

DOC snap trap guide v1.3: Using snap traps to index rodent abundance



This specification was prepared by Craig Gillies¹.

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Background

This protocol describes a technique for indexing rodent relative abundance. It is not, however, a standalone protocol; it is designed to be used in conjunction with the current DOC best practice document 'Guide to the identification and collection of New Zealand rodents' by (Cunningham & Moors 1996).² Note: in those instances where the information contained in this protocol differs from that in the Cunningham & Moors (1996) guide, this document has primacy. This document updates the original method described in 'DOC snap trap guide v1.2' (olddm-129114) with minor improvements and modifications. We also recommend users first read the overview of this method in '[Snap trap indices of rodent abundance](#)'—docdm-322683.

Introduction

Snap traps have been used for many years to index the relative abundance of rodents in both management and research situations. The technique uses 'break back' snap traps, set over 3 nights to catch rats and mice. The traps are set on randomly orientated lines and results are recorded as the number of rats or mice caught per 100 corrected trap-nights (C100TN) (Nelson & Clark 1973). This guide may be used as a standardized method for DOC staff to follow for indexing rodent abundance using snap traps.

Methods

Some things to consider before setting up a snap trapping survey

This method for indexing rodent populations only provides a coarse index of relative abundance; it is not a direct measure of population density. We recommend that snap trap indices are best used to monitor the effects of one-off poison operations on rodents, or surveying to identify what rodent species are present in an area. If you wish to monitor the effects on rodents of ongoing (over a season or longer) pest control operations you may want to consider using tracking tunnels.

Choosing line locations for indexing rodent abundance

For most study sites (up to c. 1000 ha), four to ten snap trap lines should be sufficient. We have suggested some guidelines for the number of trap lines for different sizes of survey area (Table 1) for indexing rodent abundance. Of course, some areas will be easier to survey than others but the more lines you can set up the better. Each tunnel line consists of 40 traps (20 rat traps and 20 mouse traps) set at 20 m spacings. At each trap site one rat and one mouse trap are set under separate covers. Each trap line should be no closer than a minimum of 200 m from the nearest adjacent rodent snap trap line at the closest point.

² <http://www.doc.govt.nz/documents/science-and-technical/rodent-identification.pdf>



Table 1. Suggested number of snap trap lines to use for surveying rodents.

Approximate area to be surveyed	<100 ha	100–1000 ha	> 1000 ha
Suggested minimum number of trap lines	3 lines	4–10 lines (i.e. four lines plus one additional line per every 150 ha over 100 ha)	11–20 lines (or more if logistically feasible)

When setting out snap trap lines one of the most important rules is to ensure that representative habitats are sampled. The easiest way to do this is to consider the gross habitat types that make up your study site and what proportion of that area they make up. So, for example, if 50% of your study area is red beech forest, then 50% of your survey effort should be focused in that habitat type. Generally speaking, the start points for each line should be determined by habitat type, access, logistics (all lines need to be serviced on the same day) and the distance away from the next nearest snap trap line.

When determining the direction the snap trap line runs, avoid running lines entirely along geographic features (e.g. roads, ridgelines or streams) or other potential sources of bias such as along bait station lines. The best way to avoid any bias is to randomise the direction each snap trap line runs. A simple method we use is to roll a six-sided die and the number rolled determines the compass bearing from the start point along which the line is set out (Table 2). Run the line in the most practicable of the two bearings, either Easterly or Westerly, from the designated start point. If you can't decide which to choose, roll the die again. Pick the Westerly bearing if the result is an odd number, and the Easterly if the result is an even number.

Table 2. Suggested method for determining the direction (compass bearing) of each snap trapping line.

Die roll	Angle of tunnel line (magnetic)
1	285°W–105°E
2	315°W–135°E
3	345°W–165°E
4	15°E–195°W
5	45°E–225°W
6	75°E–255°W

Setting out the traps and lines for indexing rodent abundance

1. Mark the trap locations with flagging tape.
2. Write each trap site number on the flagging tape.
3. Assemble the trap covers as you put them out in the field (see [‘Trap set construction’](#)).



4. Bait the traps with a suitably sized blob of 1:1 crunchy peanut butter and rolled oats mixture.
5. Site the traps at the most suitable spot within 2 m of the 20-m marker along the line (e.g. places that look like they would provide a good 'run' for small mammals). Set the mouse and rat traps under their separate covers (see '[Trap set construction](#)') at least 50 cm from each other but no further than 1 m apart.
6. Place each trap on reasonably level ground. If the surface is uneven, scuff the ground with your boot to create an even surface if possible.
7. Ensure that the trap cover is firmly in place by pegging it down with a No. 8 wire hoop and that the trap is secured to the hoop by a piece of twine (see '[Trap set construction](#)').
8. Check that access to the trap cover entrance is unobstructed and that the strike bar will not scrape or get caught on the cover when the trap is set off.

Trap set construction

The best traps to use are Victor professional snap traps for rats and mice (Fig. 1); these should be set under black plastic 'corflute' covers, secured in place with wire hoops (Figs 2 & 3). Corflute is the material used for real estate signs; it is cheap, light in weight and reasonably rigid. These corflute covers should be cut to shape (see Figs 4 & 5 for dimensions) with the folds creased to ensure they can be quickly assembled in the field. Once folded to shape these covers can be held together using large elastic bands. The covers should also be secured in place with No. 8 wire hoops (200 mm (H) × 110 mm (W) for rat trap covers and 160 mm (H) × 65 mm (W) for mouse trap covers). In order to reduce the likelihood of them being removed by scavengers or possums, the traps should also be secured in place. This can be done using a small piece of twine (c. 200 mm for the rat trap and c. 100 mm for the mouse trap) tied to a small hole drilled in the edge (opposite to where the strike bar lands) of the wooden base of the trap (Fig. 1), which can then be secured to the wire hoop that holds the corflute cover in place (Figs 2 & 3).





Figure 1. Victor professional rat trap and Victor professional mouse trap; each has a piece of twine attached which can be looped around the wire hoops used to secure the covers in place.

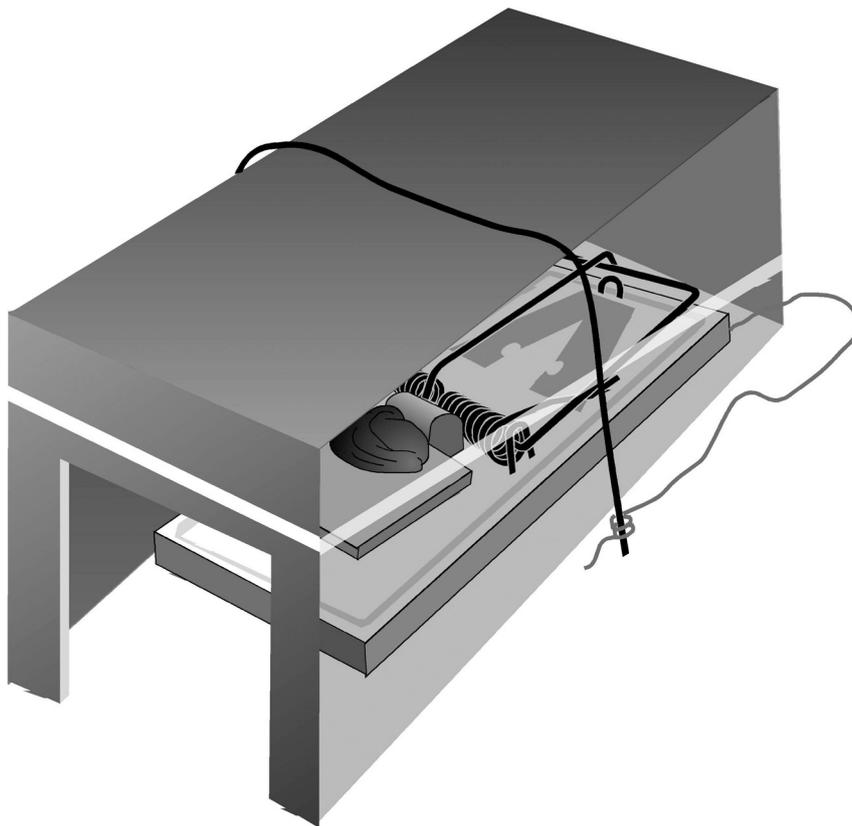


Figure 2. Black corflute rat trap cover assembled and held in place with No. 8 wire hoop.



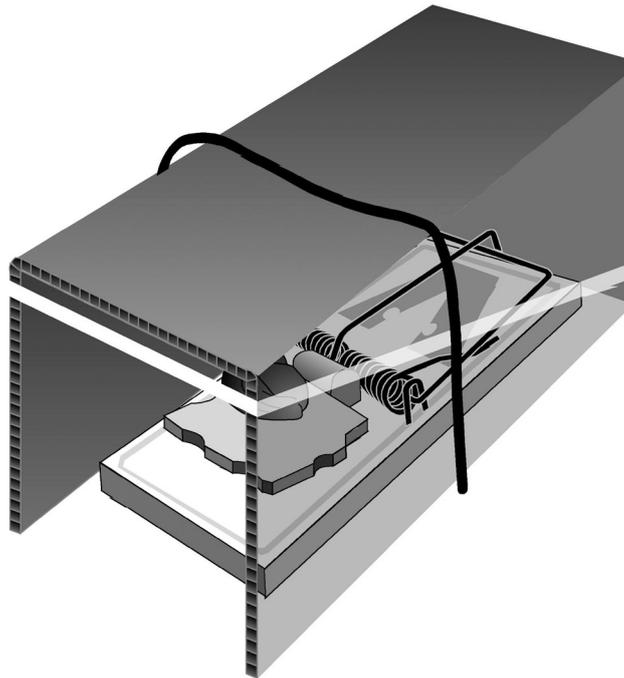


Figure 3. Black corflute mouse trap cover assembled and held in place with No. 8 wire hoop.

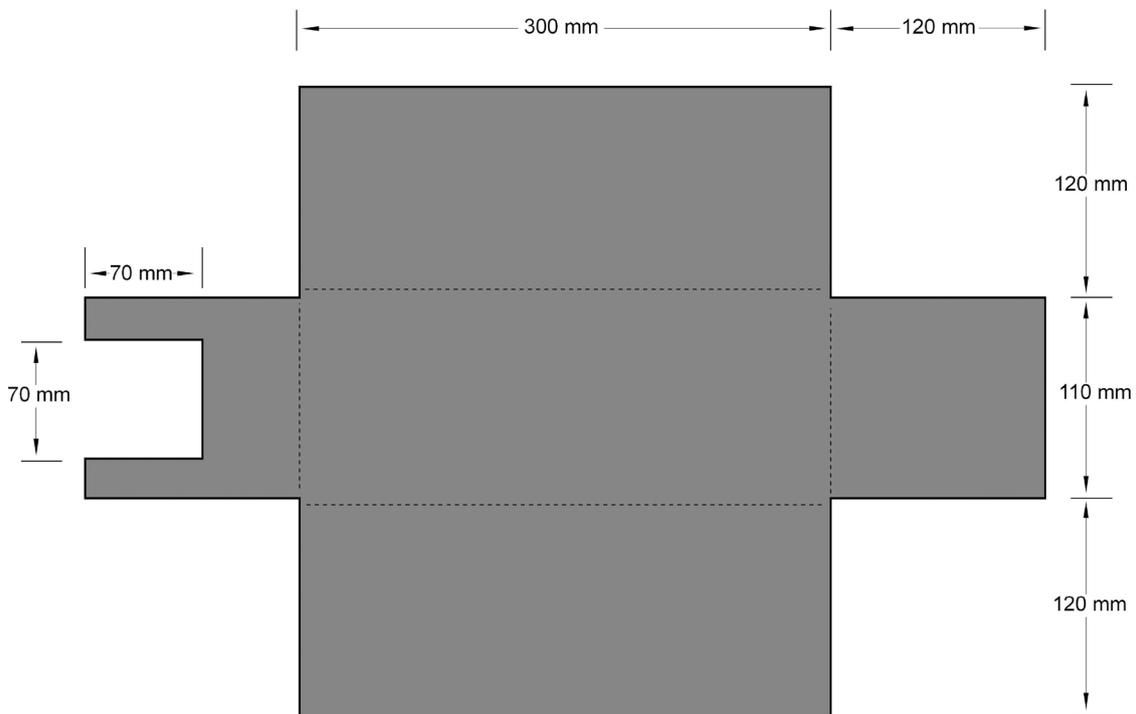


Figure 4. Black corflute rat trap cover unassembled showing shape and dimensions.



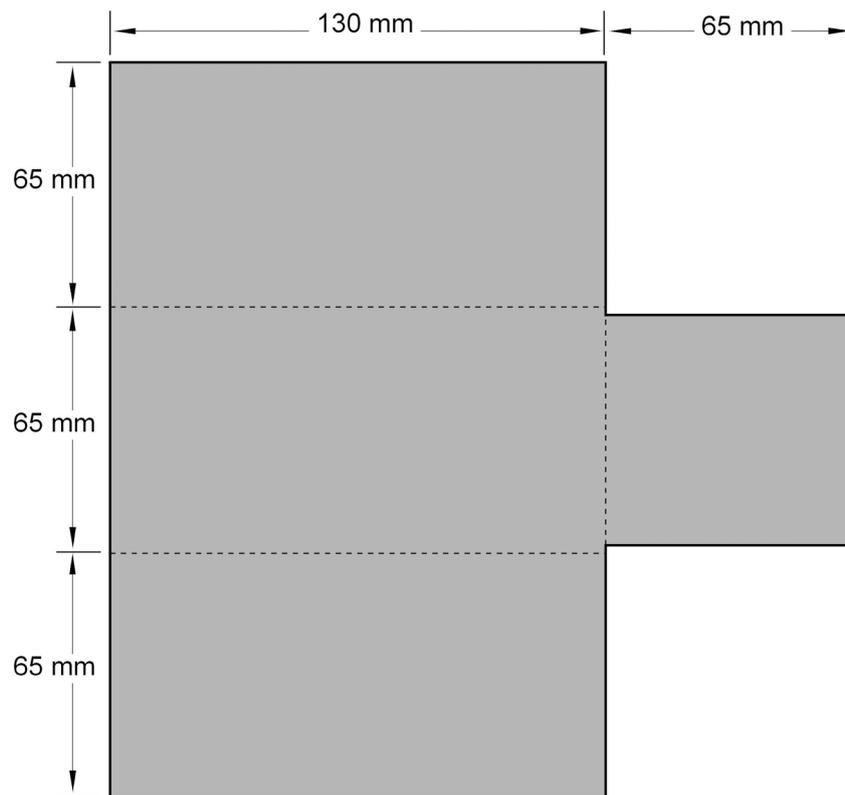


Figure 5. Black corflute mouse trap cover unassembled showing shape and dimensions.

Using the snap traps to index rodents—read Cunningham & Moors (1996)³

Each rodent survey is conducted over 3 nights.

- Day 1 Mark out lines, assemble trap covers, set and bait all traps. Log and save the start and end locations of each line into a GPS and note the line number on the waypoint.
- Day 2 Check, clear, reset and re-bait any sprung traps. Record results for all traps (see [‘What to record when checking the traps and notation’](#) below).
- Day 3 Check, clear, reset and re-bait any sprung traps. Record results for all traps (see [‘What to record when checking the traps and notation’](#) below).
- Day 4 Check, clear any sprung traps and collect all covers, traps and markers and remove from the field. Record results for all traps (see [‘What to record when checking the traps and notation’](#) below).

³ <http://www.doc.govt.nz/documents/science-and-technical/rodent-identification.pdf>

Calculating the rodent index of abundance

What to record when checking the traps and notation

In your field notes use the following system to record the trap checking data. At each check (days 2–4) note what the weather was like the previous night, the date and the number of the line you are checking. Record the results for each trap using the following notation:

SB	Trap is still set with bait
SNB	Trap is still set, but the bait has been taken
SPRB	Trap has been sprung, bait is still present
SPRNB	Trap has been sprung and the bait has been taken
SPRSRAT	Trap has caught a ship rat
SPRNRAT	Trap has caught a Norway rat
SPRMUS	Trap has caught a mouse
SPRKIORE	Trap has caught a kiore
SPROTH	Trap has caught something else (note spp.)
NOT SET	Trap missing or removed from the survey

For all target captures make a brief note on the sex and colour of the animal captured (see Cunningham & Moors 1996).

Calculating the captures per 100 corrected trap-nights (C100TN)

The snap trapping index of relative abundance for rodents is expressed as the mean number of rats or mice captured per 100 corrected trap-nights (C100TN) per trap line (Nelson & Clark 1973). You should calculate the mean number of rats C100TN per line from what was caught in the rat traps, and the number of mice C100TN per line from what was caught in the mouse traps, even though you may catch mice in the rat traps and the occasional rat in the mouse traps. To calculate the corrected number of trap-nights you essentially make an allowance for all those traps which have been sprung. To do this,

Subtract half a night for each of those traps (whether or not they had caught a rodent) on the assumption that each will have been sprung for an average of half the night. Do not make a correction for unsprung traps with the bait removed because they were still theoretically capable of catching a rodent. The index of abundance is calculated at the end of the trapping session from the total number of rodents caught and the total number of corrected



trap-nights, and is expressed as the number of captures per 100 trap-nights. (Cunningham & Moors 1996: 17–18)

Calculate the C100TN for each line, and then calculate the mean of this for all the lines. So, for example, consider the following hypothetical results from the rat traps on a three-line survey:

For line 1, after 3 nights:

- 2 ship rats were caught (i.e. $2 \times \text{SPRSRAT}$)
- 2 traps were sprung and the bait taken (i.e. $2 \times \text{SPRNB}$)
- 2 traps were sprung and the bait was still present (i.e. $2 \times \text{SPRB}$)
- 1 trap was set but the bait was taken (i.e. $1 \times \text{SNB}$)
- 53 traps were still set with the bait present (i.e. $53 \times \text{SB}$)

For line 2, after 3 nights:

- 4 ship rats were caught (i.e. $4 \times \text{SPRSRAT}$)
- 3 traps caught mice (i.e. $3 \times \text{SPRMUS}$)
- 2 traps were sprung and the bait taken (i.e. $2 \times \text{SPRNB}$)
- 51 traps were still set with the bait present (i.e. $51 \times \text{SB}$)

For line 3, after 3 nights:

- 4 ship rats were caught (i.e. $4 \times \text{SPRSRAT}$)
- 3 traps were sprung and the bait taken (i.e. $3 \times \text{SPRNB}$)
- 2 traps were sprung and the bait was still present (i.e. $2 \times \text{SPRB}$)
- 1 trap was sprung by a juvenile possum (i.e. $1 \times \text{SPROTH}$)
- 50 traps were still set with the bait present (i.e. $50 \times \text{SB}$)

So, first you need to calculate the C100TN of rats each line.

For line 1:

Total number of trap-nights = 20 traps set for 3 nights
 = 20×3
 = **60**

The number of trap-nights lost = $\frac{1}{2} \times (\text{number of captures} + \text{number of sprung traps})$
 = $\frac{1}{2} \times (2 \text{ SPSRAT} + 2 \text{ SPRNB} + 2 \text{ SPRB})$
 = $\frac{1}{2} \times (2 + 2 + 2)$
 = **3**

The corrected number of trap-nights = total trap-nights – trap-nights lost
 = $60 - 3$
 = **57**



$$\begin{aligned}
 \text{Rats C100TN} &= (\text{number of captures} \times 100) \div \text{corrected trap-nights} \\
 &= (2 \text{ SPRSRAT} \times 100) \div 57 \\
 &= (2 \times 100) \div 57 \\
 &= 200 \div 57 \\
 &= \mathbf{3.5}
 \end{aligned}$$

For line 2:

$$\begin{aligned}
 \text{Total number of trap-nights} &= 20 \text{ traps set for 3 nights} \\
 &= 20 \times 3 \\
 &= \mathbf{60}
 \end{aligned}$$

$$\begin{aligned}
 \text{The number of trap-nights lost} &= \frac{1}{2} \times (\text{number of captures} + \text{number of sprung traps}) \\
 &= \frac{1}{2} \times (4 \text{ SPSRAT} + 3 \text{ SPRMUS} + 2 \text{ SPRNB}) \\
 &= \frac{1}{2} \times (4 + 3 + 2) \\
 &= \mathbf{4.5}
 \end{aligned}$$

$$\begin{aligned}
 \text{The corrected number of trap-nights} &= \text{total trap-nights} - \text{trap-nights lost} \\
 &= 60 - 4.5 \\
 &= \mathbf{55.5}
 \end{aligned}$$

$$\begin{aligned}
 \text{Rats C100TN} &= (\text{number of captures} \times 100) \div \text{corrected trap-nights} \\
 &= (4 \text{ SPRSRAT} \times 100) \div 55.5 \\
 &= (4 \times 100) \div 55.5 \\
 &= 400 \div 55.5 \\
 &= \mathbf{7.2}
 \end{aligned}$$

For line 3:

$$\begin{aligned}
 \text{Total number of trap-nights} &= 20 \text{ traps set for 3 nights} \\
 &= 20 \times 3 \\
 &= \mathbf{60}
 \end{aligned}$$

$$\begin{aligned}
 \text{The number of trap-nights lost} &= \frac{1}{2} \times (\text{number of captures} + \text{number of sprung traps}) \\
 &= \frac{1}{2} \times (4 \text{ SPSRAT} + 3 \text{ SPRNB} + 2 \text{ SPRB} + 1 \text{ SPROTH}) \\
 &= \frac{1}{2} \times (4 + 3 + 2 + 1) \\
 &= \mathbf{5}
 \end{aligned}$$

$$\begin{aligned}
 \text{The corrected number of trap-nights} &= \text{total trap-nights} - \text{trap-nights lost} \\
 &= 60 - 5 \\
 &= \mathbf{55}
 \end{aligned}$$

$$\begin{aligned}
 \text{Rats C100TN} &= (\text{number of captures} \times 100) \div \text{corrected trap-nights} \\
 &= (4 \text{ SPRSRAT} \times 100) \div 55 \\
 &= (4 \times 100) \div 55 \\
 &= 400 \div 55 \\
 &= \mathbf{7.3}
 \end{aligned}$$

To calculate the mean (average) number of rats C100TN per line, add the rats C100TN from each line and divide the total by the number of lines. So, in this example:



$$\begin{aligned}\text{Mean rats C100TN per line} &= (\text{rats C100TN line 1} + \text{line 2} + \text{line 3}) \div 3 \\ &= (3.5 + 5 + 7.3) \div 3 \\ &= (15.8) \div 3 \\ &= \mathbf{5.3}\end{aligned}$$

You can also calculate the standard error of the mean if you like. The standard error (SE) is simply a measure of the precision of the mean. It is often very useful to express the mean number of animals C100TN per line plus or minus SE. If you use a calculator with statistics functions you can calculate the standard deviation ($\delta n-1$ button) of your sample (of C100TN from each of your survey lines). The standard error can then be calculated from the standard deviation. The standard error is equal to the standard deviation divided by the square root of the sample size, which for these surveys is the square root of the number of lines.

If you are familiar with using MS Excel you could use or modify a copy of 'DOC snap trap C100TN calc' (docdm-292725). This will calculate the number of rats or mice C100TN for each line and provide the mean (\pm SE) C100TN per line as well. Note: in that spreadsheet you only need to enter data or information in non-shaded cells.

References

- Cunningham, D.M.; Moors, P.J. 1996: Guide to the identification and collection of New Zealand rodents. 3rd edition. Department of Conservation, Wellington.
- Nelson, L.; Clark, F.W. 1973: Correction for sprung traps in catch/effort calculations of trapping results. *Journal of Mammalogy* 54: 295–298.



Appendix A

The following Department of Conservation documents are referred to in this method:

docdm-292725	DOC snap trap C100TN calculator
olddm-129114	DOC snap trap guide v1.2
docdm-322683	Snap trap indices of rodent abundance