The current status of the brown hare (*Lepus europaeus*) in Britain

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9 Appendix: Instruction sheets sent to surveyors

Hare survey of Great Britain

The principle aims of the survey are:-

1. To provide a quantitative assessment of the number of hares (both brown and mountain hares) in Britain, and to provide a means of assessing the effects of land use change on hare numbers.

2. To provide a standard and repeatable method of assessing hare numbers and a baseline against which to calculate future changes in hare numbers.

3. To estimate the current population pressures facing hares in Britain, and to provide an estimate of likely trends in hare numbers.

To achieve these goals, we will be walking transects in pre-selected one-kilometre squares, and recording all hares seen. To analyse the data objectively, we need to survey good and bad habitats, but will be avoiding urban areas, since hares are rarely seen in such areas. So please cover the square(s) you have been allocated even if you do not think you will find many hares, but choose your transect to avoid urban areas. If this is not possible, please return the square and you will be allocated a new one.

Your first task is to walk the square to choose your transect, having obtained the cooperation of the relevant landowners. Familiarise yourself with the square and choose your transects as described on the sheet *Guidelines for recording the hare data*. For England and Wales, the maps provided are the latest 2½ inch Pathfinder series, for Scotland they are either this series or the previous revision, depending on which is available. Even though these maps are the latest available, land use change in the countryside is proceeding at a fast pace, and so your map may already be slightly out of date. Once you have chosen your transect, mark it carefully in red on the first map. Remember that it is important that your transect is marked accurately on the map, since we need to measure this. Remember also that you need to take direct routes across fields and not along linear features. During the winter you will not cause any damage walking across fields, but ensure that you have permission. Also remember that you have to sample all the habitat types in the square, so do not try to select or avoid any of the habitats available.

The aim of the survey is to record hares sitting in their forms (depressions scraped in the soil or ground vegetation), and these are found in the middle of fields, in hedgerows, in woodlands, etc. By slowly walking a transect around the square you will see hares lying in their forms or flush them as you approach. All you have to do is count and accurately record the positions of these hares. The method is very simple but it is vital that you take great care in recording the position of the hare, since this is essential to enable us to get an accurate population count. So please take care when making the measurements. It would be best if you have a trial walk before you start the survey, to ensure that you are doing things properly. Also, you are not in a hurry, and do not have to complete the transect within a certain time period, so do not rush things. The key is to keep the transect line straight, and to know exactly where the transect line is. You will find that on average about 50 percent of the hares will be flushed within 15 metres of the transect line, 80 percent within 50 metres, and the rest within 100 metres, so you generally will be recording hares close to your transect. The survey period lasts from October 14 to January 14 for 1991/1992 and 1992/1993, and you are required to do one walk in each of the periods October 14 - November 14, November 15 - December 14 and December 15 - January 14. The walks should be done during the middle of the day.

Guidelines for recording the hare data

Plotting the transect

You have been sent the most up-to-date map that we have at Bristol, but there may have been small changes in recent years. So make a preliminary visit to familiarise yourself with the square, note any changes that have occurred, and then plot your transect. A guide to the ideal route is shown in Fig. 1. The transect route should have four main legs at right angles to each other, all running approximately 150 metres inside the boundaries of the square. To mark out the legs of the transect, stand at the starting point (which can be on any side to suit you) and locate a convenient object some way directly in front of you - this can be a prominent tree, field corner, pylon, or a gate through a hedge. You should then walk directly towards this land mark. In the absence of convenient land marks, you may find it easier to tie pieces of coloured rag or polythene onto fences or hedges. Repeat this process on all four legs of your transect. In areas with very big fields there may be an absence of convenient markers. If this is the case, you will have to use a compass and walk on a pre-selected bearing; mark any hedge or similar feature that you pass with a conspicuous coloured marker. It is important that you walk exactly the same transect on each visit, so ensure that your transect is clearly marked and any compass bearing recorded. In practice you are likely to find that you cannot complete each leg of the route as a single straight line due to obstacles such as rivers, quarries, etc. and you may need to align sections of each leg of the transect to take you to easy crossing points through hedges, etc. In such situations each leg of the transect will be broken into a number of straight segments as shown in Fig. 2, but these should be kept as close to the ideal in Fig. 1 as possible, and you must still traverse different habitats at random and not select a route which you think might improve your chances of seeing hares.

Once your transect route has been decided, it should be drawn very accurately onto your map. All habitats and crop types traversed by it should then be marked, using the *Guidelines for recording the transect habitat data*. Divide your transect into numbered sections, with a clear mark at the start and end of each habitat type, and on the back of the map record the habitat type in each section of the transect. Also record any changes e.g. stubble in walk one may become plough or winter cereal in walk two, or pasture without livestock may subsequently have livestock. *Please make sure that any changes that have occurred on each walk are clear.*

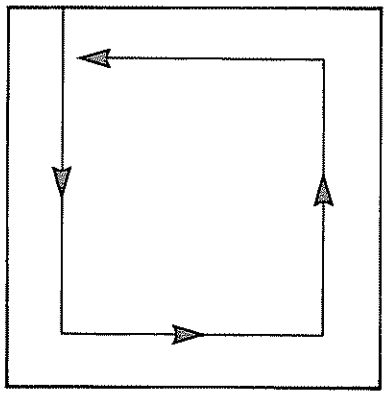

Fig. 1. Ideal transect.

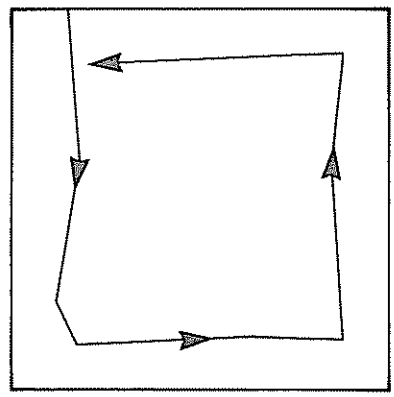

Fig. 2. Legs of transect divided into segments.

Frequency and timing of the walks

You should walk the transect three times, once in each of the periods October 14 - November 14, November 15 - December 14, December 15 - January 14. Your walks may start at any time between 10.00 and 12.30 GMT, and should be carried out at no more than a slow walking pace. Always start at the same point and walk in the same direction. The transect will be about 3000 metres long, and so each survey should take between one and two hours, and should therefore be completed by 14.30 GMT. These times are important, since during the middle of a winter day hares are most likely to be lying in their forms and hence easiest to count.

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Guidelines for recording the hare data continued

Weather

Do not carry out the surveys in extreme weather conditions which affect visibility, they are likely to drive the hares into cover or compromise your own safety. For the purposes of this survey extreme weather conditions are: driving rain, very strong winds, thick fog reducing visibility to less than 100 metres, or heavy snowfall. In upland areas, it is particularly important to carefully consider your own safety.

Equipment needed

The maps you need are supplied; on map one mark the transect in a bright colour, and clearly mark and label your habitat boundaries. On map two mark any details on set-aside, etc. in bright colours and answer the questions on the back - see *Additional information to record* below. If you have been requested to do a full habitat survey for this square, please mark this on map three, also in bright colours to ease interpretation. In addition you have three maps on which to mark any hare sightings. Beside coloured pens/pencils you may also need some coloured cloth or strips of polythene to mark the transect, and a clip-board and a field compass would be very useful. If you think you would find one useful, a cheap field compass is available from most camping stores for about £4.00; otherwise you may be able to borrow one.

Judging distances

You need to be able to judge distances and also to measure some distances accurately by pacing. Accuracy here is important, so first check your average walking pace length. This should be done by counting the number of paces you require to complete a know distance, preferably 100 metres. Do not measure a single pace or paces over a short distance, since this will be subject to considerable errors. You need to put the number of paces per 100 metres on your recording sheet. Also, once you have worked out the size of a normal pace, practice judging distances, since you need to be able to estimate distance of 25 metres, 50 metres and 100 metres reliably in the field.

Locating hares

Traverse the transect at a slow walking pace, and do not try to go too fast. Scan a semicircle of about 100 metres radius in front and to your sides. Whilst scanning to the sides be especially careful not to miss any hares lying or getting up directly in front of you. Also, when scanning further out do not make the mistake of missing areas of the ground relatively close to you on either side of the line, as hares will sometimes sit tight, staying pressed to the ground even when you approach to within 5 metres. On other occasions they may flush at over 50 metres. If you carry binoculars, only use these to check sightings. When you spot a hare in its form or see it as it runs off, try to fix on the form or point of flushing, making a mental note of any physical features close-by such as conspicuous grass tussocks, clods, etc. Then check that you are in fact directly on your transect line and note the time. When a hare has been flushed, it is unlikely to settle again while are you still in sight, but keep an eye on it to ensure that you know where it goes and do not count it twice. Also it may push off another hare, and you will have to record the position of any hares disturbed from your transect, but ignore ones that get up so far off that you would not have spotted them from the transect. Next, if the hare was flushed over 50 metres from you, use your compass to measure the angle between the point from which the hare was flushed and the transect line - see Fig. 3. Then continue along the transect line, pacing out the distance until you are at right angles to where the hare was flushed. The angle and transect distance measured in paces should be recorded on the sheet. Alternatively, if the hare was flushed less than 50 metres away, there is no need to measure the angle; simply continue along your transect until you are at right angles to where the hare was flushed. From there if the hare was less than 25 metres away pace out the perpendicular distances in pace on your data sheet. You may find it useful to leave a marker on the transect line so that you do not lose your position. For distances over 25 metres, simply give an estimate as either 25-50 metres, 50-100 metres or over 100 metres. You may also find the second methods easier for hares flushed more than 50 metres away, but this may not be practical in areas whether there are lots of hares. Then mark the approximate position of the hare on your sightings map, and add the number to correspond with that on the *Hare data sheet*. Finally make a note of the vegetation type where the hare was flushed, using the transect habitat sheet, and record this and the other information required on the *Hare data sheet*

cont'd

Guidelines for recording the hare data continued

before continuing along your transect. *Remember that it is vital that you record the position of each hare accurately in relation to the transect, and if you do not you will bias the population estimates.*

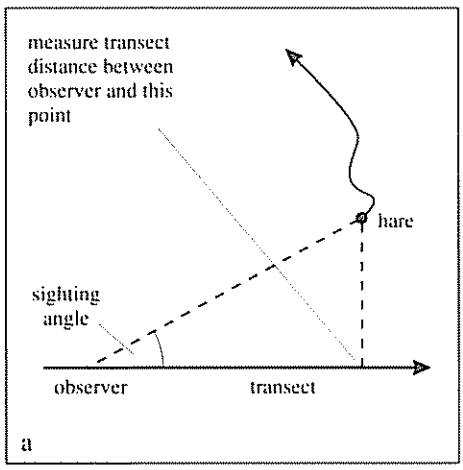

Fig. 3a. Measuring position of hares flushed more than 50 metres away.

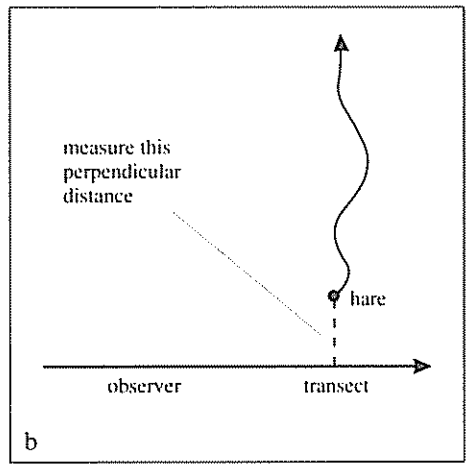

Fig. 3b. Measuring position of hares flushed less than 50 metres away.

Only record hares, both mountain and brown hares, but not rabbits. Make sure you can tell the difference reliably in the field; you may find a pair of binoculars useful for confirming identification.

Additional information to record

On the back of map two are a few simple questions, which I would like answered if the landowner is co-operative. But do not alienate him/her with aggressive questioning, or by putting questions in a way that may be viewed as "anti-shooting", etc. If possible ask the following questions in a general conversation and fill in the answers later: (1) How many hares approximately are shot on the area each year? The answer is unlikely to relate directly to your square so be specific as to the area covered e.g. "two large drives each winter on 4000 hectare estate with over 300 hares killed on each shoot", or "just a few hares killed during rough shooting on this and adjacent farms". (2) Is any of the land put down to set-aside? If so, give details for how long, etc. and also mark the area on map two. (3) Is the crop spraying routine, or are field margins and headlands left unsprayed, or is it an organic farm? For the latter, mark the organic fields on map two. (4) Is the area keepered, and if so by a full-time or part-time keeper? (5) Have any large die-offs of hares been noted in the area? If so give details of dates and approximate numbers of hares. (6) Is poaching a problem in the area? If so give details e.g. extensive use of lurchers, occasional night shooting, etc. It would be best to ask these questions after the survey has been completed; if the landowner is unco-operative, just record this on the sheet and answer any questions that you can. (7) If you encountered any problems, or have additional comments to make, please do so here.

Guidelines for recording the transect habitat data

You need to record some basic information about the habitats you are following along your transect; all you have to do is mark the position of the transect on map one, and then divide it into numbered sections and record the habitat for each numbered section on the back of the map. Please make it very clear where each habitat type starts and stops. Also record all linear features e.g. hedgerows, treelines, fences, etc. that cross your transect in the same way.

Linear features that cross the transect

1. Hedgerows: these are less than 4 metres high and less than 5 metres wide.
2. Treelines: a line of single trees (minimum of three) greater than 4 metres high and less than two canopy widths apart. Hedgerows may be associated with treelines.
3. Stone walls: fairly obvious.
4. Other man-made boundaries: wire fences, post-and-rail fences, iron railings, etc.
5. Ditches: usually small, perhaps temporary, water courses.
6. Rivers/streams: flowing water, with no evidence of canalisation, and usually permanent, continuous flowing water. Ditches are more likely to dry up and the water flow is more likely to be interrupted.
7. Canals: confined to flow in a certain direction by man.
8. Others: please specify.

Note that you may find one or more linear features in association e.g. a treeline in a hedgerow. In such circumstances both should be marked on the map.

Other habitat features

9. Semi-natural broadleaved woodland: predominantly broadleaved trees more than 5 metres high with a semi-natural or natural growth.
10. Broadleaved plantations (including orchards): tree species not native to the site and of even age.
11. Semi-natural coniferous woodland: predominantly coniferous trees of any height with semi-natural or natural growth.
12. Coniferous plantations: predominantly coniferous trees which have been planted.
13. Semi-natural mixed woodland: at least 25% broadleaved and 25% coniferous trees with semi-natural or natural growth, trees over 5 metres high.
14. Mixed plantation: at least 25% broadleaved and 25% coniferous trees, planted.
15. Young plantation: young trees, up to 3 metres high, both coniferous and broadleaved, which have been planted.
16. Recently felled woodland: areas for which there is evidence that woodland has been felled recently.
17. Parkland: areas where tree cover is less than 30%, the majority of the trees between 30 and 70 metres apart, and a minimum number of ten trees.
18. Tall scrub: between 3 and 5 metres high. N.B. stands of trees less than 5 metres high should be classified as woodland, not scrub.
19. Low scrub: vegetation less than 3 metres high.
20. Bracken: land dominated by bracken with at least 75% cover.
21. Lowland heaths: lowland areas with at least 25% dwarf shrubs.
22. Heather moorlands: as above but for upland sites. Please specify as: (a) recently burnt, with heather less than 6 inches (15 centimetres) high; (b) managed, but with heather taller than 6 inches (15 centimetres); (c) no evidence of recent management and heather tall and woody.
23. Blanket bog: areas of peat with the vegetation dominated by heather.
24. Raised bog: at least half the peat area raised into a shallow dome.
25. Marginal inundation: swamps or fens but not coastal marshes.
26. Coastal marsh: predominantly salt marsh vegetation.
27. Wet ground: areas of wet land found in association with other habitats, e.g. wet areas in a grassland field or flushes in upland areas.
28. Upland unimproved grassland: in upland areas, and will include some areas used for rough grazing and poor quality grassland such as purple moor grass. They have not been improved by the application of fertilisers, herbicides or by drainage.
29. Lowland unimproved grassland: may be regularly grazed or mown, but may be totally neglected. Should not have been improved by the application of fertilisers or herbicides to significantly alter the composition of the sward. To include herb-rich grasslands on downland, cliff tops, etc.

30. Semi-improved grassland: grassland which has been slightly modified by fertiliser or herbicide application, or by heavy grazing pressure and/or drainage.
31. Improved grassland: grassland that has had regular treatments of artificial fertilisers and herbicides. N.B. This should not include monoculture grassland, i.e. grassland leys (see 32).
32. Grassland leys: this is short-term grassland, and will usually have been reseeded less than five years previously. It is characterised by evidence of ploughing, bare soil between the grass plants, a scarcity of broadleaf plants, and is usually dominated by a single grass species, often rye grass. There are usually less than 5-10 species per square metre. Category 31 consists of longer term grassland with a higher density of grass and broadleaf species, usually in enclosed land.
33. Amenity grassland: this includes well maintained non-agricultural grass, such as playing fields, recreation grounds and golf courses.
34. Winter cereals: this includes wheat, barley or oats; be careful not to mistake these for grassland leys (category 32) or vice versa.
35. Sugar beet: differentiate between walks when this is unharvested and walks when it has been harvested but substantial amounts of broken pieces of beet have been left.
36. Carrots: should be out by the start of the survey, but some may remain.
37. Other root crops (turnips, swedes, mangels): record as for sugar beet (category 35).
38. Forage crops: may include brassicas, rape grown in cereal stubbles, etc. If you know what it is, please specify.
39. Rape: should be easy to identify; early drillings will be visible as small rosettes of brassica-type leaves.
40. Other crops: please specify.
41. Stubble: some stubble fields may still be present at start of survey.
42. Plough: only include bare ground in this category; fields with remains of root crops left in them should be recorded as one of categories 35-37.

Note that for all grassland and arable categories, where livestock is present on the field at the time of the walk, the species and number of animals present must be recorded e.g. 14 cattle, 7 horses, circa 120 sheep.

Guidelines for the full habitat survey

The maps provided are the latest available and should be reasonably up-to-date. However, there may have been recent changes to field boundaries, roads, or new houses built. So first of all mark these on the attached map. Then mark on all the habitat features at least 50 metres in length or 500 square metres in area; ignore any areas smaller than this. All the habitat types have been numbered and described below; all you need to do is first of all mark surviving hedgerows and treelines in bright colours to ensure that they are clearly visible. Then use as many different colour pens as you like to mark the boundary of each field or habitat type. On the map simply use the numbers from the list to identify the type of habitat. Although there are many habitat types listed below, in most one-kilometre squares you will use less than ten of these categories, so the task should not be too complex.

1. Hedgerows: less than 4 metres high and less than 5 metres wide. Classify them as continuous if the gaps are less than 10 metres wide.
2. Treelines: a line of single trees (minimum of three) greater than 4 metres high and less than two canopy widths apart. Hedgerows may be associated with treelines.
3. Semi-natural broadleaved woodland: predominantly broadleaved trees more than 5 metres high with a semi-natural or natural growth.
4. Broadleaved plantations (including orchards): tree species not native to the site and of even age.
5. Semi-natural coniferous woodland: predominantly coniferous trees of any height with semi-natural or natural growth.
6. Coniferous plantations: predominantly coniferous trees which have been planted.
7. Semi-natural mixed woodland: at least 25 percent broadleaved and 25 percent coniferous trees with semi-natural or natural growth, trees over 5 metres high.
8. Mixed plantation: at least 25 percent broadleaved and 25 percent coniferous trees, planted.
9. Young plantation: young trees, up to 3 metres high, both coniferous and broadleaved, which have been planted.
10. Recently felled woodland: areas for which there is evidence that woodland had been felled recently.
11. Parkland: area where tree cover is less than 30 percent, the majority of the trees between 30 and 70 metres apart, and a minimum number of ten trees.
12. Tall scrub: between 3 and 5 metres high. N.B. stands of trees less than 5 metres high should be classified as woodland, not scrub.
13. Low scrub: vegetation less than 3 metres high.
14. Bracken: land dominated by bracken with at least 75 percent cover.
15. Coastal sand dunes: include all stages of succession where the vegetation is grass-dominated or wet dune slacks.
16. Coastal sand or mud flats: should be fairly obvious.
17. Coastal shingle or boulder beaches: should be fairly obvious. To include outcrops of bare rock on foreshores.
18. Lowland heaths: lowland areas with a least 25 percent dwarf shrubs.
19. Heather moorlands: as above but for upland sites.
20. Blanket bog: areas of peat with the vegetation dominated by heather.
21. Raised bog: at least half the peat area raised into a shallow dome.
22. Marginal inundation: swamps or fens but not coastal marshes.
23. Coastal marsh: predominantly salt marsh vegetation.
24. Wet ground: areas of wet land found in association with other habitats, e.g. wet areas in a grassland field or flushes in upland areas.
25. Standing natural water: no evidence of damming.
26. Standing manmade water: artificially created reservoirs and impoundments.
27. Running natural water: no evidence of canalisation.
28. Running canalised water: a water course that has been confined to flow in a certain direction by man.
29. Upland unimproved grassland: in upland areas, and will include some areas used for rough grazing and poor quality grassland such as purple moor grass. They have not been improved by the application of fertilisers, herbicides or by drainage.
30. Lowland unimproved grassland: may be regularly grazed or mown, but may be totally neglected. Should not have been improved by the application of fertilisers or herbicides to significantly alter the composition of the sward. To include herb-rich grasslands on downland, cliff tops, etc.

cont'd

Guidelines for the full habitat survey continued

31. Semi-improved grassland: grassland which has been slightly modified by fertiliser or herbicide application, or by heavy grazing pressure and/or drainage.
32. Improved grassland: grassland that has had regular treatments of artificial fertilisers and herbicides. N.B. this should not include monoculture grassland, i.e. grassland leys (see 33).
33. Arable: all classes of arable land, including grassland leys and horticulture. A grassland ley is defined as short-term grassland, and will usually have been reseeded less than five years previously. It is characterised by evidence of ploughing, bare soil between the grass plants, a scarcity of broadleaf plants, and is usually dominated by a single grass species, often rye grass. There are usually less than 5-10 species per square metre. Category 32 consists of longer term grassland with a higher density of grass and broadleaf species, usually in enclosed land.
34. Amenity grassland: this includes well maintained non-agricultural grass, such as playing fields, recreation grounds and golf courses.
35. Unquarried inland cliffs: unvegetated rock over 5 metres in height and at an angle of at least 60°. It includes scree.
36. Vertical coastal cliffs: as above but in coastal areas and mostly unvegetated.
37. Sloping coastal cliffs: at an angle of less than 60° and mostly vegetated.
38. Quarries and open-cast mines: any excavation (gravel pits, chalk pits, etc.), including unvegetated spoil heaps.
39. Bare ground: bare soil or ground not covered by vegetation and which does not fall into categories 35-38.
40. Built land: any urban areas including gardens and transport corridors. Will include road and motorway verges and nurseries. For this category do not bother to mark built up areas, roads, etc. on the map unless there has been some change since the map was printed, when it should only be necessary to mark the changes.

Questions

1. Does hare hunting (i.e. shooting, coursing or beagling) take place in the area?

2. Is any land put down to set aside? If so, give details and mark and label relevant area on this map.

3. Is crop spraying normal, are field margins left unsprayed or is part of the square organic? If so, give details and mark and label relevant area on this map.

4. Is the area keepered?

5. Have any large die-offs of hares been noted in the area?

6. Is poaching a problem in the area?

7. If you encountered any problems, or have additional comments, please give details.