A Decision Support System for pest control

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and Bruce Warburton

Landcare Research
Manaaki Whenua

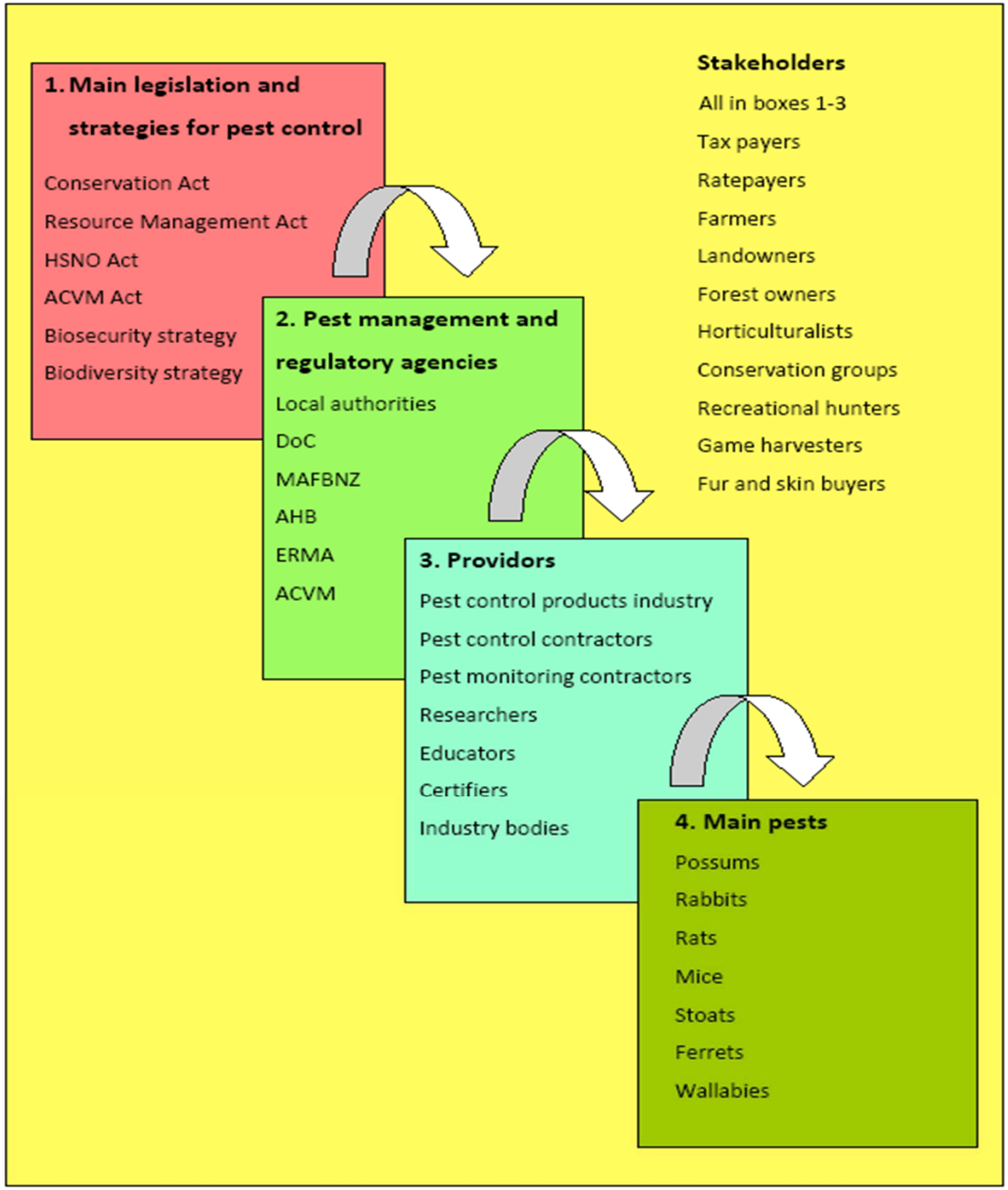
What is it?

- An internet-based system to assist in choosing the most appropriate pest control methods
- Presently – possums, rats, ferrets, stoats, cats
- Primarily for RC staff and community groups
- Funded as an Envirolink Tools project
- Many other potential users

Why?

1. **Good decision making**
   - help decision-making in a complex sector, based on science or expert advice

Pest control is a complex sector



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2. **Prioritising expenditure**
   - funds are limited – can't do everything
   - so, want best 'bangs for bucks' based on a reliable, transparent process

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3. **Consistent approach nationally**
   - part of the MAFBNZ toolbox??

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    ii. cost

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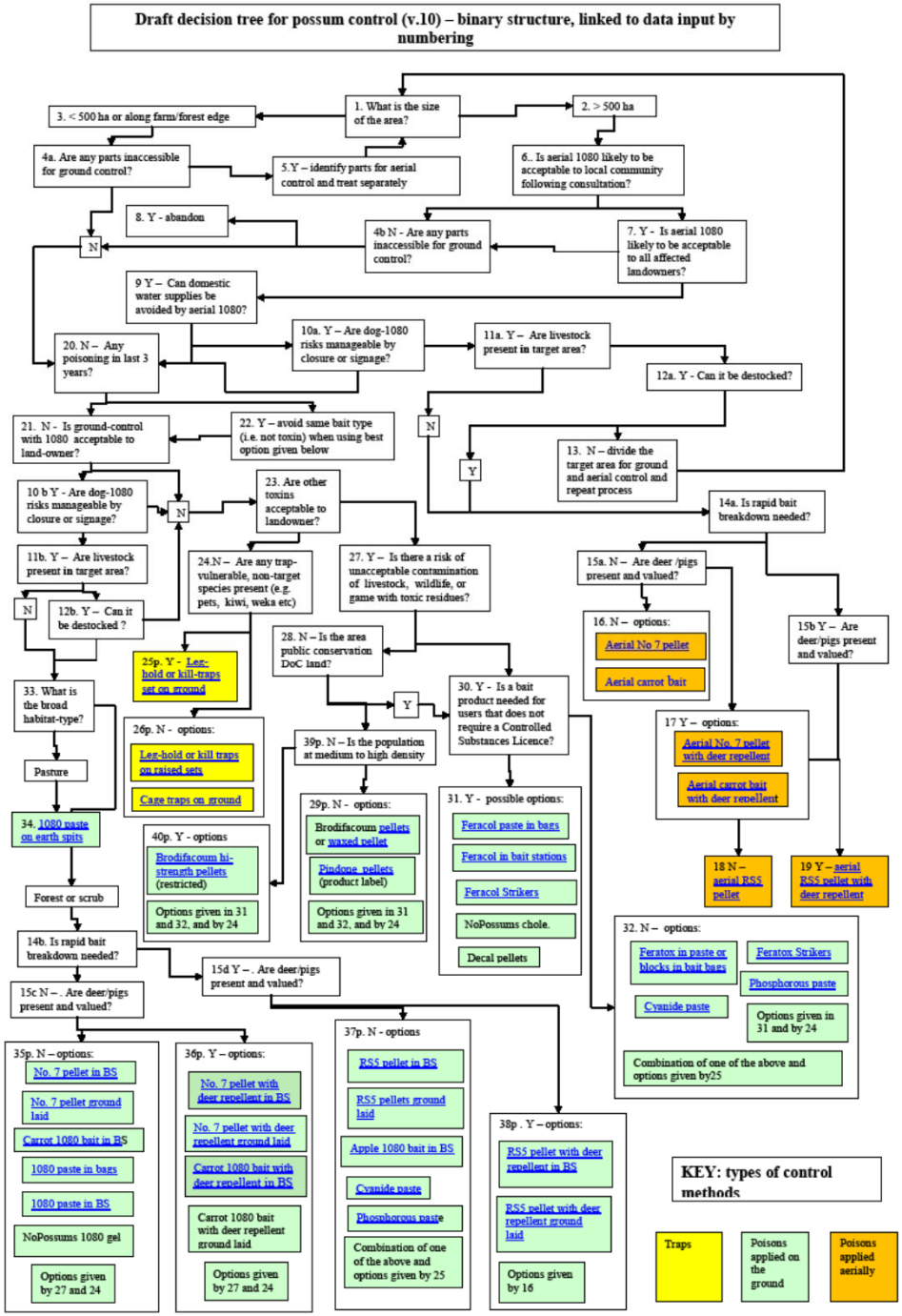
7. Prioritise jobs


Draft decision tree for possum control (v.10) – binary structure, linked to data input by numbering
1. What is the size of the area?
2. > 500 ha
3. < 500 ha or along farm/forest edge
4a. Are any parts inaccessible for ground control?
5.Y – identify parts for aerial control and treat separately
6.. Is aerial 1080 likely to be acceptable to local community following consultation?
7. Y - Is aerial 1080 likely to be acceptable to all affected landowners?
8. Y - abandon
4b N - Are any parts inaccessible for ground control?
N
9 Y – Can domestic water supplies be avoided by aerial 1080?
10a. Y – Are dog-1080 risks manageable by closure or signage?
11a. Y – Are livestock present in target area?
12a. Y - Can it be destocked?
20. N – Any poisoning in last 3 years?
21. N - Is ground-control with 1080 acceptable to land-owner?
22. Y – avoid same bait type (i.e. not toxin) when using best option given below
13. N – divide the target area for ground and aerial control and repeat process
Y
14a. Is rapid bait breakdown needed?
10 b Y - Are dog-1080 risks manageable by closure or signage?
23. Are other toxins acceptable to landowner?
11b. Y – Are livestock present in target area?
24.N – Are any trap-vulnerable, non-target species present (e.g. pets, kiwi, weka etc)
27. Y – Is there a risk of unacceptable contamination of livestock, wildlife, or game with toxic residues?
15a. N – Are deer /pigs present and valued?
12b. Y – Can it be destocked ?
16. N – options:
Aerial No 7 pellet
Aerial carrot bait
15b Y – Are deer/pigs present and valued?
28. N – Is the area public conservation DoC land?
25p. Y - Leg-hold or kill-traps set on ground
33. What is the broad habitat-type?
30. Y - Is a bait product needed for users that does not require a Controlled Substances Licence?
17 Y – options:
Aerial No. 7 pellet with deer repellent
Aerial carrot bait with deer repellent
26p. N - options:
Leg-hold or kill traps on raised sets
Cage traps on ground
39p. N – Is the population at medium to high density
Pasture
34. 1080 paste on earth spits
29p. N - options:
Brodifacoum pellets or waxed pellet
Pindone pellets (product label)
Options given in 31 and 32, and by 24
31. Y - possible options:
Feracol paste in bags
Feracol in bait stations
Feracol Strikers
NoPossums chole.
Decal pellets
18 N – aerial RS5 pellet
19 Y – aerial RS5 pellet with deer repellent
40p. Y - options
Brodifacoum hi-strength pellets (restricted)
Options given in 31 and 32, and by 24
Forest or scrub
14b. Is rapid bait breakdown needed?
15d Y – . Are deer/pigs present and valued?
15c N – . Are deer/pigs present and valued?
32. N – options:
Feratox in paste or blocks in bait bags
Feratox Strikers
Phosphorous paste
Cyanide paste
Options given in 31 and by 24
Combination of one of the above and options given by25
35p. N – options:
No. 7 pellet in BS
No. 7 pellet ground laid
Carrot 1080 bait in BS
1080 paste in bags
1080 paste in BS
NoPossums 1080 gel
Options given by 27 and 24
36p. Y – options:
No. 7 pellet with deer repellent in BS
No. 7 pellet with deer repellent ground laid
Carrot 1080 bait with deer repellent in BS
Carrot 1080 bait with deer repellent ground laid
Options given by 27 and 24
37p. N - options
RS5 pellet in BS
RS5 pellets ground laid
Apple 1080 bait in BS
Cyanide paste
Phosphorous paste
Combination of one of the above and options given by 25
38p . Y – options:
RS5 pellet with deer repellent in BS
RS5 pellet with deer repellent ground laid
Options given by 16
KEY: types of control methods
Traps
Poisons applied on the ground
Poisons applied aerially

[Link to DSS]

http://webtest5.landcareresearch.co.nz/

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VERTEBRATE PEST CONTROL

decision support system

Home About Best Practice Contact Us

Please select the pest you wish to control:


FERAL CAT


FERRET


POSSUM


RAT


STOAT

2010 International Year of Biodiversity

Biodiversity Priorities and the DSS

Landcare Research

Local intranet 85%

Location

[Next]

[Fields marked * are compulsory.]

Name of operational area:
Ashley

* Is control required in a block or along a perimeter (e.g. forest edge)?
◉ Block ○ Perimeter

* Area (ha) (consider potential for reinfestation and buffer area needed):
2460

Please select the region the operational area is in.

Region type: Regional Authorities Region: Canterbury

* Are any parts inaccessible for ground control?
○ Yes ◉ No

* Are livestock present in the area?
◉ Yes ○ No

* Can the area be destocked?
◉ Yes ○ No

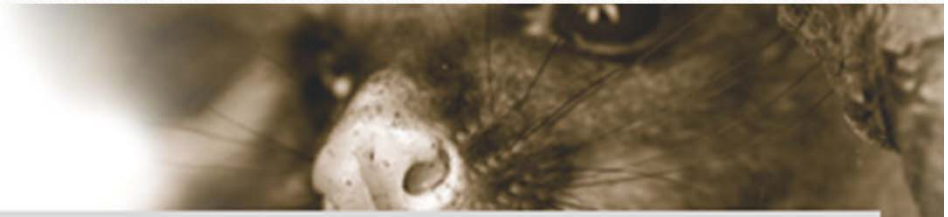
* Can the area be partially destocked?
○ Yes ◉ No

For how many days can the area be destocked?
30

Polygon reference number:
xxwwzz

Land owners (list all with LINZ descriptor):
file: g:/morgend/LINZ.as

VERTEBRATE PEST CONTROL



decision support system

Home About Best Practice Contact Us

Location > Habitat & Climate > Pest Problem > Control History & Operational Aim > Other Constraints > Control Options & Costs > Summary

Habitat & Climate

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[Fields marked * are compulsory.]

Vegetation description:
dwood forest - class IIa

* Predominant vegetation:
○ Pasture ◉ Forest/scrub

Terrain:
Gentle hills

Rainfall (mm/year):
240

Altitude range (m):
200-300

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Pest Problem

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[Fields marked * are compulsory.]

Biodiversity values threatened:
Mistletoe, Dactylanthu

Desired outcome:
Stable-increasing pop

Optimal time for control:
Spring

This is based on:
○ Pest biology ○ Landowner preference ◉ Logistics ○ Budgets ○ Other

Control History & Operational Aim

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[Fields marked * are compulsory.]

* Has any poisoning been done in the last 3 years?

◉ Yes ○ No

Time Period	Poison	Date Completed
☐ Previous 12 months		
☑ 1-2 years ago	Cyanide paste	30 June 2008
☑ 2-3 years ago	No 7 pellet in bait station	30 May 2007

Is there an existing, suitable bait station network in place?

○ Yes ◉ No

What is the operational control target? (e.g. as RTCI, or % interference with waxtags or chewcards)

3% RTCI

When must the control be completed by?

31 Oct 2010

What determines the deadline for completion?

Monitoring required in

Other Constraints on Control Options

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[Fields marked * are compulsory.]

* Is the area DoC managed public land?
(•) Yes ( ) No

* If using poison baits, would rapid bait breakdown be needed to enable early restocking?
(•) Yes ( ) No

* Are any trap-vulnerable, non-target species present (e.g. pets, kiwi, weka etc.)?
( ) Yes (•) No

* Are deer or pigs present and valued (therefore to be protected)?
(•) Yes ( ) No

* Is there a risk of unacceptable contamination of wildlife or game if anticoagulant poisons are used?
( ) Yes (•) No

* Is ground control with 1080 likely to receive Public Health Permission and the approval of landowner(s)?
(•) Yes ( ) No

* Will control be carried out by persons who do not have a Controlled Substances Licence?
( ) Yes (•) No

* Are toxins other than 1080 likely to receive Public Health Permission and the approval of landowner(s)?
(•) Yes ( ) No

* Is aerial 1080 likely to be acceptable to the local community following consultation/notification?
○ Yes ◉ No

* Is aerial 1080 likely to receive Public Health Permission and the approval of landowners?
○ Yes ◉ No

* Are dog 1080 risks manageable by closure or signage?
◉ Yes ○ No

* Can domestic water supplies be avoided during aerial 1080?
◉ Yes ○ No

* Is the operator an experienced trapper?
◉ Yes ○ No

* Is the operator capable of killing trapped animals humanely?
◉ Yes ○ No

* Can the operator check traps every day within 12 hours of sunrise?
◉ Yes ○ No

* Are there kiwi or weka present?
◉ Yes ○ No

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Control Options & Costs

Available options	Method used in last 3 years[1]	Cost/ha of treated[2] area	Source of cost data
Feratox in paste in bait bags	No	$28.00	Pest contracts - file:
Feratox in blocks in bait bags	No	$30.00	Pest contracts - file:
Feratox strikers	No	$32.00	Costed - file:
Cyanide paste	Yes	$26.00	Pest contracts - file:
Phosphorous paste	No	$25.00	Pest contracts - file:
Feracol in bait stations	No	$34.00	Costed - file:
Feracol in bait bags	No	$32.00	Costed - file:
Feracol strikers	No	$30.00	Pest contracts - file:
NoPossums chole	No	$38.00	Costed - file:
Decal pellets	Yes	$36.00	Costed - file:
Leg-hold or kill-traps set on ground	No	$36	Costed - file:
Kill traps on ground	No	$45	Costed - file:
Cage or box traps	No	$60	Costed - file:

See also available traps.

1. Note that reuse within 3 years of a particular bait type containing either 1080 or cholecalciferol, or reuse within 3 years of cyanide paste may result in lower effectiveness due to bait-shyness.
2. Cost calculated for only the actual area treated, i.e. not areas of farmland protected.

Download Cost Calculator

Possum Control Cost Calculator

This series of spreadsheets can help you generate estimates of operational control costs.
Because they cannot include all variables, the estimates should be considered as indicative only.

Control options

- Ground-based control with or without aerial prefeed
- Ground control using bait-stations
- Detection survey and ground control
- Aerial control

RTC to Density Converter

Prepared by Bruce Warburton.
Any queries please send an email to warburtonb@landcareresearch.co.nz

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Estimating costs of ground control using bait stations

Input values into white cells. Select from dropdown lists in blue cells. The cells with a red top-right corner have a comment

Operational area

Total area (ha)	2000
Habitat area (ha)	1500

Ground control

Km covered/day/person	4
Contractor price/day	$350
Habitat hectares per bait station	2

Person days and costs

Total person days for establishing stations	33
Total person days for servicing stations	75
Total person days for trapping	6
Total person costs	$39,900.00
Total person costs if bait stations established	$28,350

Total costs including buying stations =	**$52,050.00**
Total costs per total ha =	**$26.03**
Total costs per habitat ha =	**$34.70**
Total costs with B-Stations established =	**$36,300.00**
Total costs per total ha =	**$18.15**
Total costs per habitat ha =	**$24.20**

Note: These costs do not include consultation

Bait stations

Bait station type	Sentry
Cost/station	$7.00
Life expectancy of stations (years)	5
Annual bait station depreciation costs	$1,050.00
Total bait station costs	$5,250.00

Prefeeding

Prefeed per bait station (Kg)	1.5
Bait costs/kg	$2.00
Number of prefeeds	2
Total prefeed costs	$4,500

Toxic baiting

Bait type	Feratox
Cost/bait ($)	$0.60
Toxic baits/station	4
Approx toxic bait costs	$1,800
Check if toxic bait needs removing	☐

Trapping

Check if traps used as part of control:	☑
Proportion of bait stations to be trapped at	20 %
Number of traps to be set at each station	1
Number of nights trapped	3
Depreciation on traps:	$600

Reset all inputs to zero

decision support system

Summary

Ashley	
Pest species targeted	Possum
Location	Region: Canterbury. Polygon reference number: xxxyyyzzz
Area	2450ha
Land owners	File: G/morgand/LINZ/ashley
Habitat	Vegetation: Hardwood forest - class IIa Predominantly forest/scrub. Terrain: Gentle hills Annual rainfall: 240 mm/year. Alitiude: 200-300m.
Biodiversity values threatened	Mistletoe, Dactylanthus
Desired outcome	Stable-increasing populations
Control history	30 June 2008: Cyanide paste. 2-3 years ago: No 7 pellet in bait station.
Operational control target	3% RTCI
Time frame	Optimal time for control: Spring Maximum time available: 1 month Control must be completed by 31 Oct 2010. This is determined by: Monitoring required in spring

Recommended Control Methods

See also available traps.

Control Method	Cost/ha	Weighting	Benefit	Success	Efficiency	
1. Phosphorous paste	$25.00	.7	.8	.7	[Calculate]	0.01568
2. Cyanide paste	$26.00	.7	.8	.8	[Calculate]	0.017230769
3. Feratox in paste in bait bags	$28.00	.7	.8	.9	[Calculate]	0.018

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From: Vertebrate Pest Decision Support System – Landcare Research – July 2010

POSSUM CONTROL - USING FERACOL® IN BAIT STATIONS, BAIT BAGS OR 'STRIKERS'

MATERIALS

Bait

- Feracol is a peanut butter flavoured bait, highly palatable to possums [1]. The active ingredient is Cholecalciferol (vitamin D_3) in a concentrated form. This is very toxic to some animals, and possums in particular. It kills possums by elevating plasma calcium levels resulting in heart failure. Feracol comes in paste and block formulations which can be used in bait stations, if already in place, or bait bags if not. It is also supplied in ready-to-use 'Strikers'.
- Feracol is effective in controlling rats also, so unlike Feratox, it does not require preliminary control of rats where these pests are abundant.
- Only freshly manufactured bait should be used. Bait that has previously been in the field must not be reused. Only buy as much bait as you need for the operation. This ensures high bait palatability, which has a direct influence on success. Old bait is likely to have absorbed moisture, have mould growth and be less palatable.

Bait bags

- Bags must be biodegradable, marked with a warning, and able to hold 12 - 20 g of bait.
- An example that fits these criteria is Connovation's Biobag.

Bait stations

- Key requirements are: allow possums easy access, limits access by non-targets, protects bait from the elements, limits bait spillage, holds at least 200gm of bait, easy to fill (and transport when establishing the network), be durable and designed for easy attachment to trees and fences.
- Examples that fit the criteria are the Kilmore and large Philproof bait stations.

TECHNIQUE

Bait stations

- No greater than 100 m apart in forest habitats [2]. Average home range of male possums is 1.9ha and females is 1.3 ha [3].
- Laid out on grids by compass bearing [4, 5] or, in rough terrain, placed on ridges and spurs with additional lines located on 100 m contours using an altimeter. Spacing should

Availability

- Presently being tested by experienced pest managers
- Publically available by end-August
- Publicity

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Conclusion – the DSS provides:

- An expert, objective system
- Transparency/accountability
- Best current practice
- Costing tools
- Prioritisation

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We thank:

- Envirolink
- Richard Bowman
- Richard Maloney
- DoC
- NPCA

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Examples of DoC Goals

- Secure from extinction
- Long-term recovery
- Best minimum set of ecosystems ('zoos')
- Maximise ecological integrity ('restoration')
- Ecosystem services

Examples of RC Goals

- Retain current levels of biodiversity adjacent to human settlement
- Habitat protection
- Community participation
- Halting decline
- Protect and restore