

# Animal pests: Tier 1 possum monitoring trials fact sheet



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Image courtesy of D. Forsyth, Arthur Rylah Institute for Environmental Research.

## Key messages

- From October 2015 on, the New Zealand Department of Conservation (DOC) will monitor possum abundances using a chew card index (CCI) instead of trap catch index (TCI) as part of the DOC Tier 1 national biodiversity monitoring and reporting.
- Extensive field trials determined that CCI calibrated satisfactorily with TCI at multiple sample locations.
- These trials and the decision to change to CCI monitoring is an operational decision specific to DOC's Tier 1 national monitoring programme.

## Background

DOC annually monitors the abundance of introduced brushtail possums at systematically selected sampling locations on public conservation land as part of the national Biodiversity Monitoring and Reporting System (BMRS, or 'Tier 1' monitoring). These data are used to report on the status and trend of possums, and the effectiveness of possum management, on public conservation land. The method used to monitor possum abundances since this monitoring programme began in 2011 was the TCI.



A TCI is obtained for each sampling location (about 285 are monitored annually) from 40 leg-hold traps set for one night in a design specific to Tier 1 (Figure 1). Note that the Tier 1 TCI design differs from that developed by the National Pest Control Agency (see Trap catch for possums monitoring protocol <http://www.doc.govt.nz/Documents/science-and-technical/inventory-monitoring/im-toolbox-animal-pests-residual-trap-catch-index-possums.pdf>).

## Conducting Tier 1 possum monitoring

Staff found that traps that were needed for TCI monitoring were heavy and cumbersome. Also, despite taking all precautions when setting traps (even with modified kea-safe traps), there was still a risk of non-target captures. Hence, it was decided to investigate the use of interference devices (which are lighter, more transportable and pose no risk to non-target species) as an alternative method for monitoring possum abundances in Tier 1. Two methods were investigated: chew cards and wax tags. These were chosen because both have been used previously in New Zealand and have standard protocols.

To evaluate the practicalities of using wax tags and chew cards, and to ensure comparability of possum abundance estimates made using these methods and those made using TCI, a field trial was conducted in 2015.

## Field trial design

The trial was conducted during February to May 2015 on a total of 108 independent sampling locations in the North and South islands: 54 locations in forest habitat and 54 locations in non-forest habitats (Figure 2). Each sampling location consisted of twelve 200-m transects. Four transects were sampled using wax tags, four with chew cards (impregnated with 'possum dough') to attract possums and four with coil-spring leg-hold traps. All three monitoring devices (Figures 3-5) were placed at 20-m intervals on their respective transects (i.e. 10 per transect). Transects were offset by 30° to avoid devices being set at the same site on subsequent nights, which could alter possum behaviour (Figure 6.)



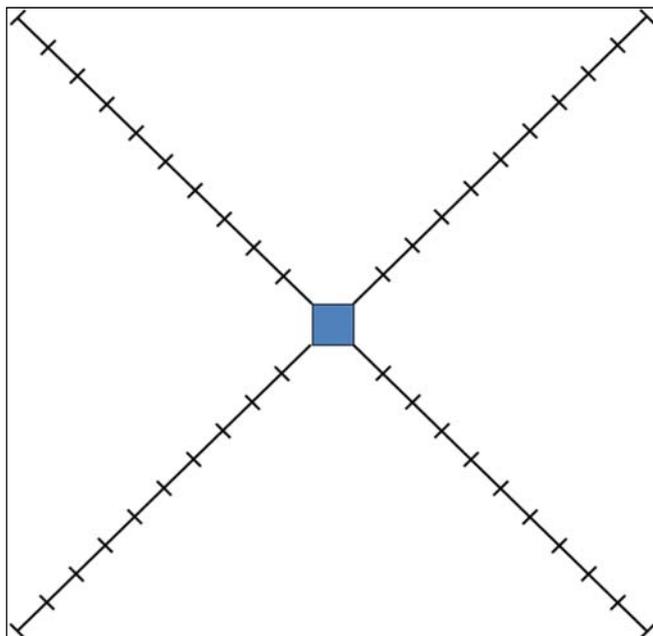


Figure 1. Design used to monitor brushtail possum abundance in the Tier 1 monitoring programme

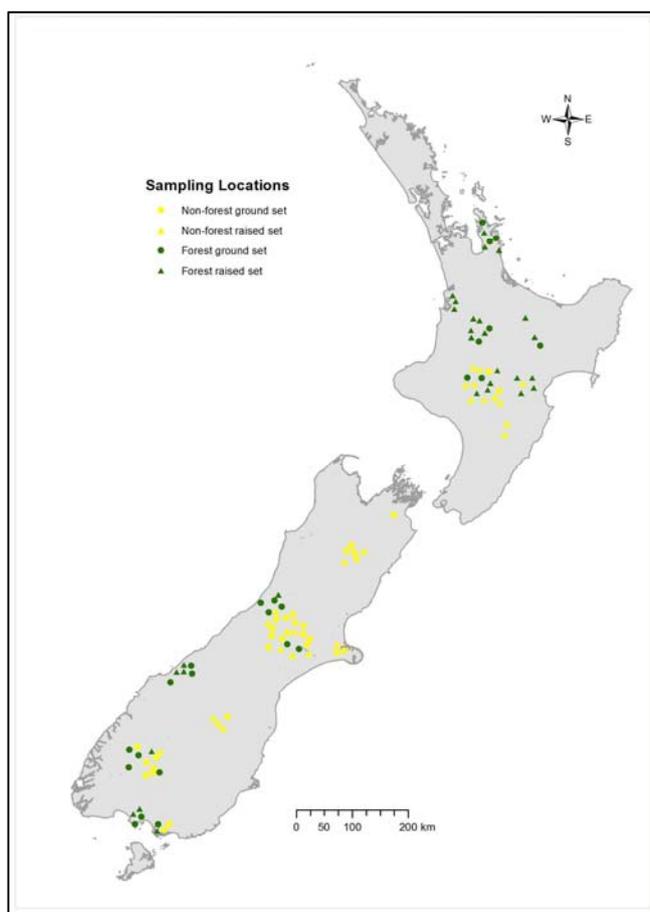


Figure 2. The 108 sampling locations (n forest = 54, n non-forest = 54) at which Brushtail Possum monitoring was conducted using wax tag, chew card and trap catch index methods. Sampling locations are offset so that they do not overlap.





Figure 3. Wax tag set in non-forest habitat (image: D. Forsyth, Arthur Rylah Institute for Environmental Research).



Figure 4. Chew card set in non-forest habitat (image: D. Forsyth, Arthur Rylah Institute for Environmental Research).





Figure 5. Leg-hold trap set in non-forest habitat (image: D. Forsyth, Arthur Rylah Institute for Environmental Research).

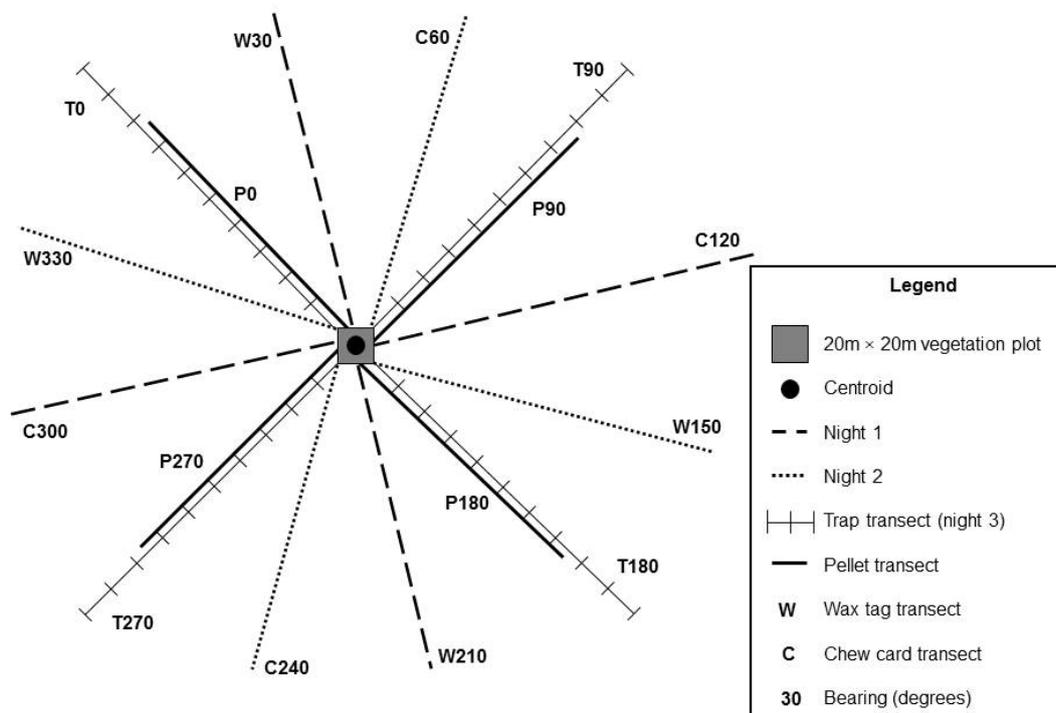


Figure 6. Design used to compare wax tags, chew cards and leg-hold traps for monitoring possum abundance and occupancy.

For each of the 108 sampling locations, TCI was calculated from the four trap transects. Possum bite marks were recorded for each wax tag and chew card. Independent experts checked a sub-sample of devices to assess the frequency of misidentification of bite marks and also confirmed whether bite marks that were deemed 'unknown' were actually possum. A bite-mark index was estimated for each transect from the number of devices assessed as having possum bite marks divided by the number of interpretable devices checked and multiplied by 100%.

## Key results

1. Overall, non-calibrated wax tag index (WTI) and chew card index (CCI) estimated possum abundances similarly, but the TCI estimate was significantly lower (Figure 7). Consequently, calibration is required if possum abundance estimates made using one monitoring method are to be compared with those from another monitoring method. There was no clear advantage of using WTI or CCI in terms of estimating possum abundance, but chew cards did have a higher detection rate in non-forest habitats (Figure 7).
2. When possum abundance data from *individual sampling locations* were considered, calibrations were poor for most pairs of monitoring methods, and even the best relationships had large uncertainty. CCIs at individual non-forest sampling locations could be converted to TCIs and WTIs. Importantly, the converse relationships did not hold: TCI estimates  $\geq 18\%$  had predicted CCI values of 100% (i.e. were saturated) in non-forest habitat, and TCI estimates  $\geq 32\%$  had predicted WTI values of 100% in forest habitat. WTIs could not sensibly be converted to TCIs or CCIs for individual non-forest sampling locations.
3. Mean possum abundances derived from *multiple sampling locations* (e.g. forest, non-forest, North Island, South Island) can be calibrated using an abundance index correction (conversion) factor.
4. Rates of misidentification of bite marks by field staff were low for both wax tags and chew cards. However, wax tags sometimes melted when set in open habitats, potentially obscuring possum bite marks.
5. Both chew cards and wax tags were considerably cheaper than traps, but on a per-device basis, chew cards were cheaper than wax tags.



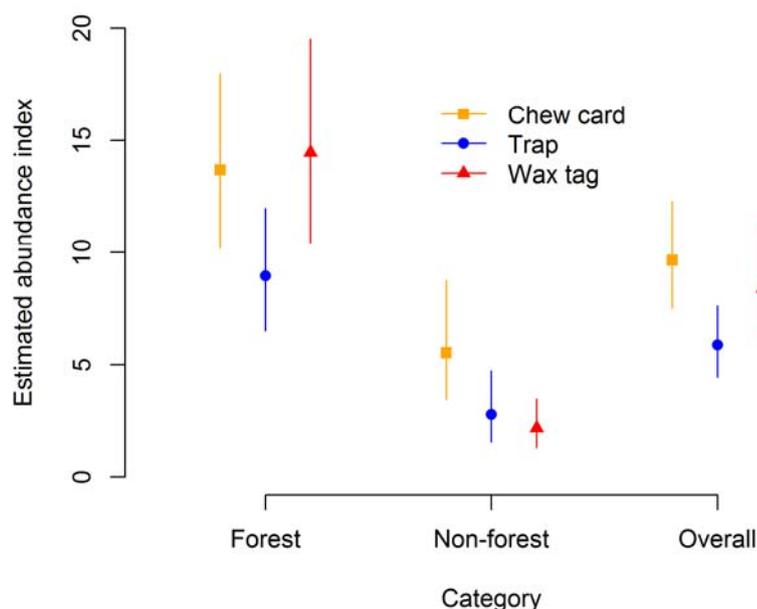


Figure 7. Possum abundance index values (%) in forest and non-forest habitats. Medians and 95% credible intervals obtained from posterior distributions are shown (Forsyth et al. 2015).

## Outcomes and final decision

Based on the results of the field trial and financial considerations, it was decided to use chew cards to monitor possum abundances in Tier 1 for the 2015/16 field season and beyond. Leg-hold traps will no longer be used to monitor possums in Tier 1.

The decision to change from TCI to CCI to estimate possum abundance is specific to DOC's Tier 1 national scale monitoring programme only. The calibrations estimated using the field trial data should not be applied to data collected using other designs.

## References and further reading

Forsyth, D.M.; Perry, M.; Moloney, P.; McKay, M.; Gormley, A.M.; Warburton, B.; Sweetapple, P.; Dewhurst, R. 2015: Calibrating brushtail possum (*Trichosurus vulpecula*) abundance estimates in DOC's Biodiversity Monitoring and Reporting System: wax tags, chew cards and leg-hold traps. Arthur Rylah Institute for Environmental Research Department of Environment, Land, Water and Planning. Unpublished client report for the Science and Policy Group, Department of Conservation. [www.doc.govt.nz/documents/science-and-technical/inventory-monitoring/im-toolbox-calibrating-possum-abundances.pdf](http://www.doc.govt.nz/documents/science-and-technical/inventory-monitoring/im-toolbox-calibrating-possum-abundances.pdf)



Gormley, A.M.; Forsyth, D.M.; Wright, E.F.; Lyall, J.; Elliott, M.; Martini, M.; Kappers, B.; Perry, M.; McKay, M. 2015: Cost-effective large-scale occupancy–abundance monitoring of invasive brushtail possums (*Trichosurus vulpecula*) on New Zealand’s public conservation land. *PLoS ONE* 10(6): e0127693. <http://dx.doi.org/10.1371/journal.pone.0127693>

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