



Landcare Research
Manaaki Whenua

Workshop to explore use of fur harvest to control spillover possums

Envirolink advice grant 1282-HZLC95

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Prepared for:

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Contents

1	Background	1
2	Perspectives	2
3	Conceptual model	2
4	Research design options	4
5	Next steps	5

Notes on workshop to explore the use of possum fur harvest to control spillover of possums from Crown-managed to Horizons Regional Council-managed land

Date: 27 May 2013
Venue: Horizons Regional Council, Palmerston North
Present: Chris Jones, Bruce Warburton (Landcare Research)
Bill Martyn, James Lambie, Eric Dodd (Horizons Regional Council)
Jason Roxburgh (DOC)
Steve Boot (Basically Bush)

Compiled for Horizons Regional Council by:

Chris Jones and Bruce Warburton

Landcare Research

1 Background

Possums are managed using differing control strategies for similar outcomes on lands managed by regional councils and by the Department of Conservation (DOC).

The Biosecurity Act 1993 was amended in late 2012, which altered the position of the Crown with regard to its responsibilities in relation to regional pest management plans (RPMP). Section 5 of the Act now requires the Crown to comply with ‘good neighbour rules’ within these plans. Good neighbour rules are designed to address the external effects of pests spilling over onto adjacent properties and causing unreasonable costs to the occupier of that land. The larger intent of requiring Crown compliance is to help ensure that RPMPs are effective at controlling pests across broad landscapes, without being compromised by adjacent uncontrolled areas on Crown land.

There is therefore increasing pressure on both parties to act as a ‘good neighbour’ and to coordinate the timing and intensity of possum management, but without coordination there may be significant opportunity cost to either or both managing agencies. One potential approach to reduce costs while contributing to shared outcomes is to incorporate into management strategies fur recovery by professional hunters and to take account of the impact of this fur harvesting in reducing possum numbers. The efficacy of this approach is yet to be tested. Any test will require collaboration between management agencies, possum hunters

and wildlife scientists. The aim of this workshop was to bring these parties together – facilitated by Landcare Research possum control researchers – to design a process for testing how fur harvest can be incorporated into possum management strategies cost-effectively. The outcomes of this workshop were used to develop an approach to address the research question of whether fur harvesting can reduce possum numbers cost-effectively to levels that meet the strategic objectives of management agencies.

The agreed approach will be used to develop a proposal for field-testing the cost-effectiveness of fur recovery as a possum management tool. If successful, this may allow DOC to meet its good-neighbour obligations and Horizons Regional Council (HRC) to achieve biodiversity outcomes more cost-effectively.

2 Perspectives

DOC: Increasingly obliged to act as a good neighbour under Biosecurity Act amendments. Ruahine Forest Park shares a long boundary with HRC land, across which reinvasion occurs of areas where possums have been controlled by HRC. Interest in exploring whether allowing access to fur harvesters might help mitigate costs of being a good neighbour while also contributing to DOC's biodiversity outcomes.

HRC: Concern that possums dispersing from Crown lands will result in need for increased control to maintain target possum densities in Possum Control Operation (PCO) areas (5% RTCI in ex-AHB-managed areas, otherwise 10% RTCI). Wants to engage with DOC in developing/reviewing RPMP. Supportive of research aimed at managing externalities affecting achievement of pest management outcomes.

Basically Bush: Wants to explore methods to better integrate fur harvesting into control programmes and how better to achieve a commercially-sustainable return in areas of low possum density. This might require putting in place semi-permanent infrastructure (traps, bait stations) to mitigate against ongoing costs, which, in turn, requires agreements with the Crown to ensure long-term (≥ 5 years) access to blocks.

3 Conceptual model

In Figure 1, line A represents uncontrolled possum populations on both sides of the HRC–DOC boundary (assuming similar habitat carrying capacities). The immediate effects of successful knock-down control on HRC rateable lands (and no subsequent immigration) are represented by B. Subsequent dispersal of possums across the boundary from DOC land would give rise to line C, indicating that additional control would be required on HRC rateable land to address the influx of immigrants. If fur harvest on DOC land is effective in controlling possum numbers, the reduction in numbers of possums dispersing across the boundary would reduce or eliminate the need for additional control on HRC rateable land (e.g. line C shifted to hypothetical line D).

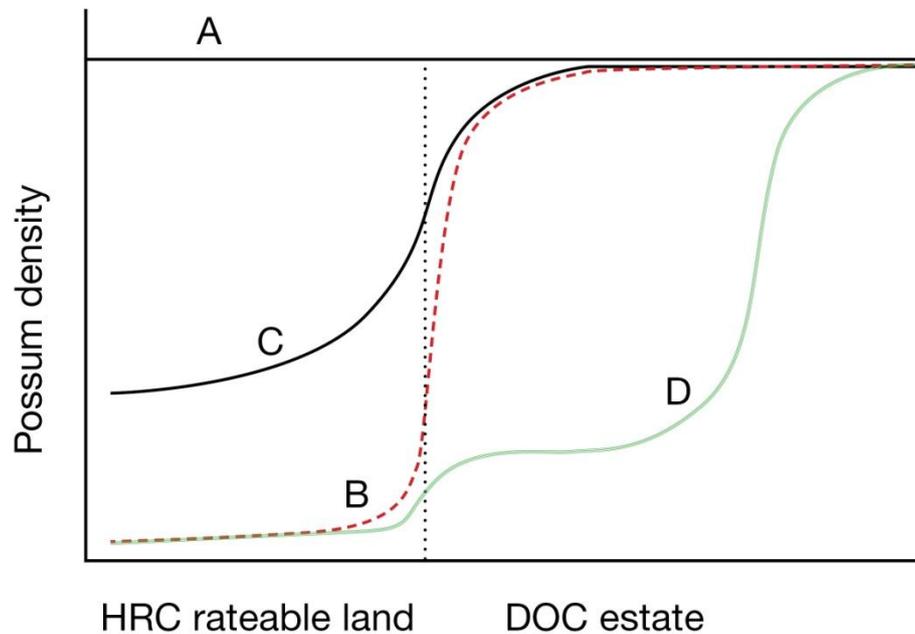


Figure 1 Conceptual model of effect of fur harvest (D), in addition to possum control options, on possums dispersing to land managed by Horizons Regional Council across the boundary with Conservation lands (DOC estate).

Overarching research question: Can an economically-viable fur harvest on Crown land (i.e. DOC estate) contribute significantly to maintaining HRC target possum numbers on adjacent HRC rateable land (i.e. line D in Figure 1)?

Subsidiary questions:

1. To what level can possum numbers be reduced on Crown land by an economically-sustainable harvest?
2. Over what area of forest adjacent to the farm–forest boundary can this be achieved?
3. Is harvesting along a boundary strip or in a wider block on the Crown-managed side of the boundary the more effective strategy in limiting population recovery on the HRC side of the boundary?
4. What is the effect of fur harvest (to the extent identified in (1) and (2) above) on the rate of recovery of possum numbers on rateable land following initial knock-down control (i.e. can mitigation of immigration (line D) be achieved economically)?
5. If fur harvest is borderline/unsustainable economically in the longer-term on Crown land, what financial offset would be required to make it economically viable, and how does this compare with the current costs of maintenance control on HRC rateable land?
6. What contribution can sustained fur harvest make to biodiversity outcomes, and the costs of achieving these, on Crown land?

4 Research design options

In an experimental study such as the one proposed here, experimental blocks will exhibit some intrinsic degree of variation. This is especially true in field settings where there is limited control over environmental variables and also because the response variable in this study (post-control recovery rate of possum populations) is likely to show spatial and temporal variation. It is therefore critical that treatments are replicated so that treatment effects (fur harvest on DOC land) can be separated from normal ‘background’ variation. Defining the number of replicates (study blocks with and without harvest) is important for both statistical and economic reasons: too few and the study will be unable to detect anything other than a very large effect attributable to fur harvesting; too many and monitoring resources will be wasted. To help us decide on an appropriate number of study blocks, we will use existing data on possum-population recovery rates to estimate how the ability of the study to detect a real change in recovery rates, i.e. the ‘statistical power’, will vary with the number of blocks. There is a common convention for setting a threshold for statistical power at 0.80, i.e. an 80% chance of detecting a real difference.

The first stage of monitoring will be to obtain an index of possum relative abundance prior to initial knock-down control on the HRC side of the boundary. It is against this baseline that any post-control recovery (with and without harvest on adjacent DOC land) can be compared. The method of indexing is yet to be decided but wax tags or chewcards are cheaper than RTCI monitoring. On the other hand, HRC PCO targets are specified in terms of RTCI and it may be better to use this standard index throughout as no reliable calibration of bite-mark-based indices against RTCI currently exists. The design and monitoring requirements are summarised in Table 1.

Study design:

- a) The simplest study design would be to establish a number of harvested and non-harvested blocks on DOC land adjacent to the boundary with HRC rateable land scheduled for PCO possum control. Following control on the HRC rateable land, possum population recovery would be monitored at regular intervals and distances (up to 2 km) from the boundary. Recovery rates would be compared between sites across the boundary from harvested and un-harvested DOC blocks. It is assumed that harvest intensity is the same on all harvest blocks. Blocks will need to be wide enough to avoid any boundary effects.
- b) A more complex design could look, additionally, at the effects of harvesting only from a strip of land (width to be confirmed) on the DOC side of the boundary versus harvesting in wider blocks. This would be similar to (a), above, except that possum population recovery on the HRC side of the boundary would be compared between sites adjacent to un-harvested, strip-harvested and block-harvested DOC land.
- c) Another option, again based on the basic design in (a), would be to compare the effects of harvesting down to different levels on DOC land. This would produce a range of line Ds in Figure 1 and enable us to identify the intensity of harvest required to minimise recovery rates on HRC rateable land. A complication is that harvesters may need to harvest below economically sustainable levels to supply sufficient data, and financial offsets may be required in the longer term.

- d) All the options above are based on the assumption that immigration of dispersing possums from un-harvested DOC land to HRC rateable land contributes more to possum population recovery following HRC knock-down control than breeding of surviving possums. This assumption could be tested by live-trapping and marking possums on the non-harvest blocks on DOC land and recording how frequently, and at what distances from the boundary, marked 'DOC possums' are captured on HRC monitoring trap-lines on HRC land.

5 Next steps

1. Develop a collaborative bid for an Envirolink Medium Advice Grant (MAG; max. \$20,000) to fund further science advice, specifically:

Statistical power analysis to determine the optimal number of replicates per treatment so that any effects of harvest on cross-boundary possum population recovery can be estimated reliably;

Detailed design, including advice on pre- and post-control monitoring and most appropriate methods;

Collation and analysis of data and reporting back to research partners.

2. Confirm, taking into account the results of the power analysis, an appropriate study design that is acceptable to all partners.
3. Identify, collaboratively, potential study blocks and confirm access and provisional timetable.
4. Initiate pre-control monitoring on HRC PCO sites.
5. Identify potential funding sources for ongoing science advice beyond the scope of the Envirolink MAG (6 months).

Table 1 Summary of design options and associated monitoring requirements for investigation of the effects of fur harvest on post-control possum population recovery rates on adjacent land

Comparison	Treatments	Monitoring requirements
a) Harvest vs no harvest	<ul style="list-style-type: none"> • Harvest in blocks (size to be confirmed) on DOC land • Optimal number of blocks (replicates) to be determined by power analysis • Compare possum population recovery rates on HRC land adjacent to un-harvested vs harvested blocks 	<ul style="list-style-type: none"> • Possum abundance (index to be confirmed) on all HRC blocks prior to control, with monitoring lines at pre-specified distances from boundary • Repeat monitoring on same lines at 6-monthly intervals following knock-down control on HRC land • Locations of harvest lines • Daily possum capture data • Biodiversity outcome indicators in harvested vs un-harvested blocks
b) Block vs boundary strip harvest	<ul style="list-style-type: none"> • Harvest in blocks and in boundary strips (size to be confirmed) on DOC land • Optimal number of blocks and strips (replicates) to be determined by power analysis, but will require replication of each harvest strategy • Compare possum population recovery rates on HRC land adjacent to un-harvested vs harvested blocks vs harvested strips 	<ul style="list-style-type: none"> • Possum abundance (index to be confirmed) on all HRC blocks prior to control, with monitoring lines at pre-specified distances from boundary • Repeat monitoring on same lines at 6-monthly intervals following knock-down control on HRC land • Locations of harvest lines • Daily possum capture data • Biodiversity outcome indicators in harvested vs un-harvested blocks
c) Harvest intensity	<ul style="list-style-type: none"> • Harvest in blocks (size to be confirmed) on DOC land, but vary harvest intensity (pull-out RTC) between blocks • Optimal number of blocks (replicates) to be determined by power analysis, but will require replication of each harvest level • Compare possum population recovery rates on HRC land adjacent to un-harvested vs intensity of harvest within blocks 	<ul style="list-style-type: none"> • Possum abundance (index to be confirmed) on all HRC blocks prior to control, with monitoring lines at pre-specified distances from boundary • Repeat monitoring on same lines at 6-monthly intervals following knock-down control on HRC land • Locations of harvest lines • Daily possum capture data • Biodiversity outcome indicators in harvested vs un-harvested blocks
d) Dispersal as a driver	<ul style="list-style-type: none"> • Pretreatment live capture and marking (ear-tagging) of possums in harvested and un-harvested blocks on DOC land • Harvest in blocks (size to be confirmed) on DOC land • Optimal number of blocks (replicates) to be determined by power analysis 	<ul style="list-style-type: none"> • Possum abundance (index to be confirmed) on all HRC blocks prior to control, with monitoring lines at pre-specified distances from boundary • Repeat monitoring on same lines at 6-monthly intervals following knock-down control on HRC land • Locations of harvest lines

	<ul style="list-style-type: none">• Compare possum population recovery rates on HRC land adjacent to un-harvested vs harvested blocks• Compare numbers of marked possums trapped on HRC land during post-control monitoring between blocks adjacent to harvested vs un-harvested DOC blocks	<ul style="list-style-type: none">• Daily possum capture data• Biodiversity outcome indicators in harvested vs un-harvested blocks• Record captures of marked possums on monitoring trap-lines on HRC land (requires post-control monitoring using RTCI)
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