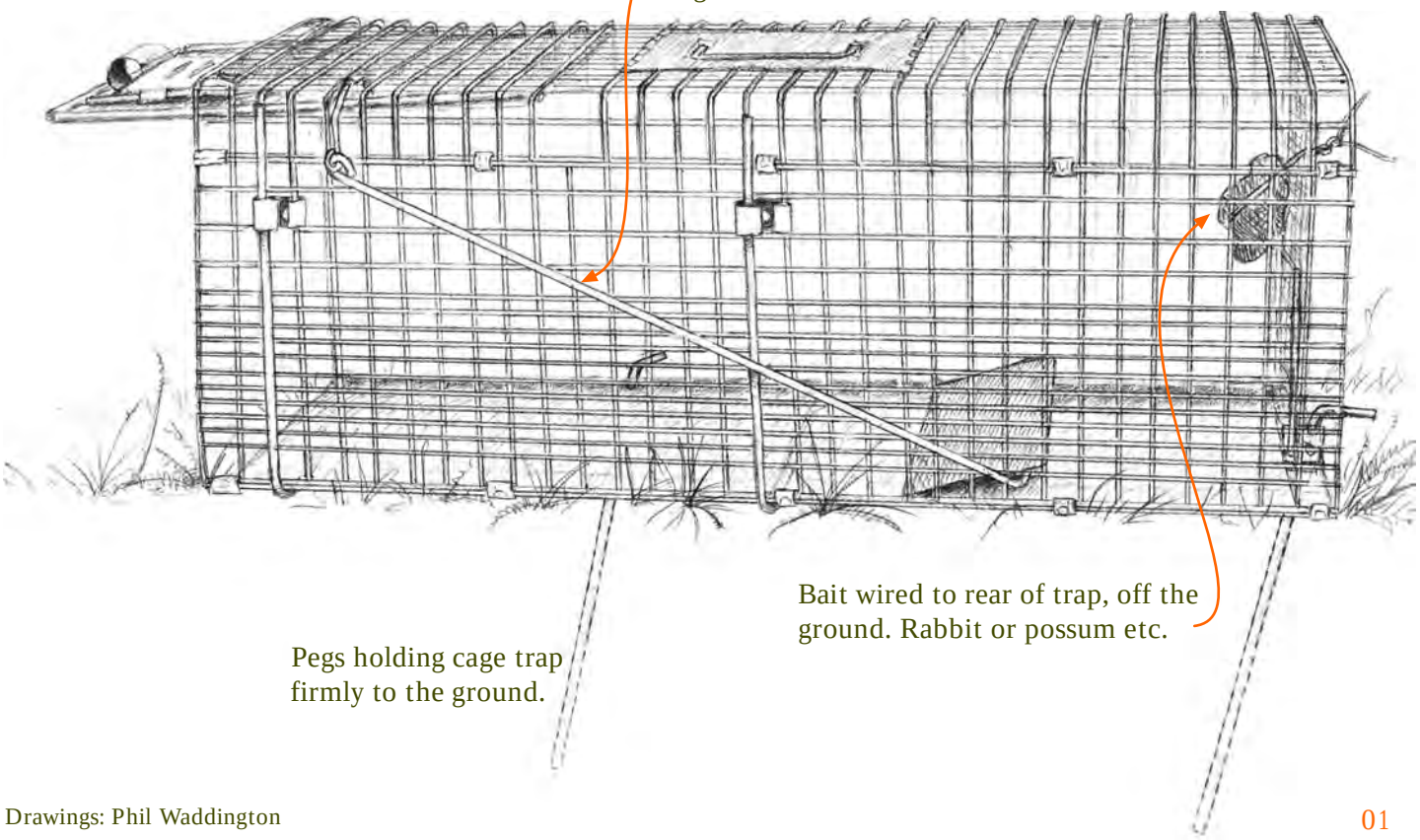
Step three
Set trap and finely tune trigger as shown in diagram.



Detail of trigger showing fine set.

Trap must be sited and set level and steady.

Trigger arm must be free of vegetation interferance.



Bait wired to rear of trap, off the ground. Rabbit or possum etc.

Pegs holding cage trap firmly to the ground.

Drawings: Phil Waddington

PREDATOR TRAPS
Doc series trapping systems

Trap Purchase/ Information

Department of Conservation
Te Papa Atawhai

Trap Purchase

Havahart model 1089 cage traps are available in New Zealand from:

MS Woodcraft Ltd.
128 Marine Pde Mt Maunganui,
Tauranga
T| 07 575 5920 F| 07 574 8910

Advice and contacts

Predator control advice, trap development contacts and feedback.

Alastair Fairweather
Department of Conservation
Animal and Plant Pests
Research Development & Improvement
T| 07 8580013 F| 07 858 0001
E| afairweather@doc.govt.nz
A| 1st Floor
Vero House
127 Alexandra Street,
PO Box 112
Hamilton

Darren Peters
Department of Conservation
National Predator Control
Research Development & Improvement
T| 04 471 3256 F| 04 471 3279
E| dpeters@doc.govt.nz
A| P.O. Box 10-420
65 Victoria Street
Wellington.

APPENDIX 4. DOC FERAL CAT KILL TRAP SYSTEM 1

The DOC Feral Cat Kill Trapping System 1 best practice information sheet is reproduced on the following pages courtesy of the copyright holder, Department of Conservation

PREDATOR TRAPS
Doc series trapping systems

Current Best Practice
Feral Cat Kill Trapping System 1

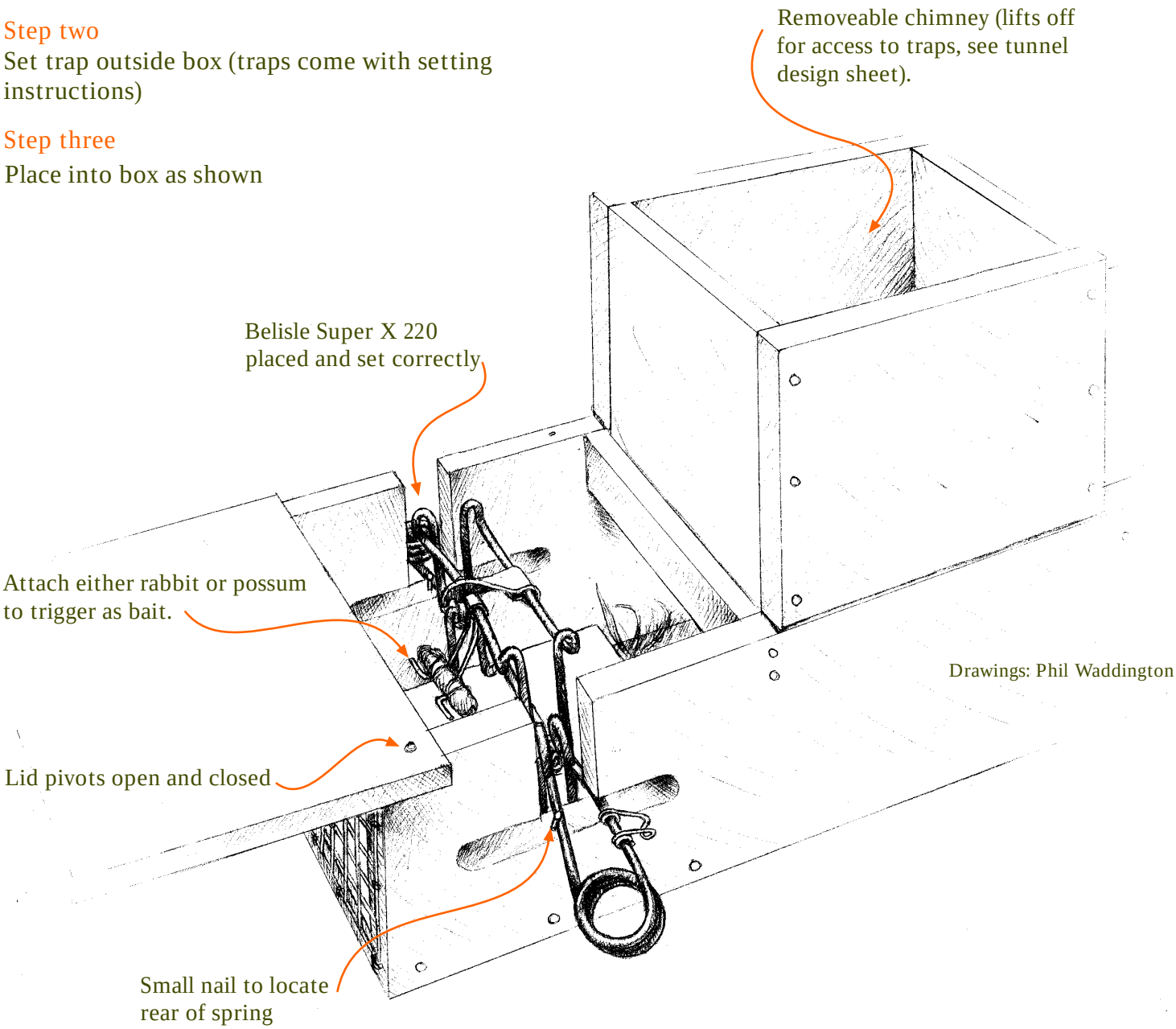
Department of Conservation
Te Papa Atawhai

This Department of Conservation 'current best practice' tunnel design, must be used with Belisle Super X 220's.
This tunnel is designed to exclude non target species, guide target species and provide public safety.
The Belisle Super X 220 set in a 'chimney' tunnel has passed* draft NAWAC (National Animal Welfare Advisory Committee) standards as a humane kill trap for feral cats. These setting instructions must be followed to meet these standards.

Step one
Bait trap trigger as shown in diagram

Step two
Set trap outside box (traps come with setting instructions)

Step three
Place into box as shown



Drawings: Phil Waddington

* Evaluation of the effectiveness of the Belisle Super X 220 for killing feral cats (wgncr-60246)

Trap Purchase/ Information

Department of Conservation
Te Papa Atawhai

Trap Purchase

Belisle Super X 220's are available direct from Canada. They supply direct via. the internet, Head Office can assist with the purchase.

Trans Canada Trapline Co
1867 Bond street.
Box 21020
North Bay
Ontario P1B9N8
Canada
www.trapsandfur.com

Trap Tunnel Purchase

Trap tunnels can be purchased from:

Haines Pallet Co. Ltd.
T| 04 568 6898 F| 04 5686480
E| haines.pallets@paradise.net.nz
A| 111 Hutt Park Road, Seaview.

Setting Tool Purchase

Robert Rose Ltd.
T| 021 711 653
E| robbie_@xtra.co.nz

Advice and contacts

Predator control advice, trap development contacts and feedback.

Alastair Fairweather
Department of Conservation
Animal and Plant Pests
Research Development & Improvement
T| 07 8580013 F| 07 858 0001
E| afairweather@doc.govt.nz
A| 1st Floor
Vero House
127 Alexandra Street,
PO Box 112
Hamilton

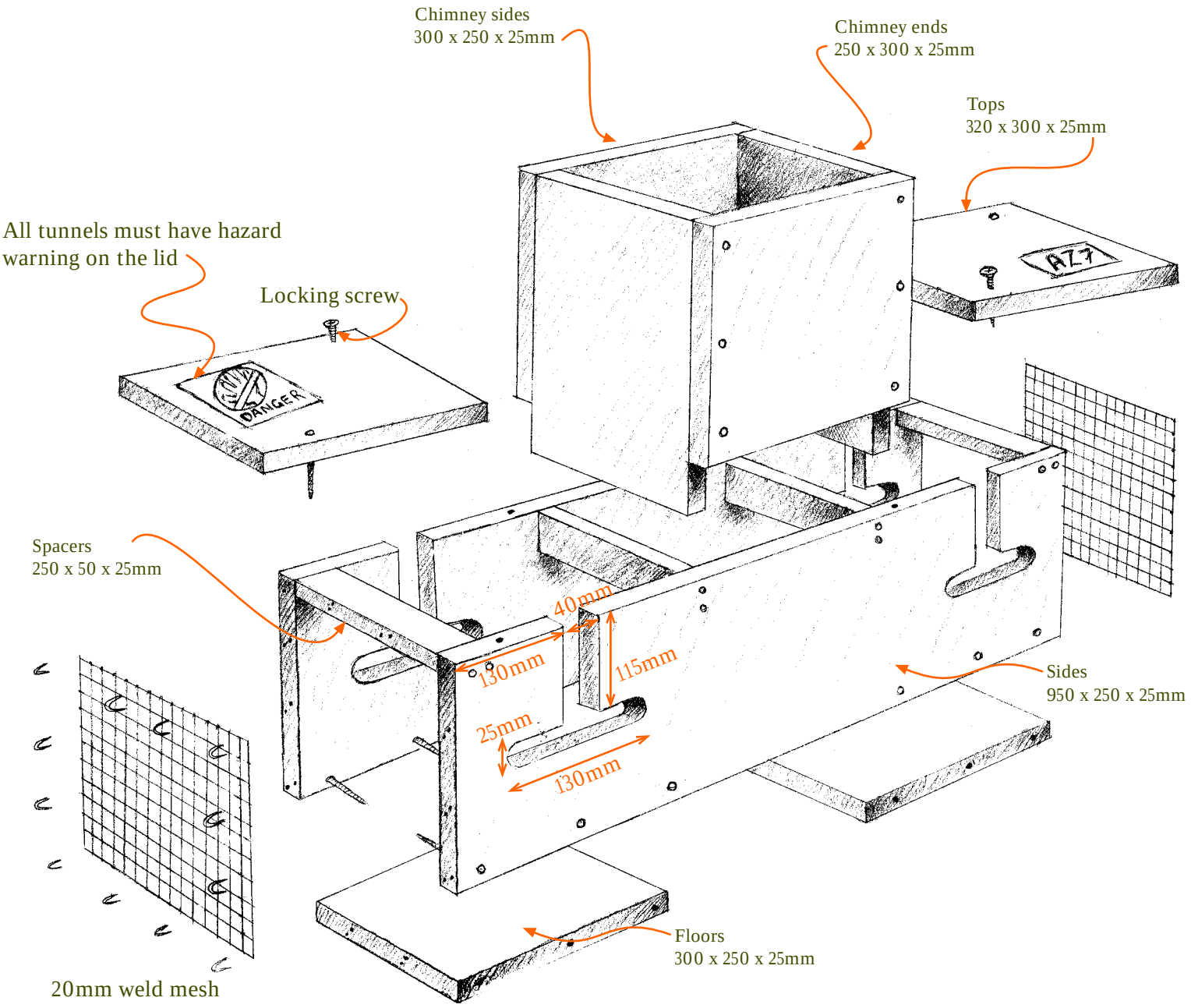
Darren Peters
Department of Conservation
National Predator Control
Research Development & Improvement
T| 04 471 3256 F| 04 471 3279
E| dpeters@doc.govt.nz
A| Level 3
65 Victoria Street
P.O. Box 10-420
Wellington.

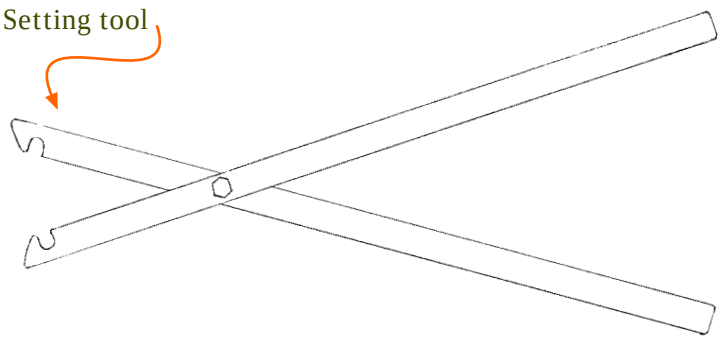
PREDATOR TRAPS
Doc series trapping systems

Tunnel Design

Department of Conservation
Te Papa Atawhai

This Department of Conservation current best practice 'chimney' tunnel design, must be used with Belisle Super X 220 traps.
This tunnel is designed to exclude non target species, guide target species and provide public safety.





Drawings: Phil Waddington
Original design: Boundary Stream MI

APPENDIX 5. DOC FERAL CAT KILL TRAP SYSTEM 2

The *DOC Feral Cat Kill Trapping System 2* best practice information sheet is reproduced on the following pages courtesy of the copyright holder, Department of Conservation

PREDATOR TRAPS
Doc series trapping systems

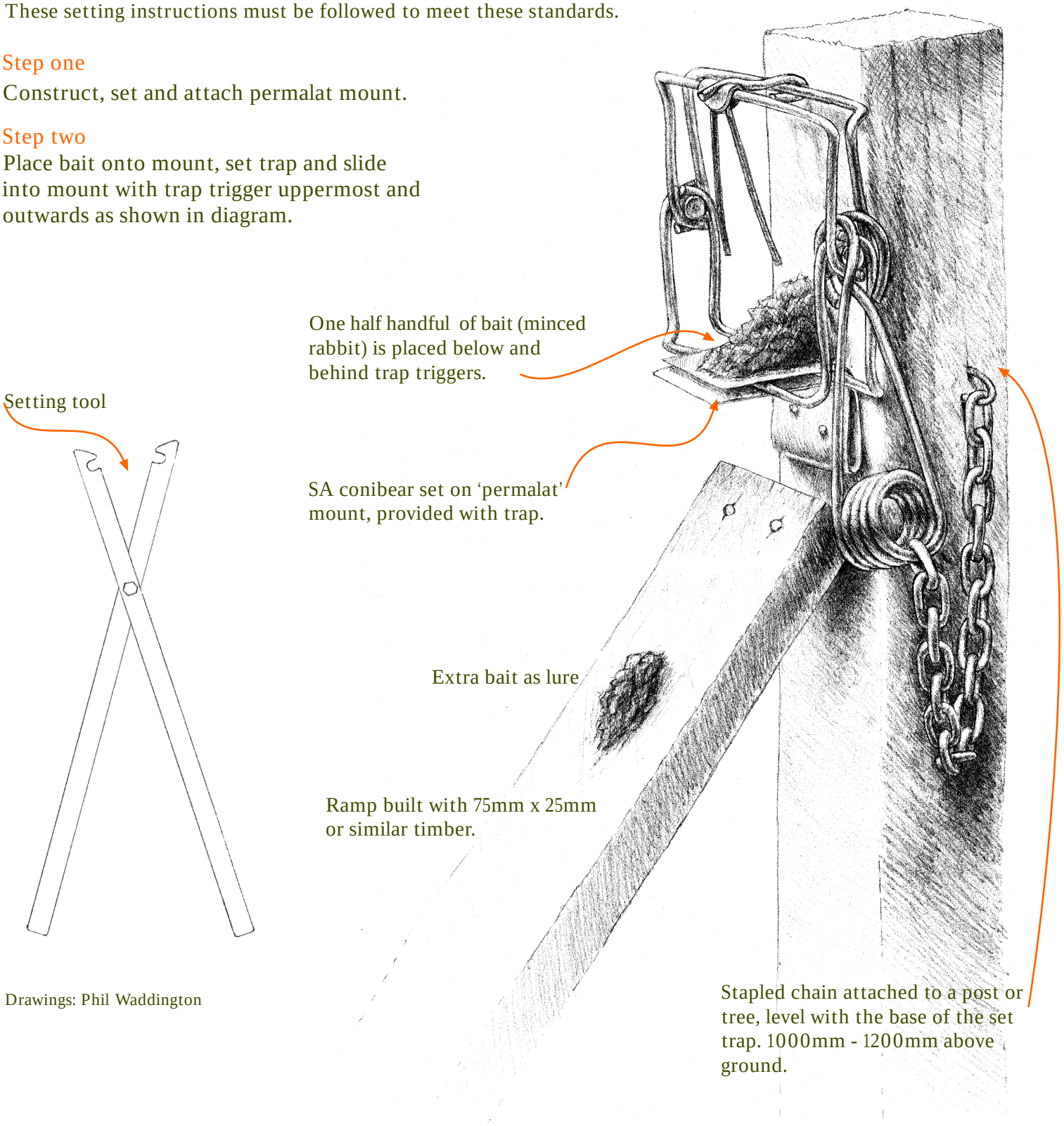
Current Best Practice
Feral Cat Kill Trapping System 2

Department of Conservation
Te Papa Atawhai

This Department of Conservation 'current best practice' ramp/cubby design, must be used with Steve Allen (SA) conibear traps.
This ramp/cubby is designed to exclude non target species, guide target species and provide public safety.
The SA conibear trap set on a 'ramp' has passed* draft NAWAC (National Animal Welfare Advisory Committee) standards as a humane kill trap for feral cats.
These setting instructions must be followed to meet these standards.

Step one
Construct, set and attach permalat mount.

Step two
Place bait onto mount, set trap and slide into mount with trap trigger uppermost and outwards as shown in diagram.



Drawings: Phil Waddington

* The killing effectiveness of a modified Steve Allen Conibear trapping system for capturing feral cats (wgncr-63175)

PREDATOR TRAPS
Doc series trapping systems

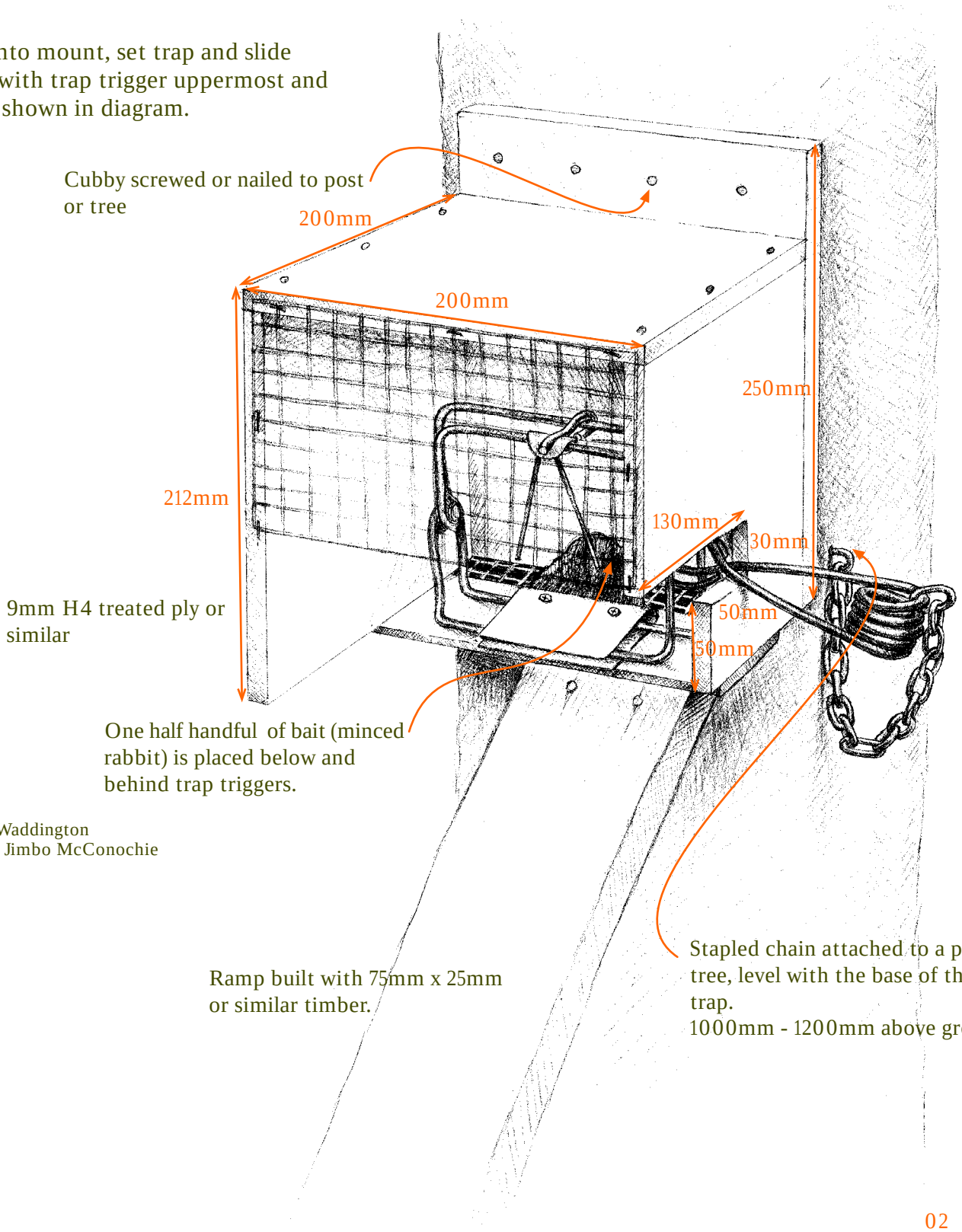
Current Best Practice
Feral Cat Kill Trapping System 2

Department of Conservation
Te Papa Atawhai

The Steve Allen (SA) conibear trap set in a 'cubby'.

Step one
Construct and attach cubby with permalat mount to tree or post.

Step two
Place bait onto mount, set trap and slide into mount with trap trigger uppermost and outwards as shown in diagram.



Drawings: Phil Waddington
Original design: Jimbo McConochie

Trap Purchase/ Information

Department of Conservation
Te Papa Atawhai

Trap Purchase

SA Conibear traps are available direct from:

Terry Johnson
T| 09 4374573 | 09 4339772
E| tnjohnson@doc.govt.nz,tnjohnson@slingshot.co.nz
A| Mclennan Road,
Whangarei

Trap cubby Purchase

Trap cubbys can be purchased from:

Haines Pallet Co. Ltd.
T| 04 568 6898 F| 04 5686480
E| haines.pallets@paradise.net.nz
A| 111 Hutt Park Road, Seaview.

Setting Tool Purchase

Robert Rose Ltd.
T| 021 711 653
E| robbie_@xtra.co.nz

Advice and contacts

Predator control advice, trap development contacts and feedback.

Alastair Fairweather
Department of Conservation
Animal and Plant Pests
Research Development & Improvement
T| 07 8580013 F| 07 858 0001
E| afairweather@doc.govt.nz
A| 1st Floor
Vero House
127 Alexandra Street,
PO Box 112
Hamilton

Darren Peters
Department of Conservation
National Predator Control
Research Development & Improvement
T| 04 471 3256 F| 04 471 3279
E| dpeters@doc.govt.nz
A| Level 3
65 Victoria Street
P.O. Box 10-420
Wellington.

APPENDIX 6. DOC FERAL CAT KILL TRAP SYSTEM 3

The *DOC Feral Cat Kill Trapping System 1* best practice information sheet is reproduced on the following pages courtesy of the copyright holder, Department of Conservation

PREDATOR TRAPS
Doc series trapping systems

Current Best Practice
Feral Cat Kill Trapping System 3

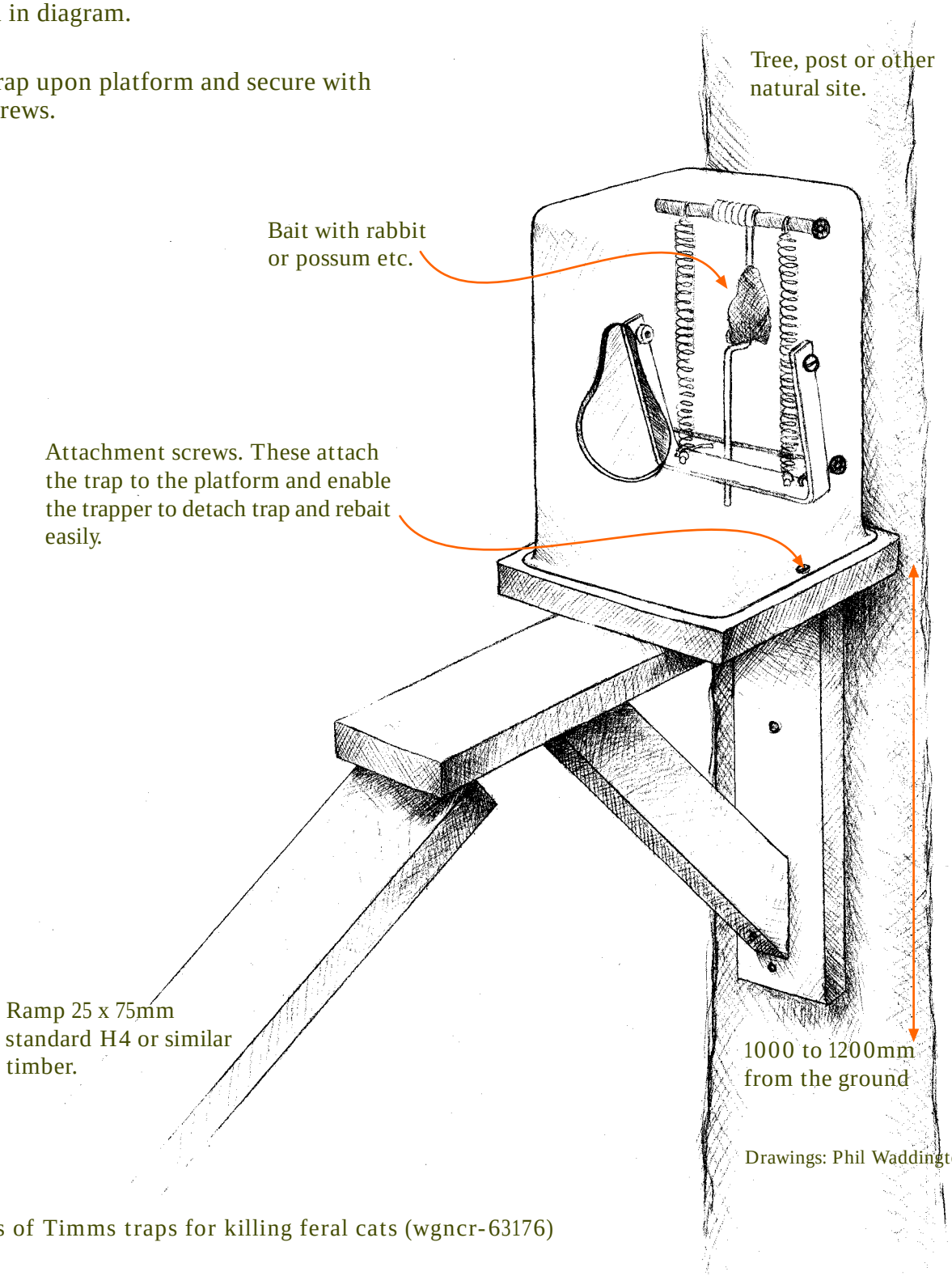
Department of Conservation
Te Papa Atawhai

This Department of Conservation 'current best practice' set design, must be used with Timms traps.
This set is designed to exclude non target species, guide target species and provide public safety.
The Timms trap has passed* draft NAWAC (National Animal Welfare Advisory Committee) standards as a humane kill trap for feral cats.
These setting instructions must be followed to meet these standards.

Step one
Thread bait onto trap trigger up to and past bent step, as shown in diagram.

Step two
Place baited trap upon platform and secure with attachment screws.

Step three
Set trap.



Drawings: Phil Waddington

* Effectiveness of Timms traps for killing feral cats (wgncr-63176)

Trap Purchase/ Information

Department of Conservation
Te Papa Atawhai

Trap Purchase

Timms traps are available in New Zealand from:

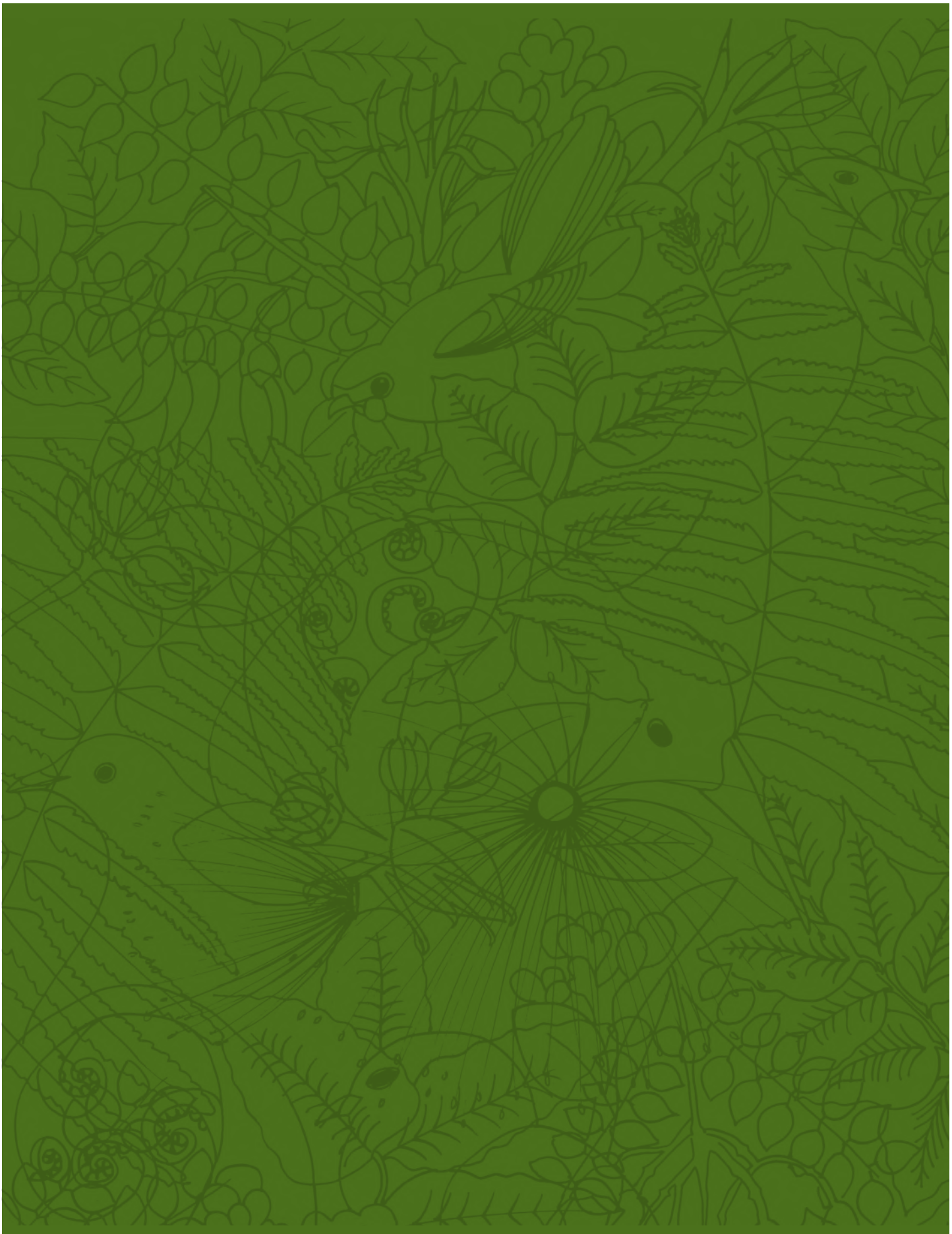
K.B.L Rotational Moulders
P.O. Box 827
Palmerston North
T| 06 358 6477 F| 06 355 4825
E| sales@kbl.co.nz

Advice and contacts

Predator control advice, trap development contacts and feedback.

Alastair Fairweather
Department of Conservation
Animal and Plant Pests
Research Development & Improvement
T| 07 8580013 F| 07 858 0001
E| afairweather@doc.govt.nz
A| 1st Floor
Vero House
127 Alexandra Street,
PO Box 112
Hamilton

Darren Peters
Department of Conservation
National Predator Control
Research Development & Improvement
T| 04 471 3256 F| 04 471 3279
E| dpeters@doc.govt.nz
A| P.O. Box 10-420
65 Victoria Street
Wellington.



c/- info@bionet.nz

National Pest Control Agencies