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PEST HARES

MONITORING AND CONTROL

PRODUCED BY

National Pest Control Agencies

ABOUT NPCA

NPCA (National Pest Control Agencies) assists those involved in vertebrate animal pest control in New Zealand.

Animal pests are a serious threat to both New Zealand's native flora and fauna and its primary production sector. We help address this threat by providing a co-ordinating forum for all those involved in vertebrate pest management, be it practical pest control and monitoring in the field, strategic management, policy making, pest research or technology development.

OUR PUBLICATIONS

We produce a range of publications containing up-to-date, practical information on animal pest control. They are written by experienced practitioners and updated regularly to ensure they reflect current best practice.

Our publications include:

- best practice guidelines on controlling and monitoring vertebrate pests;
- information about relevant regulations;
- public awareness and education material for schools.

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This guide may be updated from time to time, so please check that your version is current by checking the publications section on **www.npca.org.nz** or by contacting NPCA direct.

SUMMARY OF AMENDMENTS IN THIS EDITION

This edition includes the following amendments to the preceding July 2008 edition.

1. Renumbering of the main section headings to include the introductory section.
2. Minor wording corrections and updates of organisation names where these have changed and, where necessary, updates of references to websites, legislation and by-laws.

CONTENTS

PART 1 Introduction

1.1. Purpose

These guidelines were commissioned by the NPCA.

The practical and regulatory aspects of hare control and monitoring are updated and made freely available.

The primary audience is field staff and contractors responsible for undertaking hare control and monitoring.

The guidelines allow flexibility for ongoing innovation and tailoring of operational design to local needs.

Some practices for control and monitoring of hares are almost identical to those for rabbits, particularly with regard to night shooting and counting. Where relevant, this document will refer to the practices detailed in the sister publication '*Rabbits: Monitoring and Control, Good Best Practice Guidelines*' available online at www.npca.org.nz

1.2. Layout

This document is in four parts:

1. Introduction.
2. **Biology and impact as a pest species**. The biology and habits of hares are presented and provide a basis for the nature and timing of control and monitoring. Impacts on primary production and native ecosystems are discussed.
3. **Control.** Best practice guidelines are presented for control, exclusion and deterrents.
4. **Monitoring**. Best practice guidelines are presented for design, deployment and reporting of monitoring.

1.3. Acknowledgements

This document collates available published material, much of it included verbatim. We acknowledge the contribution of various authors in producing some relevant 'Science for Conservation' publications and various authors of regional fact sheets.

PART 2 BIOLOGY AND IMPACTS OF HARES

2.1. Biology of the Hare Lepus *Europaeus occidentalis*

Hares (also called brown hare, European hare and common hare) are similar in appearance to a rabbit but about twice the weight (3-4 kg) with much larger hind feet and ears. The ears also have a black patch at the tip. When moving, hares have a loping gait. The coat is tawny coloured along the sides and a mottled fawn and black colour extends from the head, down along the back. The belly is white.

Hares were first liberated in New Zealand in 1885. The majority of introductions occurred in the 1860s and 1870s at major ports around the country. Sport and harvesting for food were the primary motivations behind these introductions. During the late 1800s hares spread rapidly throughout most of the North and South Islands. They were protected from unrestricted hunting from 1861 until 1866, when landholders were given permission to control them as pests. Hare distribution has remained largely unchanged since this initial rapid increase in numbers and distribution and they now occur throughout New Zealand in suitable habitat from sea level to 2000 m elevation (excl. parts of Fiordland and Stewart Island) wherever patches of open country exist. The highest densities of hares occur in sub-alpine grasslands along the eastern side of the Southern Alps.

Hares can be identified from their distinctive footprints where the large hind feet overreach the forepaws. Tracks made at slow speed show asymmetrically placed hind foot prints, unlike rabbits which have the hind footprints side by side. Tracks made by hares travelling at high speed show a completely symmetrical gait. On soft surfaces such as snow the five hind toes are spread, leaving prints like a dog's, and the four toes on the small forepaws are kept close together to give a pear-shaped print; forefoot prints follow each other in line, about 10–20 cm apart. Scats are round pellets usually slightly larger and lighter in colour and more fibrous than rabbit pellets and less rounded in shape. They also tend to be scattered.

Hares are largely solitary except at the peak of the breeding season (September) when males will congregate around and compete for females in oestrus. Average home range size of five individuals tracked in Canterbury was 53 ha, though most of the hares' time was spent in small centres of activity. Hares show little emigration from an area, moving on average 280–640 m from their initial capture site over two breeding seasons.

In areas where hares are at high densities they are often the most important mammalian herbivore present, particularly in areas where domestic stock have been removed and/or commercial hunting has markedly reduced the number of wild ungulates. Hares have a diverse diet of grasses, herbs, trees and shrubs and will eat woody seedlings. There are relatively few hares at the highest altitudes but, in such habitats, they survive well given the lack of competition from other herbivores.

Hares are primarily nocturnal. During daylight hours they spend much time crouched in a 'form', an oval shaped depression in vegetation or soft ground approximately 200 x 400 mm in size. Hares typically begin feeding at dusk (earlier in spring) and may move some distance, often downhill, to find grazing. They habitually use the same paths or 'runs'. In deep grass. These may become conspicuous depressions 100–200 mm wide, along ridges and up and down slopes. Hares may travel 15 km while feeding in one night in snow above the bushline, however, most are relatively sedentary.

In New Zealand, hares start breeding soon after the shortest day of the year. The breeding season extends from early July until mid-March, with over 90% of females pregnant from August to February. The average litter size in one New Zealand study was about two, allowing for pre- and post-implantation loss, and the average number of successful litters per year was four to five. This gave an annual production of 10 young per female. Hare population densities appear to be self-regulated through behavioural mechanisms and so their populations do not undergo the kinds of irruptions seen in rabbits. Their densities do not exceed three per hectare but it is uncertain why this is so. There is no evidence that they are limited by food, they are not territorial and direct aggressive interactions seem to be rare.

Adult hares are remarkably free from predation in New Zealand, although they are occasionally taken by harrier hawks, stoats, ferrets, weasels and feral cats. As with most mammals, it is the young that are most vulnerable to such predators. Hares are also relatively free of parasites (as are many other wild mammal species in New Zealand). Many of the diseases that affect or can be transmitted by hares in Europe – including European brown hare syndrome, plague, rabies, tularaemia, brucellosis and myxomatosis – are not present in New Zealand populations.

2.2. Impacts

Hares can impact new forestry plantings, primary production, amenity values and native ecosystems, particularly at higher altitudes.

Newly planted trees and seedlings can be bitten off at a 45° angle. Other plantings such as poplars or willows can have bark stripped and any small branches or new growth nipped off.

Citrus trees can have low branches nipped off and bark bitten off the trunk. Young cuttings or new growth are nipped off and often not eaten. In most instances all the bark is removed.

In the case of pip and stone fruit, large areas of bark are often bitten from trees less than one year old. Low branches and in some instances small trees can be bitten off at a 45° angle.

With berry fruits, any new growth on canes or young vines are often nipped off in 10-12 cm pieces and left at the base of the vine. Flowering trees and shrubs, such as camellias and rhododendrons, also have their branches nipped off and left at the base of the shrub.

Hares will also attack vegetable crops. Asparagus spears get bitten off and left at the plant base. Cabbages, cauliflower, lettuces and other market garden crops are commonly grazed, along with corn, wheat and maize.

As hares are usually found in lower numbers than rabbits, damage from hares is usually less significant, although in some cases an individual hare can cause major damage in just one night.

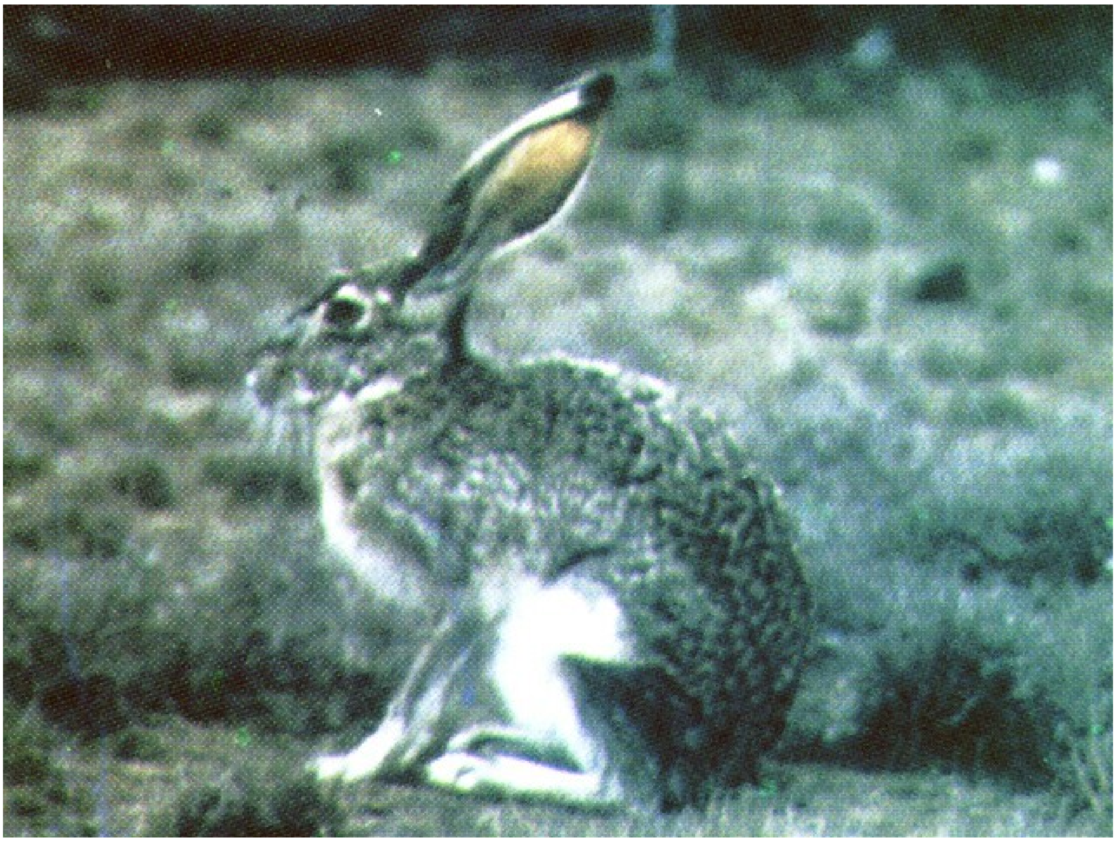
In lowland areas hares may impact indigenous biodiversity values by selective browsing of rare and endangered species.

Probably the more significant impacts of hares on indigenous biodiversity occurs in high altitude habitats.

- Hares can inhibit the recovery, regeneration and recruitment of snow tussocks.
- Hares can affect the recovery of native sedges, exotic grasses and native herbs in wetlands.
- In some red tussock/hard tussock grasslands hares can affect the rates of recovery of red tussock, hard tussock and exotic grasses.
- Hares can reduce the available plant material in fescue tussock, sub-alpine grassland.
- In some parts of their range, hare populations are likely to be consuming more forage per hectare than possums, chamois, thar or deer. However, elsewhere, the impact of these other grazers is probably far more significant than that of hares.

While there are concerns that hares may be causing unacceptable damage to high altitude vegetation, it is difficult to separate hare impact from that of rabbits, possums and larger grazing mammals.

Some studies suggest that hares reduce the growth and inhibit regeneration of vegetation in some high altitude habitats but in other habitats have little measurable effect. In some situations hares may be beneficial to New Zealand grasslands, in particular when their grazing suppresses exotic grasses or introduced weeds.



Photograph 1. Hare at night

PART 3 CONTROL

3.1. Management Options

Hare management poses some challenges. They are ubiquitous in the environment but at rather stable and low density. The self-regulatory nature of hare populations poses problems for any control program because they are likely to recover quickly[1].

Only one study (Parkes 1981) has investigated hare population recovery after control. In a 120 ha control block in the Avoca River valley, inland Canterbury, c.100 hares were poisoned and a further 200 shot over an eight-month period in 1980. Pellet surveys suggested that this control work reduced hare numbers on the block by 60%. There was, as expected, substantial recovery in hare numbers during the subsequent breeding season, given each female produces around ten offspring in a season.

That study substantiates the experience of pest control professionals that:

1. localised, one-off hare control operations will only provide a brief respite from hare impacts;
2. hares are reluctant to take poison bait, and kill rates less than 30% can be expected.

Management tools are therefore effectively restricted to:

- do nothing
- localised shooting
- exclusion fencing
- repellents.

Because hare damage tends to be very localised, doing nothing is the usual and appropriate response.

Where there is localised damage, night shooting is a reasonably cost-effective method of controlling hares on agricultural land, where access and visibility for shooters is good. In alpine basins, however, the rugged terrain poses both access and visibility problems for shooters.

Snares placed in hares' runs and checked on a daily basis have been used in lowland areas where hares occur in high densities. In the alpine areas, however, hare populations are low and their runs indistinct so snaring is unlikely to be efficient. Animal welfare considerations further contribute to exclude snaring from the list of practical management tools.

Trapping is a possibility, but labour intensive, and rarely used.

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[1] Although hare population generally recover quickly following control, isolated populations may be effectively managed. Hares were night shot in Whitereia Park (Kapiti Coast) during 2002 and 2003, with a total of 160 hares shot. The relatively isolated peninsula has not experienced any recovery of the hare population to date (2007). (Glen Falconer, Greater Wellington, pers.comm.)

Any hare control work should be carried out well before any planting is undertaken. This can be followed up with application of repellents to new plantings. Exclusion fencing is an option for intensive horticultural enterprises.

3.2. Night Shooting

Night shooting is the most effective method of controlling hares.

Photograph 2. Typical night shooting setup, shooter is also equipped to continue on foot.

The best practice techniques for night shooting hares are the same as for rabbits, and the reader is referred to the NPCA publication, *Rabbits: Monitoring and Control, Good Best Practice Guidelines,* at www.npca.org.nz

Additionally, here are some tips and hints for night shooting of hares. Look for animals feeding and for their eyes, which shine red at night. When shooting, approach the area quietly, into the wind if possible. Move along the edge of the cover, shining a light ahead with steady sweeps. Do not shine the light beyond shooting range and ensure you do not illuminate yourself as this disturbs the hares.

Once an animal is sighted, hold it in the outer edge of the light until ready to shoot. If the hare starts to move, don't chase it, take the light off it for a few seconds, then put it back on the same spot (hares often stop once the light has been taken off them). If it runs to a fence or cover, follow it with the light as it will invariably stop for a second before going through a fence or into cover.

Always observe the seven basic safety rules of firearm use:

1. treat every firearm as loaded;
2. load the firearm only when you are ready to fire;

3. always point firearms in a safe direction;
4. identify your target;
5. consider your firing zone (especially at night);
6. store firearms and ammunition safely;
7. avoid alcohol or drugs when handling firearms.

3.3. Repellents

Repellent preparations are designed to render plants unpalatable and unattractive to browsing hares or rabbits. Repellents are generally applied as foliar sprays, which have to be reapplied periodically to treat new growth occurring within browsing range (40cm - 50cm above ground level). Spray-on repellent solutions should not be applied to the point of run-off as with garden sprays. Adhesives in repellent mixes can block plant stomata when heavy applications are used, especially on delicate or bipinnate foliage. A coarse droplet size and a 50% foliar coverage overall are adequate for repellent spray application.

Although testing has been confined principally to radiata pine, egg repellents are considered to be suitable for use in horticulture, landscape plantings and gardens.

Egg repellents are reliable, inexpensive and practical. They are easy to apply and most effective, particularly in the initial weeks after planting when damage is most likely to occur. The egg repellent made from fresh eggs and paint is the most suitable for a small number of trees. If larger scale plantings are to be sprayed, it may be wise to purchase egg powder and the acrylic resin adhesive to reduce costs.

Reasonable protection can be obtained with mutton fat and kerosene, however, foliage can be burnt if too much is applied. Not recommended for broadleaf species.

Thiropel spray concentrate was found to be more effective in the longer term than other repellents, but it is toxic to humans and difficult to handle. This concentrate product, containing 40% thiram, is still being developed. Thiropel containing 10% thiram, is presently available commercially and designed as a paste. If diluted for spray application it may be too weak to be fully effective.

Repellents should be applied immediately after planting. Liberal applications of the repellents to the ground of fence posts near the new plantings which will help deter browsers. Checks should be made following application. If browse does occur a second application should be considered. This could be combined with the release spraying operation.

Egg-based Repellents

To make one litre (*treats 50 seedlings)*:

- mix 80 gm whole egg powder plus 800 ml water, or 5 fresh eggs plus 600 ml water in 150 ml primal AC235 acrylic resin

- mix 150 ml acrylic paint (preferably white with a reasonable percentage solids – white timbacryl was tested).

If using egg powder – mix with a little of the water to form a paste and then add the other ingredients. If using fresh eggs – beat well, then add the other ingredients.

Spray approximately 20 ml of the repellent on and around each seedling in the field immediately after planting. A second application may be needed in the spring.

Mutton Fat and Kerosene

- 10 parts mutton fat plus 1 part kerosene.
- Melt fat and mix in kerosene. Allow to set.

Wipe seedlings with lightly greased rubber glove, leaving minimal visible fat. Dab ground at base of tree or supporting stakes, if used, to provide more smell deterrent.

3.4. Fencing

When establishing a small horticultural block or nursery within an area containing a relatively high infestation of hares, the most cost effective way of preventing hare damage will be exclusion fencing.

Rabbit exclusion fences will also exclude hares (see *Rabbits: Monitoring and Control, Good Best Practice Guidelines* at www.npca.org.nz). However the fencing requirements for hares are less demanding than for rabbits.

Hare-proof fencing should comprise a netting fence at least 900 mm high with mesh 40 mm and with the remaining netting bent out along the ground. A mesh size of 80-100 mm will work for hares but is too large to deter rabbits as well. Fences must be tightly stretched and pegged to the ground to ensure there are no gaps. All drains and depressions must be netted as well. Gates into the block must be netted and closefitting, preferably with a concrete or timber sill. Gates must be kept shut at all times.

Alternatively, electric fencing is an effective method of excluding hares. If possible, a mains powered energiser should be used. If using a battery unit, ensure that it is checked regularly and that the batteries are kept fully charged.

Fence lines need to be checked regularly, especially during spring and autumn, to ensure that vegetation is not shorting the lower wires.

The lower four wires on the fence should be about 10 cm apart and should be alternating live and earthed wires. Wires can be fitted to electric fence battens or to posts and insulators. If hare numbers are high, it is advisable to fit an additional live wire about 10 cm above the ground and 10-15cm out from the base of the fence.

Electric rabbit netting is ideal for providing temporary protection and can be easily moved when plants are well established or no longer require protection.

PART 4 Monitoring

4.1. Monitoring Techniques

Monitoring of hare populations may be used to:

- estimate percent kill after control.
- provide population trend data.

Night counts and faecal plots using the cleared-plot method produce acceptable indices within time and resource constraints for non-research use. Standing crop faecal pellet counts have been demonstrated to be too variable to be useful in New Zealand.

Night counts are most practical over agricultural land with relatively low ground cover. Generally, however, densities are too low to make this method robust enough to measure anything but large changes in the population size as the index is usually less than 1 hare/km in regional rabbit spotlight routes However, where hare numbers are high and the area is accessible to vehicles the method may give robust estimates.

In many instances, hares are monitored incidentally, as part of rabbit night count monitoring.

Faecal pellet counts are suitable where vegetation is too high to enable night counts and do deliver a more sensitive index. The effort to monitor large areas is substantially higher than for night counting.

4.2. Night Counts

Draw on a map (not less than 1:50,000) the outer limits of the monitoring area in which the hare population is to be assessed.

If the monitoring area is to receive different control methods in different parts, then separate the monitoring area into strata based on the control methods being used. Further stratify where you expect significantly different hare densities.

It is assumed that accessible parts of the property or control area will be covered. For ease of following in the dark, and accessibility, farm tracks are often used. The length of route that can be covered by one observer in one night is expected to be about 25 km. The number of routes most affects the precision of the abundance index. Night counting for more than 20 km along a route appears to have little effect on the precision. Counting for more than one night leads to little or no increase in precision. Therefore, the counts on each route will be made on one night only.

For regional trend monitoring using night counts, the routes should be randomly selected from amongst all possible routes in the study area. Invariably, hares will be counted incidentally with regional rabbit night count surveys, hence monitoring design is identical as for rabbits.

The field techniques are identical to night counting rabbits, please consult *Rabbits: Monitoring and Control, Good Best Practice Guidelines* at www.npca.org.nz.

4.3. Cleared Plot Monitoring

Hares produce between 300 and 700 (mean 434) faecal pellets per day, which remain intact for at least 60 days and usually for many years under New Zealand subalpine and alpine climatic conditions. Therefore, standing crop densities of pellets in favoured habitats can exceed 100/m^2. This means that the simplest way to estimate relative densities between sites or changes in density over time is by estimating the recruitment of new faecal pellets on plots.

The methodology presented is based on John Parkes' work, which seems a more efficient and, perhaps, practical sampling design than the previous methodology presented in the NPCA hare monitoring protocol.

A plot size of 0.09 m^2 and an interval of 60 days between counts is recommended. Plots should be 5 m apart along lines of 100 plots. The small plot size allows rapid counting and, thus, a large number of plots to be counted and cleared of new pellets (up to 1,000 plots per person/day) in short-tussock grassland habitat.

The number of plots, lines, and how the plots and/or lines are distributed across the area to be monitored depends on:

- the uniformity of the hare population through the treatment area;
- the size of the area;
- the practical limitations of access to all parts of the area for locating individual plots.

Because of limited research on this subject, it is not known what the optimal number of plots and lines should be but it is suggested that a minimum of 1,000 plots be used. The number of lines is therefore a minimum of 10 for any monitoring using this method. In some alpine areas, lines of this length would be impractical. It is therefore essential that the area be assessed for ability to place lines and the maximum size of those lines.

On a map of the treatment area, number the centres of each grid square and randomly select the number of start points required. Where the treatment area has been divided into strata, ensure that the proportion of lines allocated to each stratum is in the same proportion as the strata contribute to the total treatment area.

All lines shall follow a default compass bearing of zero degrees magnetic where possible.

Permanently mark each plot centre with a small bicycle spoke pushed through an aluminium tree-tag. If the spoke is pushed well into the ground, it is inconspicuous and it appears to have no effect on hares' defecation behaviour. However, larger pegs that remain above the ground attract hares and are used as latrine sites.

Plots should be 5 m apart along a transect so that they can be easily found. In longer grass, occasional larger marker pegs can assist in retracing the transect and locating the small plot pegs.

A circular wire hoop (340 mm diameter), with its centre located by braces, is placed over the spoke and all pellets with any part within the hoop are counted and cleared. All hare faecal pellets should be counted and cleared from the plot at the initial count (the standing crop) and then all pellets recruited are counted and cleared at each subsequent measurement. Make sure to dump pellets well away from the plot boundary to minimise the chance of them being blown or washed back on to the plots.

Record results at each plot site on a standardised form. For practical convenience, reduce the form to notepad size (preferably wet-notes).

CLEARED PLOT FAECAL PELLET RECORDING CARD

HARE FAECAL PELLET SURVEY FORM									
Area/Block Name:						**Line Number**		**Line Bearing**	
Date		**Observer**		**Stock present? Y/N**		**Treat**	**Non Treat**	**Line Start Co-ordinates**	
Plot#	**Pellet Count**	**Plot#**	**Pellet Count**	**Plot#**	**Pellet Count**	**Plot#**	**Pellet Count**	**Plot#**	**Pellet Count**
1		**21**		**41**		**61**		**81**	
2		**22**		**42**		**62**		**82**	
3		**23**		**43**		**63**		**83**	
4		**24**		**44**		**64**		**84**	
5		**25**		**45**		**65**		**85**	
6		**26**		**46**		**66**		**86**	
7		**27**		**47**		**67**		**87**	
8		**28**		**48**		**68**		**88**	
9		**29**		**49**		**69**		**89**	
10		**30**		**50**		**70**		**90**	
11		**31**		**51**		**71**		**91**	
12		**32**		**52**		**72**		**92**	
13		**33**		**53**		**73**		**93**	
14		**34**		**54**		**74**		**94**	
15		**35**		**55**		**75**		**95**	
16		**36**		**56**		**76**		**96**	
17		**37**		**57**		**77**		**97**	
18		**38**		**58**		**78**		**98**	
19		**39**		**59**		**79**		**99**	
20		**40**		**60**		**80**		**100**	

4.4. Data Analysis

4.4.1 Night Counts

For night count technique, calculate the mean hares/km for each route, and then the mean hares/km for each stratum. A weighted mean index across all strata may then be calculated.

Because hares do occur at the high densities rabbit populations can get to, there are no problems of skewness in the data. Hence, percent kill can be calculated directly, without log conversion.

Calculating the index and its confidence limits is exampled below,

Route No.	Stratum	Route Length Km	Total hares seen	Hares/km
1	Lowland	18	10	0.56
2	Lowland	21	8	0.38
3	Lowland	24	5	0.21
4	Lowland	15	20	1.33
5	Lowland	22	0	0.00
	Lowland	**Stratum**	**Hares/km**	**0.50**
			SD	**0.51**
			SE	**0.23**
			95% CI +/-	**0.46**
6	Hill	16	1	0.06
7	Hill	21	0	0.00
8	Hill	20	5	0.25
9	Hill	18	3	0.17
	Hill	**Stratum**	**Hares/km**	**0.12**
			SD	**0.11**
			SE	**0.06**
			95% CI +/-	**0.11**
	Combined Result		**Hares/km**	**0.27**
			SE	**0.10**
			95% CI	**0.19**
Lowland Ha	20,000	Hill Ha	30,000	

…where:

- SD is the Standard Deviation
- SE is the Standard Error (SD/ square root (number of routes))
- CI is the confidence interval (2 * SE)
- Combined hares/km is (habitat area stratum 1/total habitat area*hares/km stratum 1)+(habitat area stratum 2/total habitat area*hares/km stratum 2)+ etc to stratum n
- Combined SE is square root[(habitat area stratum 1/total habitat area*SE stratum 1)+(habitat area stratum 2/total habitat area*SE stratum 2)+ etc to stratum n].

4.4.2 Cleared Plot

Similar to night counts, the cleared plot technique yields an index of density comprising pellets/m^2/day.

We do not use the standing crop data initially collected, although that may be useful for mapping the distribution of hares, particularly if you use a systematic sampling technique rather than the random sampling described in this document.

Calculating the index and its confidence limits is exampled below,

Line	Stratum	Plots	Pellets/60 days	Pellets/m/day
1	Alpine	100	134	0.25
2	Alpine	100	60	0.11
3	Alpine	100	530	0.97
4	Alpine	100	287	0.53
5	Alpine	100	0	0.00
	Alpine	**Stratum**	**pellets/m/day**	**0.37**
			SD	**0.39**
			SE	**0.17**
			95% CI +/-	**0.35**
6	Subalpine	100	806	1.48
7	Subalpine	100	523	0.96
8	Subalpine	100	267	0.49
9	Subalpine	100	915	1.68
10	Subalpine	100	762	1.40
	Subalpine	**Stratum**	**pellets/m/day**	**1.20**
			SD	**0.48**
			SE	**0.21**
			95% CI +/-	**0.43**
	Combined Result		**pellets/m/day**	**0.92**
			SE	**0.15**
			95% CI	**0.31**
Alpine ha	5,000	Subalpine ha	10,000	

…where:

- Pellets/m^2/day for a line = pellets total / (0.091* 100 plots * 60 days)
- SD is the Standard Deviation
- SE is the Standard Error (SD/ square root (number of lines))
- CI is the confidence interval (2 * SE)
- Combined hares/km is (habitat area stratum 1/total habitat area* Pellets/m^2/day stratum 1)+(habitat area stratum 2/total habitat area* Pellets/m^2/day stratum 2)+ etc to stratum n
- Combined SE is square root[(habitat area stratum 1/total habitat area*SE stratum 1)+(habitat area stratum 2/total habitat area*SE stratum 2)+ etc to stratum n]

4.5. Reporting

Reporting of monitoring results should ensure that all relevant information is recorded and filed. The report should include some operational information, monitoring information and results.

For operational information include:

- location (code).;
- size of the management area;
- control method(s);
- date of control start and date of completion.

For monitoring information include (as relevant to technique):

- date of original plot clearing and pre plot counting;
- date of post control clearing and plot counting;
- weather during counts;
- lengths of night count lines, and subsections;
- number of plots and lines;
- habitat for each line;
- strata for each line if area was stratified;
- operator;
- append map with plot lines marked;
- compass bearings of plot lines;
- monitoring results (mean index and 95% CI).

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