

GUIDELINES ON CAT ERADICATION AND MONITORING TECHNIQUES

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PURPOSE

- These Guidelines are to be used by Project Managers conducting cat eradication projects based on the PII Resource Kit Rodent and Cat Eradication.
- The Guidelines are a summary of learning from many cat eradications and control programs. It provides an introduction to the specific techniques and structure of a well planned eradication. Its value is however limited unless tailored to your local environment (climate, biological, legal and social). Advice is available from many sources to assist you to do this. The most important step is getting this advice.

1. STRATEGY

1.1 PLANNING

- Prior to the eradication operation review the island's biosecurity procedures – what is the possibility of feral cats or other pests re-establishing on the island as a result of natural or human-assisted movement. Un-neutered domestic cat populations can act as a source for re-establishment of feral populations, and humans can re-introduce cats if other issues (e.g. continued presence of rodents) are not also addressed.
- Have the operational planning peer reviewed before beginning the operation.
- When costing and planning eradication projects take care to cost all aspects adequately and allow for contingencies. Money shortages affect morale and raise operational risks which if they lead to failure will prove more expensive in the long run.
- It is an unfortunate but most likely an unavoidable effect that some non-target species may be caught, injured or killed by use of methods employed to eradicate cats. Some negative effects must be considered and taken into account during planning. Such effects are however likely to be short-term only, and the benefits of eradicating cats will significantly outweigh them in the long-term.

1.2 TIMING OF OPERATIONS

- Feral cats should be targeted when natural food resources are at a seasonally low level. Typically this is winter to early spring, but may vary from island to island according to the range of prey species available seasonally. Timing is more important for the 'knockdown' phase of any cat eradication than for follow-up work.
- If using toxic bait vulnerable to weather conditions do not begin deployment of bait until a forecast of three fine nights. Bait affected by bad weather may either become unpalatable to cats or may be destroyed by the weather conditions

1.3 TWO-PHASE APPROACH

- Unlike rodent eradications, in cat eradications it is unlikely that all individuals will succumb to a single toxin or any other single eradication method. The strategy for eradication of cats therefore is considerably more complex than for rodents, and requires a careful planning of sequence of methods that takes into account many other factors, including: other species being targeted (if any); the size, vegetation

and terrain of the island; the size, density and general ecology of the cat population; limitations on methods imposed by local laws or vulnerable non-target species; and other issues such as any prior control efforts. For this reason it is very important to obtain specialist input and advice from experienced cat eradication specialists and feral cat ecologists.

- The strategy should be to work progressively from passive, low disturbance techniques such as poisoning, to more direct methods such as dogging and shooting. This is critical - an initial technique that catches fewer cats but does not educate any survivor is preferable to one that catches more cats but leaves the few survivors educated and wary.
- Key infrastructure such as a track network and accommodation facilities should be in place prior to the commencement of any control methods being employed. Early establishment of the track network is particularly important on temperate wet islands that are heavily vegetated. As well as providing access for humans, cats will use these tracks, and this facilitates trapping or poisoning.
- It should also be noted that the last cats (or other animals in any eradication) are often those that behave abnormally. For example, one cat on Raoul Island did not alter or expand its home range even when its neighbours were all removed, and continued to feed largely upon soft-bodied invertebrates rather than the readily accessible seabirds. The lesson to appreciate is that normal cat behaviour should not be presumed for any possible remaining animals, and that a range of control and monitoring techniques are employed in the right order to eliminate the possibility of aberrantly behaving cats remaining somewhere on the island.
- The operation will normally comprise two distinct phases – the relatively quick ‘knockdown’ phase (to remove the bulk of the population as quickly and effectively as possible) and the more persistent ‘follow-up’ phase, to remove any survivors. This is followed by prolonged monitoring to confirm success.

1.3.1 KNOCKDOWN PHASE

- The aim of the knockdown technique should be to target all individuals, and the strategy should be planned on this basis. Not all individuals will succumb to the method but all should at least be exposed to it, i.e. coverage of the technique should encompass all of the treatment area. The aim is to remove the vast majority by this method (at least 90% of all individuals is a suggested minimum goal – the greater the % knockdown the easier and more cost effective the follow-up work is likely to be). The faster the knockdown can affect the greatest proportion of the population without individual cats becoming wary of the technique, the better the results are likely to be.

Approach if associated with rodent/rabbit eradication:

- Cats are vulnerable to secondary poisoning as a result of brodifacoum baiting against rodents [NB. In New Zealand brodifacoum is not registered for direct use against cats]. Results vary widely (< 50%-100%) However, some survivors must be expected and follow-up techniques must be planned for in a strategic sequence.
- Cats are possibly also vulnerable, but probably to a lesser extent, to secondary poisoning in pindone or 1080 operations against rabbits.

- Thus, brodifacoum baiting targeted at rodents (and to a less proven extent, pindone or 1080 operations against rabbits) will act as a knockdown for cats, but this must be followed up with methods outlined below in ‘follow-up’. If cats are present and are to be targeted in a multi-species eradication, the standard bait rates to target the rodents or rabbits do not need to be altered.

Approach if targeting cats only:

- The place poison might be used include
 - As an initial knockdown that is unlikely to educate cats that survive (provided you use a different bait for traps).
 - As an alternative to other techniques. While it is far more common the other way round several cats have been poisoned that had been educated to traps.
 - Occasionally you want to leave something behind between trips. Poison is the only option.
- There is only one currently registered toxic cat bait in NZ. It is “0.10% 1080 Feral Cat Bait”, manufactured by ACP, which is comprised of c.2g polymer-based fishmeal pellets, containing 0.1% 1080). [This bait is sometimes also known as ‘Pestoff Feral Cat Bait’].
- None of the cat poison options used to date (currently legal and otherwise) are particularly effective for eradication purposes.
- Bait rates – cat densities can vary widely on islands, from more than 2 per hectare to 1 per 25 ha or more – prior information on relative density is desirable to enable baiting is sufficient to target all individuals.

1.3.2 FOLLOW UP PHASE

- Follow-up techniques should be implemented as soon as practical after effects of the knockdown technique have fully manifested. For brodifacoum operations against rodents (and pindone operations against rabbits) this is likely to be 3-4 weeks after the first baiting. For most other options follow-up can be instigated almost immediately.
- When rodents/rabbits have been targeted, the loss of this food source may make surviving cats hungry and more likely to be trapped but they could also switch to other foods such as birds or invertebrates.
- Past experience with eradication of cats suggests that the most difficult ‘last survivors’ will have experienced but escaped from previous control or eradication attempts. It is critical to maintain the highest standards to avoid ‘educating’ cats. This means that only the best, most experienced people available should do the cat trapping.
- The work will need to be systematic and have the basics 100% correct at all times. This means all the tracks (on temperate wet islands) are kept in perfect condition to encourage a cat to use them. All traps need to be set with painstaking care. It is likely that control options tried earlier in the operation will not succeed in catching any remaining cats so different approaches will be called for. The trapping needs to be mindful of the very real prospect of human activity putting the cat off.

- All traps, poison bait sites and other site-specific devices should be individually numbered and GPS'd if at all possible. Re-number if repositioning any trap – retaining the same number will lead to confusion when analyzing information on trapping effort and locations.
- All hunting/searching transects should also have routes tracked by GPS, and this information downloaded and stored for on-going and future analysis.

1.4 DATA COLLECTION

- The type of trap, set and bait type and/or toxic bait should be recorded on a regular schedule for all trapping undertaken and this information will be used when planning the approach for the last survivors. When targeting a problem cat late in the eradication knowing what it has not been exposed to may be critical.
- All trappers/bait layers should record the findings of each trap check in a field notebook, and this should be maintained on a daily basis.
- The location of any sign found in the follow-up phase should be recorded using GPS and any sign found will be removed so that fresh sign can be detected more easily.
- All cat carcasses especially in the follow-up phase of the project should be recovered for analysis, and a DNA sample collected and stored. Age, breeding state, etc can assist in measuring progress by establishing if breeding is on-going. DNA can assist in determining 'relatedness' of surviving individuals, or attributing located sign (droppings, fur) to a particular individual. DNA can also assist in determining if any subsequent 're-establishment' of cats is as a result of a failed eradication or through a new 'invasion'.
- All traps should be clearly labelled and their position recorded by GPS.
- All hunting/dogging efforts should also have routes mapped by GPS and recorded.
- All data should be entered electronically and stored in a systematic and safe way, including separate file back-ups (on CD or pen-drive etc).

1.5 QUALITY CONTROL

- The quality of the trapping effort will have a large influence on the success of the eradication operation. It is crucial that staff responsible for setting traps are experienced and that any problems in trap setting or maintenance are identified and rectified immediately. Before the trapping programme begins, trappers will be briefed and the standard of trapping required demonstrated. The team leader will be responsible for maintaining these standards throughout the trapping programme. The work should be periodically audited by the project manager. These audits will include testing the pressure required to set off the treadle plate. Any problems throughout the cat trapping period will be discussed in the regular debriefs with the project manager. The project manager will make a decision on how these problems will be resolved.
- Great care is required to set traps to the best possible standard. The extent to which negative experiences result in trap shyness is unknown, but it is very likely that a cat that has escaped from a poorly set trap will

subsequently be considerably harder to trap again. This can potentially add significantly to the cost and duration of the eradication project.

- The staff checking traps should aim to disturb them as little as possible, but should be responsible for periodically springing and resetting them and keeping them in good working order. Traps should be set off at least once a week to reduce the risk of a trap seizing and once a month traps should be lifted, checked for wear and corrosion and cleaned out before being replaced. The dog and sear (the trap trigger and trigger locking devices) should be inspected during these checks and filed if necessary. Where there is any doubt about the performance of a trap it should be replaced.
- If cat presence is detected during the follow-up phase, the first response should be to establish a greater intensity of traps within the area. This assumes that existing trap sets are as they should be, i.e. already top quality, If not fix them up to standard as the first response. If these measures fail, then other measures such as different trap types, lures, toxic baits and using dogs to search and destroy will be explored.

1.6 PROJECT REVIEW

- In the Operational Phase, a regular reporting and review process should occur. A clear, formal process should be established by which the Project Manager, field operators and others can exchange information and viewpoints. This should generally be on a scheduled basis to avoid it being overlooked, but there should be flexibility to respond quickly to new information or changing circumstances.
- Project reporting should include regular progress reports – suggested headings for progress reports are - activity this period; progress against the operational plan and any deviations from this; issues and proposed resolutions; activities next period; anticipated problems; key project risks.
- In the post operational phase, formal debriefs and reporting should focus on lessons for future projects. Each DOC project has piggy-backed on the experience of those before it and plays a part in identifying lessons for future projects. This is doubly important for projects which fail.

1.7 SURVEILLANCE TECHNIQUES

- This is a very difficult issue to set standards for, as there are many variables.
- It can be expressed as an equation:

Probability of detection = Quality of effort x Quantity of effort x Time elapsed.

- Quality should be a given, but is not always, for example you may use information from third parties visiting the island in the cat teams absence. Quantity of effort may be at your discretion or it may be dictated by finance or other logistical constraint, but for whatever reason it will be variable.
- Time elapsed is the variable that you use to even out the equation, achieve the same level of probability no matter what the quantity or quality. The more time has elapsed without finding any further evidence of cat presence, the more confident you can be. Time elapsed includes time actually looking and time away from the island.

- Usually at least six months should elapse after the last evidence of cat presence without any further sign of cat presence before declaring success.
- Use a variety of techniques rather than rely on just one. Recommended options include trained dogs, searching for natural sign and predation, spotlighting.
- Surveillance techniques

Surveillance technique	Details
Seeing Cats	Often seek shade in the heat of the day – search likely areas, including disused buildings. More active at dusk and night.
Prints and droppings	Cat prints are often very obvious in sandy locations, particularly along the tops of beaches, or where there is soft dust or mud (note that cats normally avoid wet areas). Droppings are often left unburied, as a scent-marker.
Spotlighting	Cat’s eyes show up very strongly in strong torchlight or spotlights, and can be seen for many hundreds of metres over open terrain. The eyes glow a yellow-green colour.
Seabird predation	Search for bodies of adult seabirds (especially terns, noddies, shearwaters) – cats often eat the head or tear open the body of the seabird.
Lures	Place out bait such as fresh fish or meat in open sandy areas, 1-2 metres up a upright pole or a tree trunk – look for cats checking the bait or look for footprints in the morning after. Semi-domesticated cats may also be attracted to the food or cooking smells around your campsite, so be watchful.

2. METHODS

2.1 PRE-BAITING

- Where possible, pre-baiting should occur to encourage cats to familiarize themselves with the bait and to habituate them to take it. This should be the same type of bait intended for use in the trapping/poisoning programme and should be presented in a similar fashion and in a similar or greater density where possible (if commercial toxic cat baits are used, pre-bait with a non-toxic version of the same if possible). Several pre-baits are recommended, at 1-3 day intervals, until bait take is regular. Traps should not be set out until trapping actually commences. Bait take should be recorded and all un-eaten non-toxic bait removed prior to commencing trapping/poisoning.

2.2 HUMAN SCENT ISSUES

- Minimise human scent issues when establishing trap or hand-laid bait sites. Wear gloves when handling and setting traps. Rinse all traps in fresh water and ‘weather’ them in outdoor conditions for a week or more prior to use, to remove any lingering human smells or any smell of protective/lubrication coatings on the traps.

2.3 TRAPPING

2.3.1 PREFERRED TRAPS

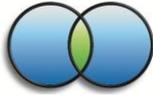
- Where possible, it is recommended to use the following trap types **in order of preference**. Use the traps listed first unless there is a clear reason why they cannot be used (e.g. legislation on your country, or presence of highly vulnerable non-target species). However, to achieve cat eradication it is quite possible that some non-target species are caught/killed. This needs to be considered in planning of such operations.
 1. Victor 1 ½ hard-jaw leg-hold trap
 2. Victor 1 ½ soft-catch leg-hold trap
 3. Victor 1 hard-jaw trap
 4. Kill traps (relative effectiveness in eradication situations not fully evaluated)
 5. Cage traps

The following are permitted for use against feral cats in New Zealand [check for your own country's rules and regulations]:

2.3.2 LEGHOLD TRAPS

[see <http://www.biosecurity.govt.nz/animal-welfare/reg/traps/legholdtraps> for permissible types of traps in New Zealand]

- Victor 1 ½ soft jawed traps are recommended under New Zealand DOC best practice for cat control but are not ideal for eradication operations as soft jawed traps increase the risk of a cat pulling out of a trap. For eradications, the risk of an animal escaping from a trap must be minimised. Victor soft-catch traps were used to target the last most difficult cats in island eradications, but escapes from such traps may at least for Raoul Island have caused considerable extension to the project's duration.
- Victor 1 traps (hard-jaw) may be too small (smaller jaw size may make miscaptures more common, and small size also make placement of concealed traps with 'hazing' more difficult), but information from previous work and opinions of experts vary.
- Ideally, Victor Size 1½ (unpadded) leg hold traps should be used to target cats. Victor 1½ hard jawed traps will no longer be available for use after 1 January 2011 in New Zealand because of changes to the Animal Welfare Act 1999. [Outside of New Zealand it may be locally acceptable to use hard (metal jaw without rubber insert) rather than soft jawed leg-hold traps, and where possible this is recommended as the risk of escapes is further reduced. Victor size 1 ½ traps are the recommended size – smaller and larger sizes both raise the risk of cats pulling free].
- Some operators may have a preference for soft-jaw traps in the belief that it will cause the cat less trauma. Bear in mind that a number of other factors have a much greater influence on the trauma inflicted e.g. the swivel attachment point and condition, the length of chain, whether it is a front foot/back foot capture etc. All aspects must be considered.
- There are 3 main ways to set leg-hold traps, - the blind-end or cubby set; the walk-through set; and the chimney set (See Figures 1, 2 & 3 below). All of these can be used to target cats, but walk-through sets (unbaited) are usually reserved for later in a project for wary survivors.
- For either the blind or walkthrough trap set, the trap jaws on each trap should face parallel to the cat's likely direction of travel (the 'dog' or trigger is therefore on the side).



- All traps must be doubly attached (i.e. 2 staples or wire ties) to an anchor point such as a tree or stake. The chain should be 650mm long, and a loop of strong elastic (bungy) cord or spring should be incorporated into the chain so as to reduce potential 'jarring' of the trap and chain by a captured cat (see Figure 4). This spring or 'bungy' doubles up on a longer section of chain rather than replacing the chain, it can fail and the chain is needed as a back-up. It is essential that the swivel is in perfect condition, if it is not the cat can sometimes gain sufficient leverage to pull out. Traps should be dug in so that they are flush with the ground and concealed by a fine layer of dry soil/litter material. Any vegetation that could entangle the trap and thereby provide leverage (similar to a seized swivel) allowing a cat to pull out should be removed.

HAZING TRAPS

- While different set types need different hazing and material some generic rules apply. The haze is intended to both direct the cat's travel over the trap and its paw onto the plate. *It is however very easy to arouse the cat's suspicion so that it walks past or around the set.* For example, a blind end or cubby set, the most common style and mistake is to make parallel picket fences of heavy sticks stuck vertically in the ground and reaching about the height of a cat head. If you use far less, lighter longer sticks stuck in at the appropriate angles you can achieve both better direction of the paw and a much more open set less likely to deter the cat.
- The haze is **not** simply a physical barrier. To an extent a good haze is physical but a cat could easily jump over it or push it aside. It is *subtle influencing* of the cats behaviour rather than trying to *force* the cat's choice where it puts its paw. Making a physical barrier works fine on the naïve cat but will deter the wary cat from entering the set. It is the wary cat that is the difference between eradication and control.

BLIND END (HAZED) TRAPS

- Traps should be 150-250mm from the back of the trap to the bait that is attached to the tree or other solid material used as the trap backing. Traps should be set to attempt to catch the cat by the front leg. This requires much easier, less obvious, and therefore better hazing and means you usually catch the cat by the front leg not the back. The trauma and possibility of broken bones from front leg capture is way less. Bait should be firmly placed on a nail or similar attached to the tree 250-300mm above the level of the trap. Traps should be dug in so the plate (pan) of the trap is level with the ground. Hazing on either side of the traps should be sufficient to deter access from the side, but **should not** be higher than cat head height. Guide sticks should be placed on either side of the frontal (desired) approach to the trap-site, in order to guide the cat's feet toward the traps.

CHIMNEY TUNNEL SETS

- Recommended where vulnerable ground-dwelling non-target species such as ground doves, rails or seabirds are present. Victor 1 ½ padded traps should be placed inside wooden Scott Theobald (ST)-type chimney tunnels (see Fig 3)

WALK THROUGH TRAPS

- Two traps (or even two pairs of traps) are used in a walk-through set. Each trap or pair of traps should be set 1-1.5m from the other. These traps should not be baited, but should rely on the nature of the trap site (i.e. on a known or suspected travelling route for cats). Vegetation or haze should inhibit access by cats from the side of the set. Guide sticks at the end of the walk-through set should be placed to assist directing the cat's feet toward the traps, but again attempt to subtly influence the cats placement of feet rather than force it to place its feet in certain locations. It is likely that trap-shy cats (i.e. aware of baited traps) are vulnerable to un-baited walk-through sets. Cats have been caught in walk-through sets after leaving sign at or near baited sets. Walk-through sets placed near fresh cat sign are a frequently used tool

to catch the last cats in cat eradications. Un-baited walk-through traps, placed where cats walk, are a very effective cat control tool.

2.3.3 LIVE CAPTURE TRAPS

- Havahart model 1089 (treadle-type). (See Fig 5). Use of cage traps is only recommended where kill traps and leg-hold traps are clearly not able to be used because of non-target or sensitivity issues – they are *considerably* less effective than leg-hold traps. When used, cage traps must be pegged firmly to level ground, and should be steady (i.e. it should not ‘rock’). Trigger should be fine set, and bait should be wired to rear of cage.

2.3.4 KILL TRAPS

- There are a range of kill traps available for use, but they have not been used widely enough in eradication operations to comment on their effectiveness. Where possible, use leg-hold traps in preference until further information becomes available on effectiveness of kill-traps in eradication scenarios.
- Some kill trap types are:
 - Steve Allen (SA) Conibear trap on a ramp, or cubby set on ramp
 - Belisle Super X 220 inside chimney tunnel
 - Timms trap

These can be effective but are bulky and logistically difficult to use in any number. Always use baited.

2.3.5 TRAPPING PROGRAMME

- The pre-baiting period should provide a clear indication of the time required to service traps on the island. All traps must be serviced each day so a network of up to 50 traps is likely to be maximum that can be sustained by any one team member while maintaining the necessary high quality of the trap sites, but this is highly dependent on the spacing between traps and the nature of the island (also remember to factor in relieving staff into the staffing equation).
- It will take appreciably extra time to install the trap system, so extra labour input would be required at the installation phase or whenever re-locating large numbers of traps.
- Where skilled personnel are in short supply, use the most experienced cat trappers to decide on location of traps and to establish them. Selection of trap sites and initial set-up of the trap is critical. Less experienced personnel can take responsibility for checking and/or re-setting the traps daily.
- For large islands, the entire island does not necessarily need to be covered all at once, but this is the ideal.

2.3.6 TRAP SPACINGS & SITE SELECTION

- Rather than a strict trapping grid, trapping should focus on edge habitats including tracks, road networks, bush edges, ecotones and the island’s coastline. Considerations in the final placement of a trap may include the ability to inspect the site from a distance so that cats can be dispatched with minimal disturbance and the presence of the public because of the risk of injury and trap disturbance.

- Trap spacings can vary widely according to cat density, known home ranges, habitat types, etc. Even in high density populations home ranges are likely to be >50ha. Intervals between traps used in successful operations have ranged from 1 per 50m to 1 per 500m on each trapline, and even as little as 1 trap per 80⁺ha on arid islands. Within reason, quality of trap sets is far more important than trap density.
- Avoid wet muddy areas or dense ground vegetation, though the edge of such sites where movement is less restricted may be prime locations. Tracks and open ridgelines are preferred.
- More intensive trapping should be undertaken wherever sign of surviving cats is detected. Intensive trapping should occur, involving placing traps at (as a guide) approximate 100m intervals or closer along all tracks or edge habitat within 500m of the site (however, above advice is reiterated – quality of trap sites is better than quantity, so choose sites carefully). These traps should be maintained until the cat is caught or no more sign is detected for a period of three months.
- Significantly more cats are caught at a few specific trap locations by factors other than just by chance. There is an ongoing search in the literature to find site characteristics that can be exploited to make trapping more cost-effective. Such characteristics are often difficult to determine, especially in (uniform) forested habitats, but details should be recorded of any particularly successful traps (e.g. aspect, habitat/edge types, on possible travelling routes, etc) and information on these traps presented in project reporting and review. A few trap sites may catch more cats, but cats are still likely to be caught throughout the entire trapped area, so trapping coverage still needs to be comprehensive.

2.4 POISONING

- Toxins have been widely used to control cats. For example, sodium monofluoroacetate (1080) in fish baits were effective at killing 90% of cats on Baltra Island, Galapagos archipelago. Brodifacoum (aerially applied to eradicate rats) killed all cats on Tuhua Island, New Zealand through secondary poisoning.
- Only 1080 and alphachloralose are licenced/approved for use in NZ. The latter has not been tested in eradications and as a consequence is not recommended unless trials prove its effectiveness. The former has major implications for subsequent use of cat-detecting dogs, and known deaths of such dogs from 1080 poisoning highlights the great risk of planning any operation where the use of working dogs follows (or is combined with) the use of 1080. The effectiveness of current New Zealand registered baits containing 1080 has been variable. Australia has had success with a sausage bait containing 1080. If this is legally an option for your eradication you should consult with the developers of this bait to obtain the latest info.
- Use the best available cat poison baits along all tracks (25m spaced) and beaches (50m spaced). Pre-baiting (using non-toxic bait of the same type) should occur wherever possible, for a period of at least a week or until a good proportion of these baits are known to be taken by cats. Toxic bait should then be made available (in good condition) for 30 days.

2.5 BAITS AND LURES

- Wherever possible, use locally sourced bait that cats may be familiar with e.g. fresh fish, rabbit/rodent/bird. Where these are not available, externally sourced options include frozen fish, canned fish, frozen rabbit.
- Bait should ideally be replaced within 3 days (dependent on local conditions – hot weather and flies etc will deteriorate bait faster). Most cats will not be attracted to old, smelly baits and such bait may even deter individuals from all baits of that type.
- Make all replaced bait unavailable to cats (i.e. place in trash bags and physically remove it from the habitat, do not discard it or throw it away at the trap site).
- Baits do not need to be large, and can be placed in a site away from direct sunlight – scent of bait is more important than sight of it, as the cats curiosity will draw it in if the bait is attractive. Baits and lures are designed to attract cats from only a few metres away – trap location is very important, and attractiveness of bait scent is more important than size or visibility of bait.
- No one type of bait will work for all cats, and some cats were very fussy about what they eat. It is even more likely that with a wider and more plentiful range of natural food sources available through reduced competition that any remaining cats will be even more discerning. A range of baits and lures should be used throughout the project.
- Some baits may be attractive to other animals on the island, (e.g. land crabs, rats, ants) which can remove the bait, reduce its palatability to cats, possibly obliterate any indistinct cat prints or sign, or possibly get caught in the traps. Experimentation with baits, trap presentation and mitigation to reduce non-target effects is recommended prior to commencing trapping operations.
- Lures that attract only cats should also be employed. The most obvious one is cat urine or faeces. An equal proportion of both, mixed with glycerin as a preservative is known to be a highly attractive lure to most cats, and lasts longer than bait and is less attractive to non-target species. Any opportunity to collect cat urine and faecal material (e.g. from any cat put down or killed in traps etc) should be taken – gloves should be worn to avoid any potential for disease transfer or infection (e.g. salmonella) and also to avoid placing human scent on such material. Material can also be sourced from off-island locations (e.g. catteries or other cat control operations) – there is some suggestion that unfamiliar scent may be more attractive than scent from neighbouring or known individuals). Material could be frozen until use if necessary, and used sparingly.
- Audio lures (e.g. a cat ‘meow’ recorded on a digital chip and played on a repeating schedule through a small speaker) are potentially useful but of limited term value as cats quickly acclimatize to them.
- Catnip – known attractiveness to most (but not all) cats but effectiveness not established for eradications, but be aware of potential for establishment as a plant pest if viable seed is present, and perhaps also plant pathogens.

2.6 HABITAT MODIFICATION

- Most cats will make use of open tracks, boardwalks and road verges for travelling and hunting. Maintain tracks free of encroaching or tall vegetation. In wetter environments, dry tracks will be sought out by cats for travelling.
- Where possible, remove piles of cut vegetation or other debris where cats may hide or den. Close off openings in or under buildings or structures to limit possible hiding or den locations.

2.7 NATURAL SIGNS

- Searching for scats, prints, prey kills. Scats are often left in obvious places as scent markers. Footprints on sandy beaches, mud, peat etc are often obvious and easily discernible from other species. Such areas are often the best place to search for sign. Cat predation is in certain instances diagnostic (the way they eat the prey leaves a distinct appearance to the remaining carcass).
- In the latter stages of an eradication, all cat scats and other sign should be removed from tracks so that fresh scats can indicate surviving cat activity. Removal of scats is important, do not rely on being able to age scats. Depending on the ground and climatic conditions scat weathers at very different rates, an apparently old scat can be newer than scats that look fresh.

2.8 TRACKING PADS

- A valuable monitoring/detection tool if established across previously used tracks. Natural materials are best (sand is good but if not locally available any fine material that will carry a print is okay)

2.9 DISPATCHING TRAPPED CATS

- The preferred method for dispatching cats is a single shot through the head with a silenced .22 calibre rifle. All shots will be taken from within 50m of the animal and only when it has stopped moving. In some situations (i.e. a cat in a leg-hold trap) a blow to the head with a stout stick can be used. In both cases the neck will be cut severing the carotid artery to ensure the animal is dead.
- Try to keep areas where trapping is taking place free from un-related human activity. Any inexperienced people encountering a cat in a trap should immediately withdraw and the cat should be disturbed as little as possible until someone trained/delegated to kill them can arrive, preferably by shooting them. A cat disturbed by humans is likely to panic and move round strenuously, and may in some circumstances pull free from the trap.

2.10 HUNTING

- Spot-lighting, and dogs are very effective eradication tool on islands once knockdown has been achieved but can only be used effectively where there is open ground and not a regular, heavy vegetation cover.
- Check accuracy of rifles and projectiles (and their operators!) with regular 'sighting in' at pre-established safe test sites.
- It is far better to leave an animal for another day rather than to take a risky shot. Each shot should be a killing shot. Optimise the shooting opportunity before attempting a shot.

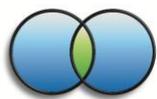
- In some circumstances a higher power rifle e.g. .223 or .22 magnum is preferred over a rim-fire .22 (e.g. Macquarie Island experience, where strong winds could influence accuracy of lower powered projectiles over distance).
- Rifles should have silencers if at all possible, to reduce potential disturbance factor. Shotguns should not be used.
- There is some suggestion that very strong spotlights cause cats to turn away from the light (e.g. Macquarie Is, Mexican islands experiences). Use lower powered spotlights (<50W recommended wattage).

2.11 DOGS

- In NZ dogs are only used for location of any remaining cats, not hunting them, as dogs are often muzzled to protect the dogs from prior use of poisons and to protect non-target species from the dogs, but hunting dogs can also be used. Hunting dogs would be most valuable in more open country, but may be risky in dense forest or rough/steep ground where the cat may have a higher chance of escape.
- With indicator dogs, once an area/pattern of presence has been detected, target the individual cat with selected control options (traps, toxins, etc) appropriate for the situation (bearing in mind past control options the cat may have encountered). Hunting dogs (i.e. those that detect and then kill the cat) are a possible option, particularly on more open islands where the chances of the dogs catching a cat are higher. However, caution should be applied to their use in heavily forested areas where the cat has a high chance of escape – it will become a very wary cat after such experiences, making it considerably more difficult to catch later.
- All dogs used in NZ should have DoC predator-dog certification, or if other than in NZ be trained and adequately assessed to ensure they can focus on cats and safely operate in the presence of other wildlife species.
- Dogs trained in wet habitats will have difficulty following scent in arid habitats but not vice versa.

3 SKILLS REQUIRED

- The Project Manager needs a good working knowledge of feral cat ecology and native prey ecology to manage operations effectively.
- Staff using or handling toxins need to have the appropriate training and certification
- Staff setting cat traps should have prior experience or have significant training and prior assessment and on-site supervision from such operators. Quality of trap-setting is perhaps the most important aspect in ensuring successful cat eradications. *It is recommended that 'new' trappers are trained prior to the commencement of trapping in eradication projects.*
- Those involved in the operation need to understand that eradication is different from control operations, as *all* individuals of the pest species must encounter one or more of the eradication methods and be put at risk. It requires commitment from the whole team to achieve this.



- For those projects involving extended stays on remote islands all people involved on the island need the ability to live and work harmoniously in such an environment. Particularly in the follow up and monitoring phases it is essential that all observations indicating possible cat presence are pooled and analysed collectively. This cannot happen with poor group dynamics. The inevitable consequence is increased cost and increased risk of failure.

4 CAUTIONS

- Non-target species may also be vulnerable to certain trap types
- Native non-target species may be vulnerable to toxins. Environmental effects (both negative and positive) need to be carefully considered during planning through preparing an AEE (Assessment of Environmental Effects)
- Any cat-detecting dogs need to be assessed for safety of use around non-target species found at the operational site. Seasonal use may reduce potential for disturbance or negative effects
- Community views on feral cat control and the individual methods can vary widely – effective stakeholder consultation with the community is required.

5 APPENDICES

Examples of Recommended Cat Trap Sets

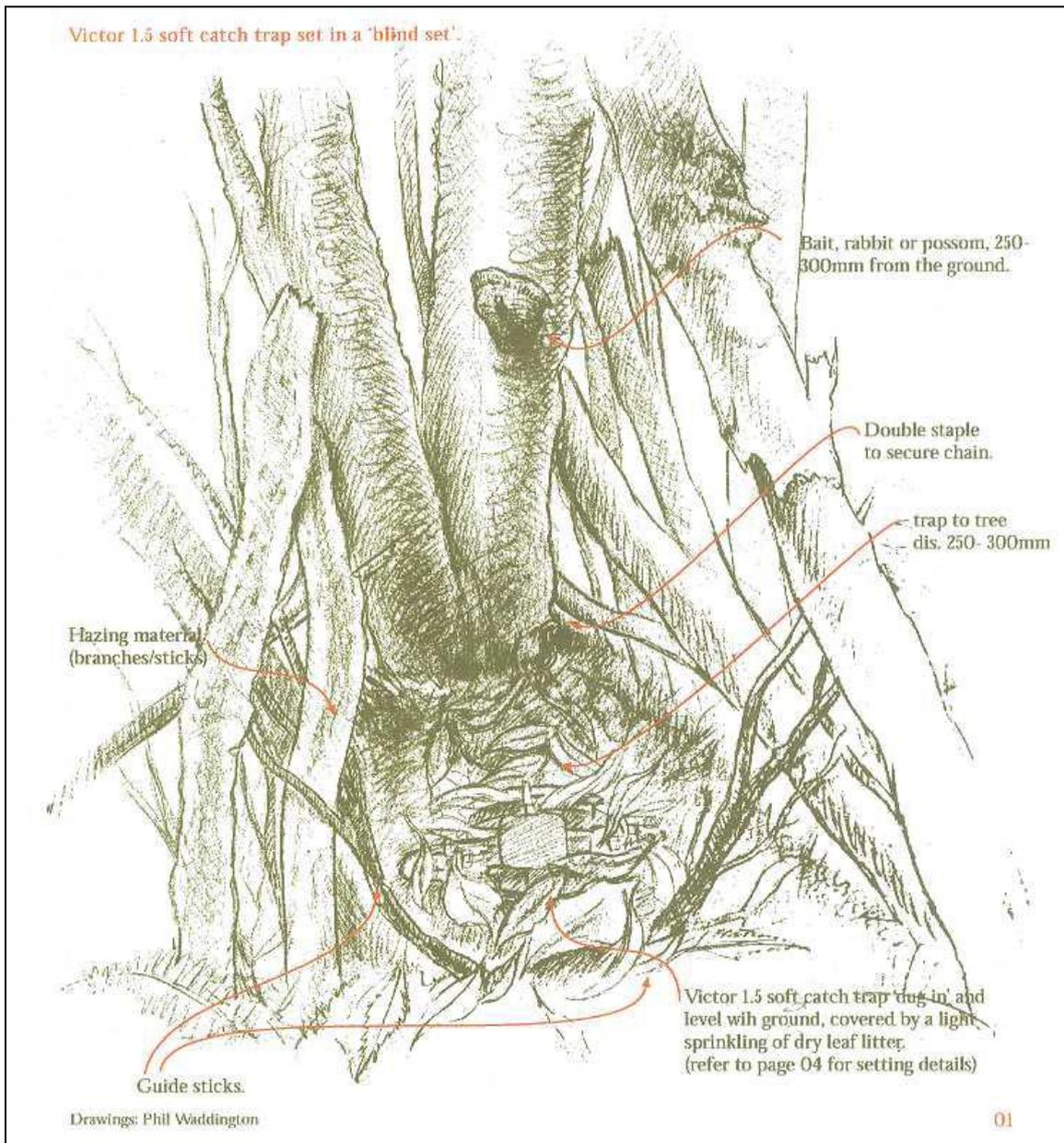


Figure 1. Baited Cubby set. A 'blind' or 'cubby' set suitable for use with Victor leg-hold traps (sizes 1 ½ hard jaw preferable, also 1 ½ soft catch, 1 hard jaw). Note that it is recommended that hazing is not as much as illustrated - it should be cat head-height only, and does not need to be a sturdy physical barrier. Trap trigger should be at side, so that jaws of trap lie parallel to cat's approach from the front.

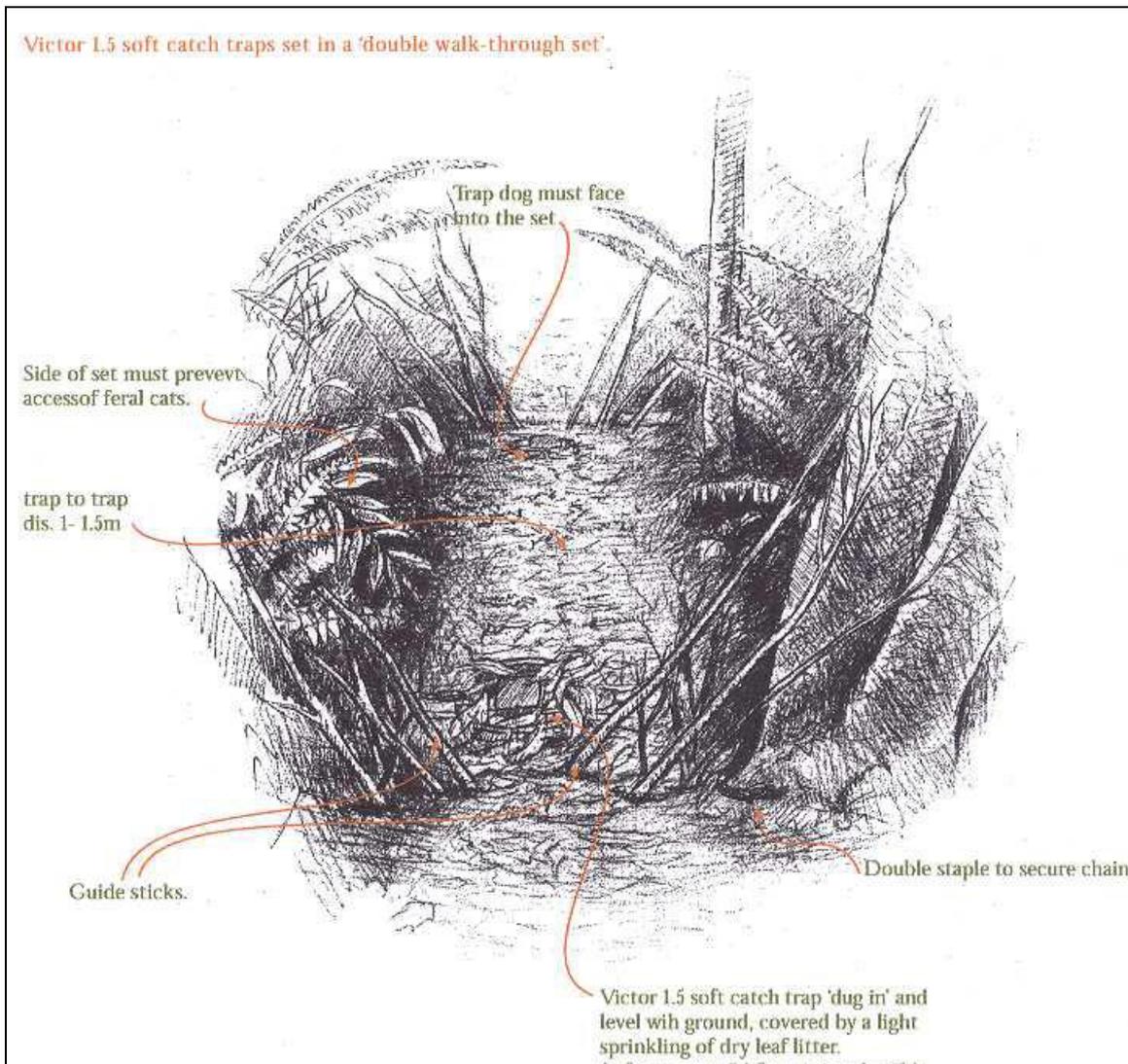
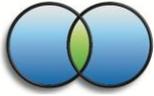


Fig. 2. A Walk-through Set. Suitable for use with Victor leg-hold traps (sizes 1 ½ hard jaw preferable, also 1 ½ soft catch, 1 hard jaw). Note two traps are set approximately 1 to 1.5m apart. Traps are camouflaged with a light sprinkling of fine leaf litter (avoiding any larger sticks or material that may inhibit the effective closing of the trap). Contrary to statement in illustration, the trap trigger should be at side, so that jaws of trap lie parallel to cat's approach from the front.

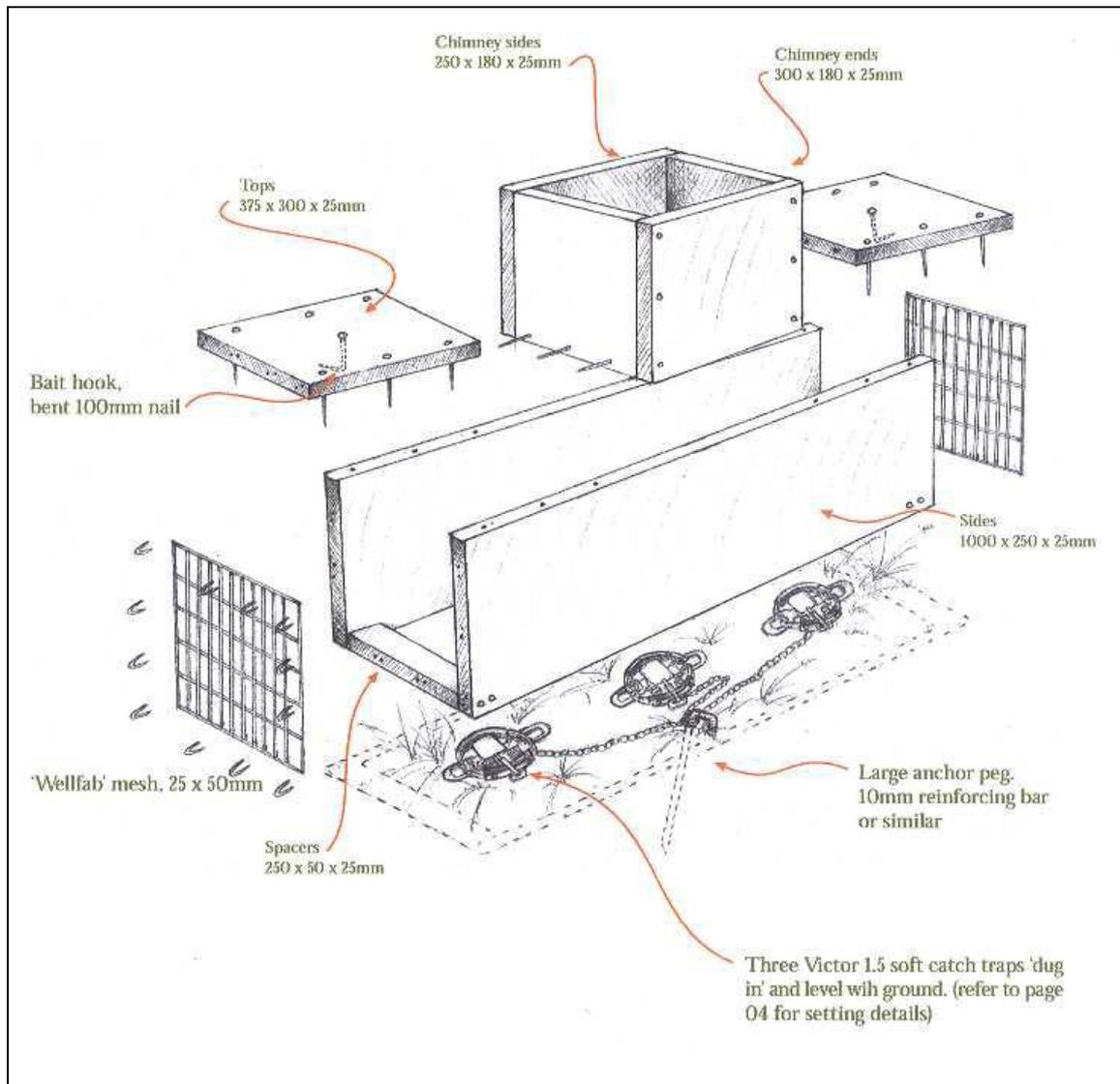


Fig. 3. Design and recommended setting for a chimney-type trap. This type of trap is bulky but an excellent option where there are vulnerable ground-dwelling non-target species – cats readily gain access through the open 'chimney' top but less agile species are not able.

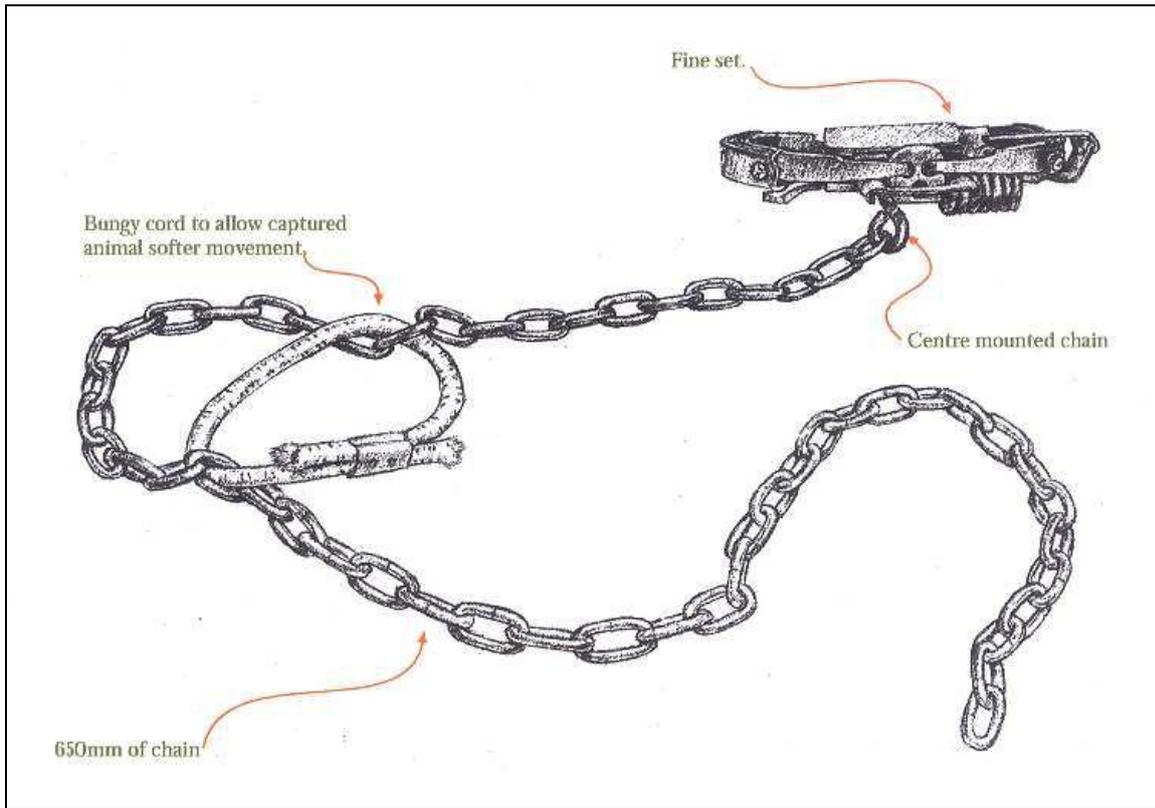


Fig. 4. Recommended chain attachment for a leg-hold trap.

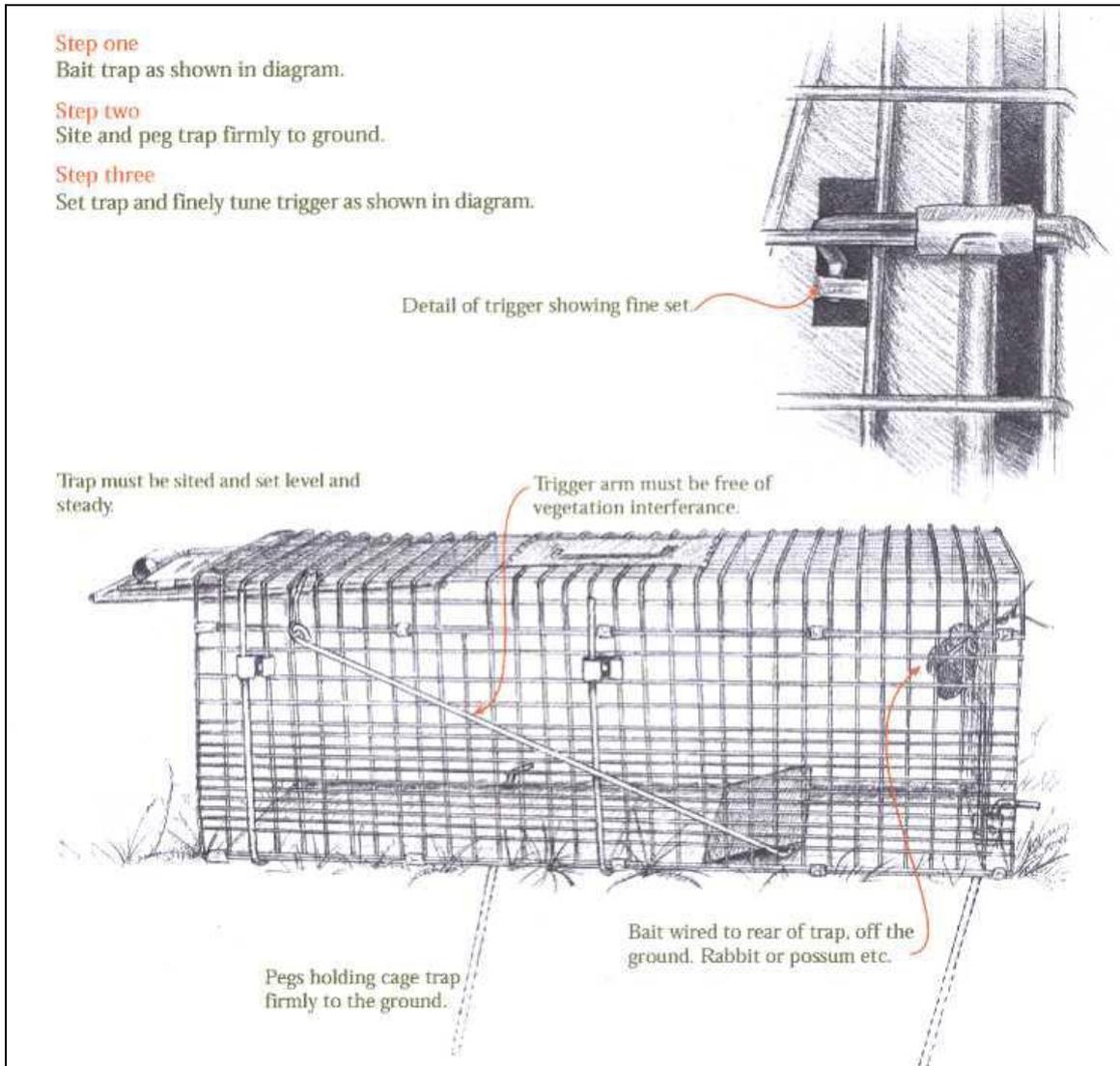


Fig 5. Recommended cage trap setting