Game & Wildlife
CONSERVATION TRUST
Advisory Service

Peak District Mountain Hare Counting Guidance & Results: Advisory Report to The Moorland Association – January 2022

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Contents

1. Summary

The mountain hare, *Lepus timidus*, is an important game species throughout much of its European range. It is Britain's only native lagomorph species and was introduced to the Peak District in England around 150 years ago. Research on mountain hares in England is relatively scarce and reliable data are needed to provide estimates of mountain hare population density. This information would help to evaluate population trends and inform conservation status and future species management.

In November 2021, the GWCT Advisory Service was commissioned by The Moorland Association to provide mountain hare count training to professional gamekeepers within the Peak District National Park. The aim of the training was to; i) equip practitioners with the knowledge on how to count mountain hare using a standard methodology developed in Scotland, and to; ii) further our knowledge of mountain hare populations in the Peak District National Park in order to better inform their conservation status and future management.

Data on the numbers of hares recorded by gamekeepers in the Peak District National Park may be equivalent to a population density of between 52 – 125 mountain hares per km^2 (average encounter rate was 7.8 hares per walked km) in the environs of those managed moorland count sites. These population levels are similar to those recorded on moorland managed for grouse shooting within the mountain hare's core range in Scotland and are up to 5.5 times higher than the most recent estimates of mountain hare densities from other sites in the Peak District National Park.

These results highlight the importance of continued monitoring, and practitioner led surveys in contributing to our understanding of the Peak District mountain hare population in the future.

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2. Introduction

The mountain hare, *Lepus timidus*, is native to Scotland and Ireland but was introduced to the Peak District in England around 150 years ago (Hulbert et al. 2008). Although research on mountain hares in England is relatively scarce, studies of mountain hare in Scotland show that they are strongly associated with heather moorland, and particularly that managed for red grouse, *Lagopus lagopus scotica*, shooting (Patton et al. 2010, Hesford et al. 2020), where it is thought that they benefit from heather habitat management and legal predator control carried out by gamekeepers (Stoddart and Hewson 1984, Hesford et al. 2019).

Globally the mountain hare is listed as a species of least concern by the International Union for Conservation of Nature (IUCN), but European populations face several pressures at regional levels including climate change (Acevedo et al. 2012, Pedersen et al. 2017), interspecific competition (Caravaggi et al. 2017) and perceived hunting pressure (Watson and Wilson 2018). In Scotland, the mountain hare conservation status was recently downgraded from "Favourable" to "Unfavourable-Inadequate", partly because there was insufficient data to provide robust population estimates and trends (JNCC 2019). In England, data on mountain hare population is even more limited. Thus, reliable data are needed to provide estimates of mountain hare population density throughout the British range. This information would help to evaluate population trends and inform conservation status and species management. However, as mountain hare are predominantly nocturnal species, they can be difficult to detect (Newey et al. 2011).

In 2018, Scottish Natural Heritage (SNH) commissioned a study designed to assess the effectiveness and reliability of different methods of estimating mountain hare density (Newey et al. 2018). Following the publication of this study (Report 1022) in early 2018, SNH (now NatureScot) concluded that observational counting of mountain hares along defined transects at night using lamps or thermal imaging equipment can provide more consistent abundance indices than daylight counts. Since 2018, the Game & Wildlife Conservation Trust (GWCT) has adopted the recommendations of report 1022 for mountain hare counting guidance training. We have focused specifically on use of the lamp methodology in training as this technology is widely available, making it accessible to non-governmental organisations, citizen science practitioners and professional gamekeepers. To date, more than 130 moorland managers from 70 estates in Scotland have now been trained using this methodology, and a system of night-time counts in core parts of the mountain hare range has now been established in Scotland. These will form the basis for providing monitoring of mountain hare within their core range as part a National Monitoring Scheme.

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3. Methods

3.1 Training

Mountain hare count training, developed in Scotland by GWCT, was delivered by Dr Nick Hesford, GWCT Advisor Scotland, to members of the Peak District Moorland Group at Lodge Farm, Crowden, Glossop, SK13 1JA, on the 12th November 2021. The training course was attended by a total of 21 practitioners from 10 different estate and covered the following components:

- Mountain Hare population and conservation
- Development of counting methodology
- The importance of Mountain Hare counting for management planning
- Count methodology practice, equipment, count cards and information return
- Selection of survey sites and transects

3.2 Survey sites

A total of 13 survey sites from 10 estates were identified in dialogue with course attendees (Appendix 1 shows the locations of each survey site). All survey sites were located on open moorland habitat managed for driven grouse shooting, and comprised primarily of ericaceous dwarf shrub communities, dominated by heather (*Calluna vulgaris*). Survey sites were established in line with Report 1022 guidelines (Newey et al. 2018), and the Moorland Forum's 'Principles of Moorland Management'. The survey site maps returned to course attendees by GWCT for count monitoring set out details of the transects as well as transect start / end points (OS grid references or GPS). These maps were also provided as Geospatial.pdf documents which can be viewed on a smartphone or tablet. This allowed surveyors to view their live location alongside the survey map, thus facilitating navigation and ensuring that the same sites will be used for monitoring in succeeding years.

3.3 Survey counts

After receiving training, practitioners were encouraged to conduct two visits, separated by at least a week, to each survey site. All surveys of mountain hare were conducted following the methods

outlined in Newey at al. (2018) where each site count comprised 2-4 parallel survey transect lines of 2km each, spaced approx. 500m apart. Transect lines were orientated parallel to the dominant altitude gradient (transects usually ran up/downhill) to minimise variance between transect lines by accommodating expected changes in hare distribution with altitude. Lamping surveys started at least one hour after sunset. An observer walked along each transect at a steady pace shining a high-power spotlight from side to side as they traversed the transect line and recorded all the mountain hares observed during the survey.

3.4 Analysis

As outlined in Newey et al. 2018, simple counts of the number of hares seen were divided by the length of the transects covered to give an encounter rate. This can be used to provide an index of animal abundance. Report 1022 calibrated encounter rates against Spatial Capture Recapture (SCR) methods with a view to interpreting density estimates without need for furthermore complex distance analysis. The report observes that the number of hares seen along transects when lamping or using thermal imaging equipment is greater when SCR estimates indicate higher densities and less when SCR estimates indicate low densities. Whilst the report also recognised that the relationship between SCR density and indices is not currently suitable to infer exact density with sufficient confidence, it does provide an indication of a broad density range at the count sites. This approach is considered more reasonable by land managers, particularly if counting of hares along transects might be combined with other management activities.

4. Results

Of the estates that received training, 12 sites from 9 estates were subsequently surveyed between December 2021 and January 2022. A total of 108 km of moorland transects were surveyed and the overall average mountain hare encounter rate for all sites surveyed in the Peak District was 7.8 (range 3.5 – 13.6) hares per walked km of transect (Table 1).

Table 1: Average encounter rate for all sites surveyed between December and January 2022.

	2021-2022
No. Estates	9
No. counts	12
Total transect length (km)	108
Average encounter rate (hares / km)	7.8
Std Dev	3.4

Previous research undertaken to compare SCR densities with encounter rates in SNH Report 1022 (Newey et al. 2018), indicate that the potential SCR density range for an encounter rate of 7.8 hares per walked transect is between 52 and 125 mountain hares per km^2 (Fig. 1).

5. Discussion

Mountain hare encounter rates observed in the initial year of surveys within the Peak District National Park, are broadly similar to those recorded on moorland managed for driven grouse shooting within the mountain hare's core range in Scotland, where night-time counts have been employed (R. Macleod Unpublished data). The encounter rates recorded, indicate significant numbers of hares on these sites when compared with SCR density estimates, which suggest a potential SCR density range of between 52 and 125 hares per km^2.

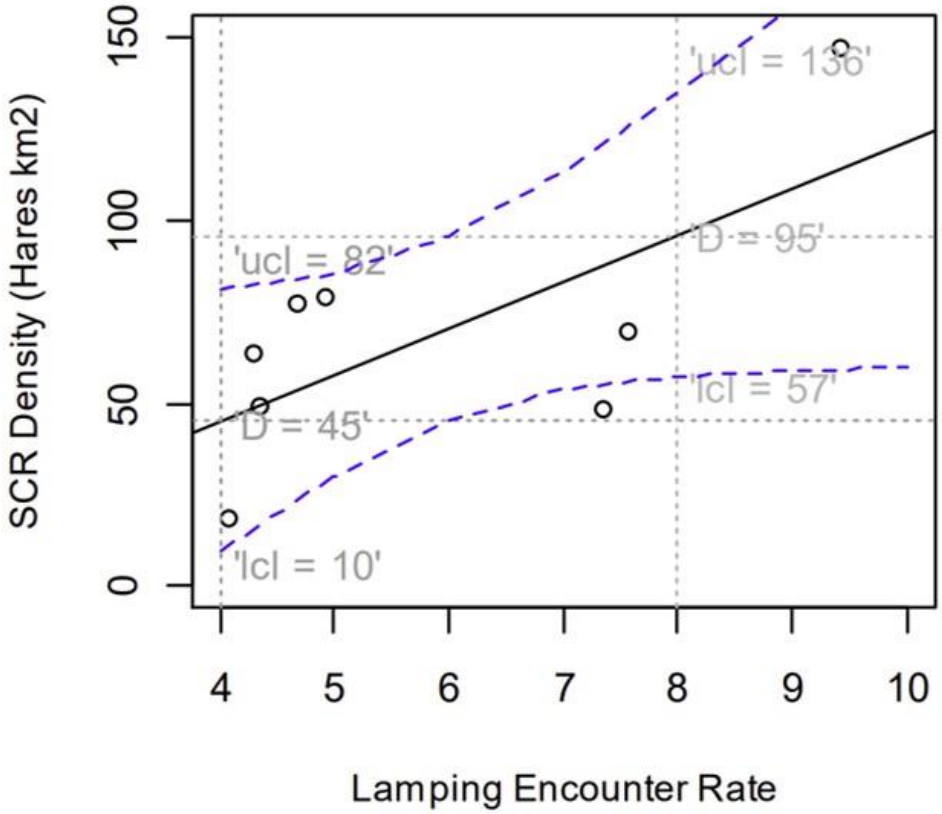

Figure 1. Relationship between encounter rates from lamping surveys and SCR density (Hares per km^2). Adapted from SNH commissioned report 1022 - page 27 (Newey et al. 2018).

Studies of mountain hare in Scotland show that they are strongly associated with heather moorland managed for red grouse shooting (Patton et al. 2010, Hesford et al. 2019, Hesford et al. 2020) where hare densities can exceed 200 km^{-2} (Watson et al. 1973). High hare densities on grouse moors are associated with beneficial heather habitat management and predator control carried out by gamekeepers (Stoddart and Hewson 1984). In comparison, throughout their continental range mountain hares typically occur at much lower densities e.g. 2-3 km^{-2} (Angerbjörn 1986, Newey et al. 2007, Rehnus and Bollmann 2016). Similarly low densities (0.2-2.6 km^{-2}) have been reported for moorland areas of Scotland where there are no grouse shooting interests (Hesford et al. 2019).

The equivalent SCR density estimates, for the average encounter rate observed in this report, are more than twice as high (at the lower confidence limit), and more than five times as high (at the upper confidence limit, as the highest density estimates for mountain hare previously recorded at other sites in the Peak District National Park (Bedson et al. 2021). This highlights the importance of continued monitoring, and practitioner led surveys in contributing to our understanding of the Peak District mountain hare population in the future.

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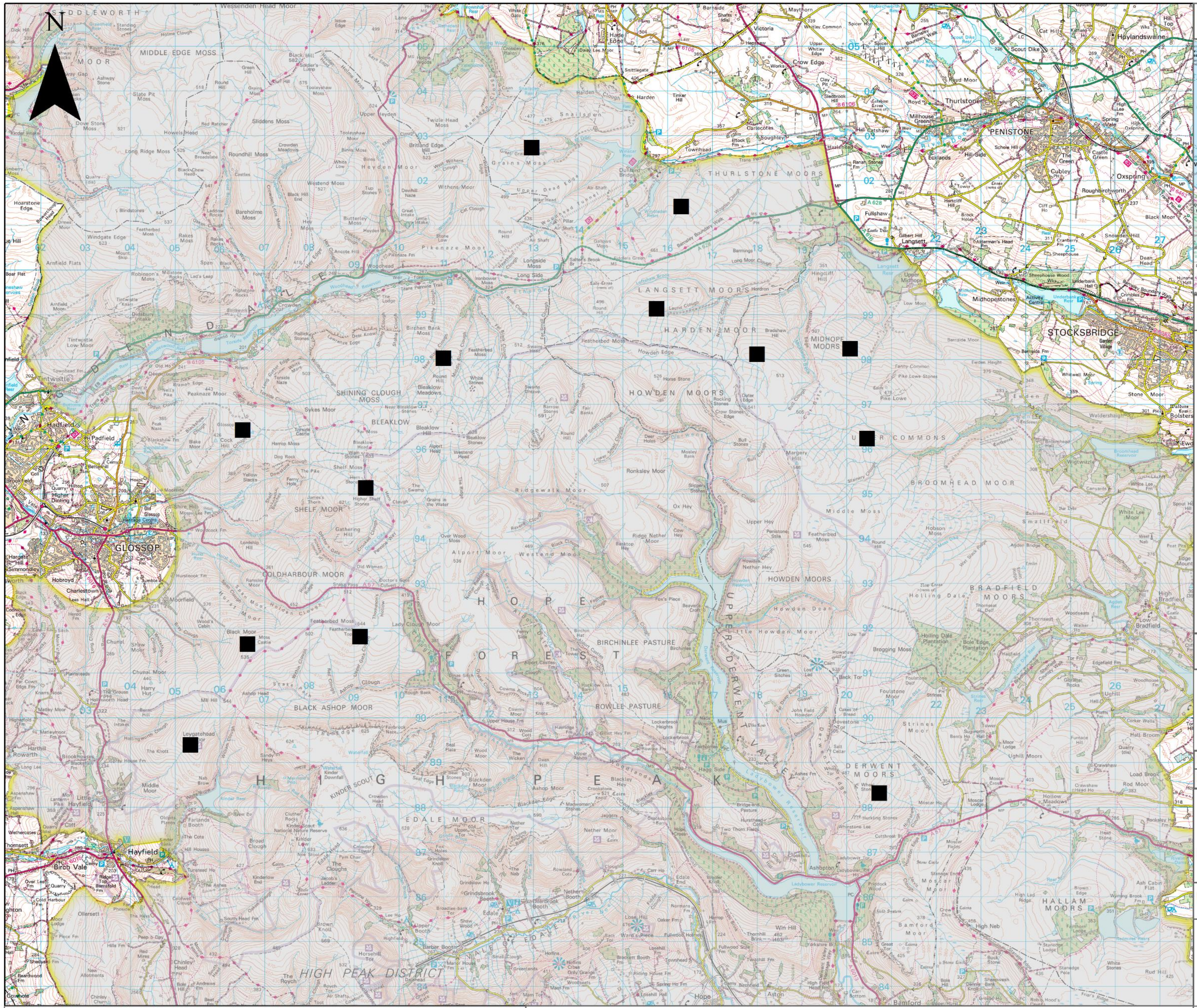
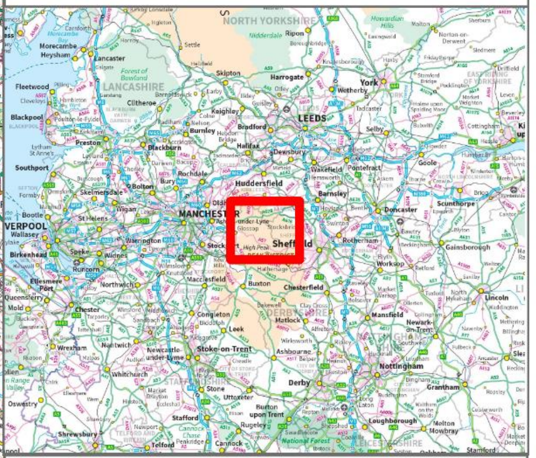
Appendix 1 – Location Map



Location Map



Legend

■ Survey sites

▨ Peak District National Park

Map Title

Peak District Moorland Group Mountain Hare Survey Sites 2021/2022

23/11/2021	N Hesford	H Straker
Date	Drawn	Approved

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Client

The Moorland Association

Scale at A3 1:80,000

0 1 2 4 6 8 10 12 Kilometers