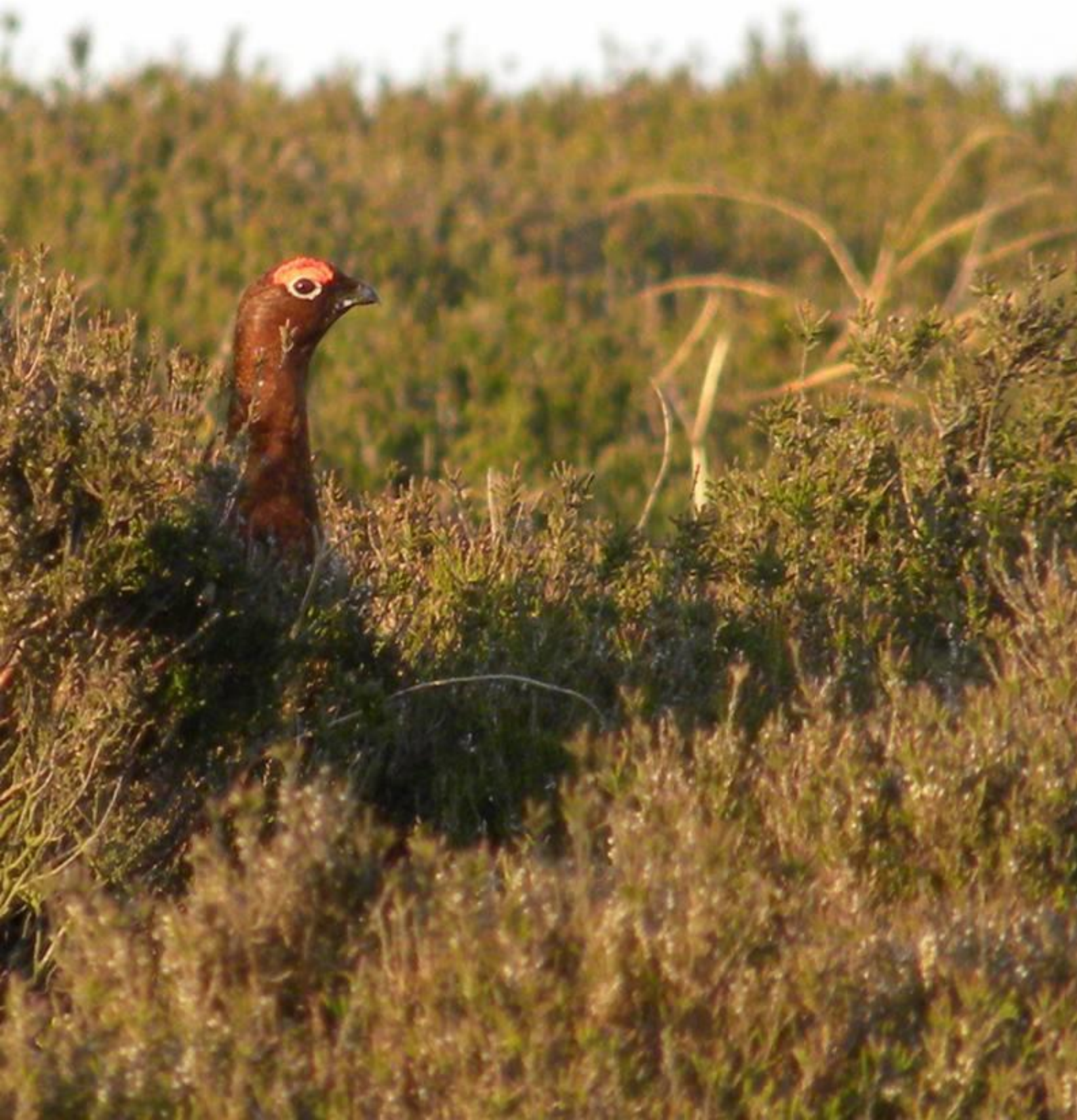


# ***Red Grouse***

***on The Long Mynd***

***Survey and Population Estimate***

***2014***





# Estimating the Red Grouse Population on The Long Mynd 2014

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## Strettons Area Community Wildlife Group

There are several Community Wildlife Groups in the Shropshire Hills Area of Outstanding Natural Beauty (AONB), including the Strettons Area Community Wildlife Group (SACWG), which was launched in February 2012.

### The Groups

- Bring together people interested in wildlife
- Undertake survey work to establish the status of key bird and plant species and habitats
- Encourage and enhance local interest in wildlife
- Actively promote conservation.

SACWG helped promote this survey, and organised it in 2013 and 2014. Several members participated.

SACWG holds an Annual Public Meeting, at which this and other wildlife surveys are discussed.

**More information can be found on the website, [www.ShropsCWGs.co.uk](http://www.ShropsCWGs.co.uk)**

## Introduction

Systematic monitoring of the Red Grouse population was carried out by the National Trust, through dawn counts of calling territorial males in winter, for several years. Two dawn counts in the winter of 2009–10, coupled with casual records, indicated a minimum of 32 territories, but, adding observations of birds only seen or heard once, the estimated population was around 51. Three dawn counts in the winter of 2010–11, coupled with casual records, indicated a minimum of 40 territories, but, adding observations of birds only seen or heard once, the estimated population was around 59 (Caroline Uff, *pers.comm.*).

This method did not produce a sufficiently accurate population estimate for such a scarce species, or to assess the effectiveness of the Trust's heather management. It was therefore decided to pilot a new survey method in 2011. Personal observations over many years have found that male birds also display at dusk, and a project was undertaken to estimate the Red Grouse population by mapping such displays.

Efforts were made to recruit as many participants as possible, and the project produced a population estimate of 60 – 63 territorial males. The project was considered a success, and was repeated in 2012. Again, efforts were made to recruit as many participants as possible. The newly formed Strettons Area Community Wildlife Group helped organise the project in 2012, which produced a population estimate of 63 - 66 territorial males. Similar efforts in 2013 produced a population estimate of 53 - 54 territorial males. Bad weather, including heavy snow, delayed the counts, so it is not known if the lower population estimate was due to increased mortality due to the weather, or a reduction in Grouse activity which made counting them more difficult.

A full report has been produced each year (*Red Grouse on The Long Mynd: Survey and Population Estimate (Year)*). These Reports can be found on the Community Wildlife Groups website, [www.ShropsCWGs.org.uk](http://www.ShropsCWGs.org.uk)

It is hoped to repeat the project each year to produce a population trend. For the 2014 survey, efforts were again made to recruit as many participants as possible. The 2014 publicity leaflet is attached as Appendix 1.

Everyone who offered to help with the project was invited to a briefing on Thursday 27<sup>th</sup> March 2014, though many people who participated in previous years felt it unnecessary to attend a further briefing. A PowerPoint presentation was made, explaining the objectives of the project, and what to look for and record. A video of displaying Grouse was shown.

A Project Brief was supplied to all participants. It is attached as Appendix 2. It has evolved since the first survey in 2011, incorporating the lessons learnt as set out in each annual Report.

## Methodology

Sixty-seven Watch Points, selected to give a good field of view of part of the survey area, were identified, and marked on enlarged copies of 1-10,000 Ordnance Survey maps. The same Watch Points were used as in 2013, but there were seven more than in 2012: some new areas on the edge of the range were added in 2013, as they might be coming into suitable condition as a result of the heather management.

There were 12 different survey maps altogether, and some of these are used as background to present the Project results (see pages 6 – 14). The 67 Watch Points are marked on these maps (There is no Watch Point 43).

It was intended to start the survey on 3 April, and hold it each Thursday until 8 May. This was similar to the timetable followed in 2012 and 2013, which started two weeks earlier than the 2011 survey because more Grouse were observed on the earlier survey dates in 2011.

However, in view of the poor recording conditions on several surveys in 2012, the local weather forecast was again used, so a planned survey could be postponed in advance if conditions were likely to be unsuitable (rain or strong winds).

Heavy rain was forecast for 3 April, so the first survey was not carried out until 10 April. Surveys planned for 1 and 8 May were also postponed.

Volunteers were asked if they could help on additional dates, to replace the cancelled surveys. Several new dates were agreed. In the event some of these new dates were arranged and then cancelled, and substitute surveys actually took place on 28 April, and 12, 13 and 15 May.

Ideally each Watch Point should be covered three times. However, several surveyors were unable to come on the re-arranged dates, so a seventh date was added in an attempt to ensure that all Watch Points were covered adequately. In the event, 42 Watch Points were covered three times (and three more were covered four times), 21 were covered twice, and one was covered only once. This was a much better level of coverage than last year, and the final survey, on 15 May, was only one week later than planned.

A copy of all 12 numbered survey maps, together with a fieldwork recording sheet, was emailed to all participants before the first planned survey. Then, the day before each survey date, every participant was notified of their allocated Watch Point by email, together with the map number they should print (together with a fieldwork recording sheet) and take to their Watch Point

The fieldwork recording sheet is attached as Appendix 3. Participants were asked to record on the map all Grouse seen or heard, together with a number for each observation. The display flight of a territorial male often provokes a response from an immediate neighbour, often another display flight to the edge of the territory. There were several instances of two birds landing close together at the edge of their respective territories. On other occasions several birds were seen and heard concurrently, or nearly so. These are the most helpful observations in determining the boundary between territories, and participants were particularly asked to record all such events.

The time of each observation was entered on the fieldwork recording sheet, together with a description of what had been observed. The times were recorded to allow cross referencing of the same observation from adjacent Watch Points, and on some occasions to prove that concurrent records must have been due to different birds. The symbols used on the map were described in the project briefing, and they are also set out on the fieldwork recording sheet.

Participants were also requested to summarise their observations, with their own assessment of how many different territorial males they had observed.

## **Observations**

The Project organised 52 individuals, including four couples and two families, who recorded the birds seen or heard from the 67 different Watch Points on seven separate evenings. It was originally intended to record every Thursday between 3 April and 8 May. However, bad weather meant that the first count, and the last two, were cancelled and rearranged, and a seventh count was held, as outlined above.

Fieldwork recordings were made from every Watch Point. One had a count made on only one date, 21 had counts on two dates, the majority, 42, had counts on three dates, and three had counts on four dates.

It was initially hoped to cover all Watch Points at least three times, the level of coverage almost achieved in 2012, but there were fewer participants, and the cancellations and re-arrangements meant there were fewer participants on the rescheduled dates. In addition, a few observers did not return survey maps, or did not report that they had not carried out surveys at their allocated Watch Points, so it was believed that surveys had been carried out at particular Watch Points when they had not been.

A total of 181 result sheets (137 maps with observations, plus 44 nil counts) were returned for analysis. These maps included 865 different observations of Red Grouse (some of which were concurrent observations of two or more birds). The coverage is summarised in Table 1, and compared with that of previous years. Coverage was much better than in 2013, and almost comparable with the two earlier years.

**Table 1. Summary of Survey Coverage and Results 2011 - 14**

Year	2011	2012	2013	2014
Total Number of Watchpoints	38	60	67	67
Number of Surveyors	48	67	40	52
Number of Counts	147	204	122	181
Average Number of Counts / Watchpoint	3.9	3.4	1.8	2.7
Number of Records	818	816	460	865
Average Records / Count	5.6	4.0	3.8	4.8
Counts with no Grouse recorded	12	51	26	44

Table 2 provides a breakdown of the results on each of the seven Survey dates in 2014. A full breakdown is attached in Appendix 5.

**Table 2. Summary of Observations of Red Grouse during 2014 Long Mynd survey.**

Survey Dates	April				May			Totals		
	10	17	24	28	12	13	15	Counts	Records	Average
Total Counts	33	35	32	20	17	22	22	181		
Counts of Zero	12	16	2	0	4	3	7	44		
Total Grouse Records	108	59	297	136	74	136	55		865	
Average Records / Count	3.3	1.7	9.3	6.8	4.4	6.2	2.5			4.8

## Analysis

All observations were transcribed onto master maps, using a different colour for each date.

For all parts of the area these were A3 blow-up versions of the A4 survey maps. A sample map from a previous report, showing all the observations used for analysis, is shown in Appendix 6. It shows the dashed lines between birds observed concurrently, and these dashed lines are highlighted. There were 12 such maps used altogether.

The analysis was carried out using the territorial mapping method (*Bird Census Techniques* Bibby et al 2006). This method uses concurrent observations of different birds exhibiting territorial behaviour (display flight, aggression or song). Observers were asked to record the times at which they heard calls, and this data too has been used to identify different birds calling concurrently against each other. The territory boundary passes between the positions of the males recorded concurrently. Similar observations on different dates identify

the different sides of each territory, so that clusters of observations can be grouped into a territory.

Care was taken when transcribing the observations on the survey maps onto the Master Map to join each observation of two or more birds together with dashed lines. By the rules of the territory mapping method, observations of a bird at the same position twice in three visits constitutes a territory. The difficulty with utilising this method for Red Grouse is that each territorial male has a large territory, and moves around it. A lot of the calling and display activity is at the edge of the territory, as each male competes with his neighbours, and sometimes the birds actually invade the neighbouring territory. Thus each male may be recorded several times on the same evening by participants at several nearby Watch Points; and then again, in different locations, on subsequent survey visits. This difficulty is overcome by rigorously applying one of the rules of the territory mapping methodology – the data must be interpreted to produce the minimum population estimate.

Using the concurrent observations, joined by dashed lines, to define territory boundaries, all observations can be grouped into the different territories shown in the results section.

It must be stressed that there is not necessarily any correlation between the size and shape of each territory shown on the maps with the ground that each Grouse actually occupies. Many of the Grouse recorded cannot be assigned to a territory with any degree of certainty, and the maps represent notional territories, based on those observations which locate (often very approximately) a boundary between territories.

Also, if there are no observations to establish the boundary on one side of a territory, the analysis will show one territory when in fact there are two. The population estimate calculated by this method is therefore the minimum, and there may be more.

## Results

The next nine pages each show one of the maps issued to the project fieldworkers, with all the territories found in 2014 on that map shown, based on the analysis described in the preceding section. (Only nine of the 12 maps are shown – the remaining three maps did not show any other territories that were not wholly on one or more of these nine)

The Watch Points are the grey numbers in circles. All territories are numbered on each map (in blue), to ensure all have been counted (1 – 56).

However, there were several records from the area south of Shooting Box, around WP32 that were difficult to interpret, and it is likely that there was an additional territory there.

**The total number estimated from the Survey maps is 56 - 57 territorial males.**

## Comparison of Results with those from NT and Other Records

Once the results were finalised, and the territories were mapped, they were compared with the casual records collected by the Trust during 2014. These records did not suggest any additional territories to those identified from the analysis of survey maps.

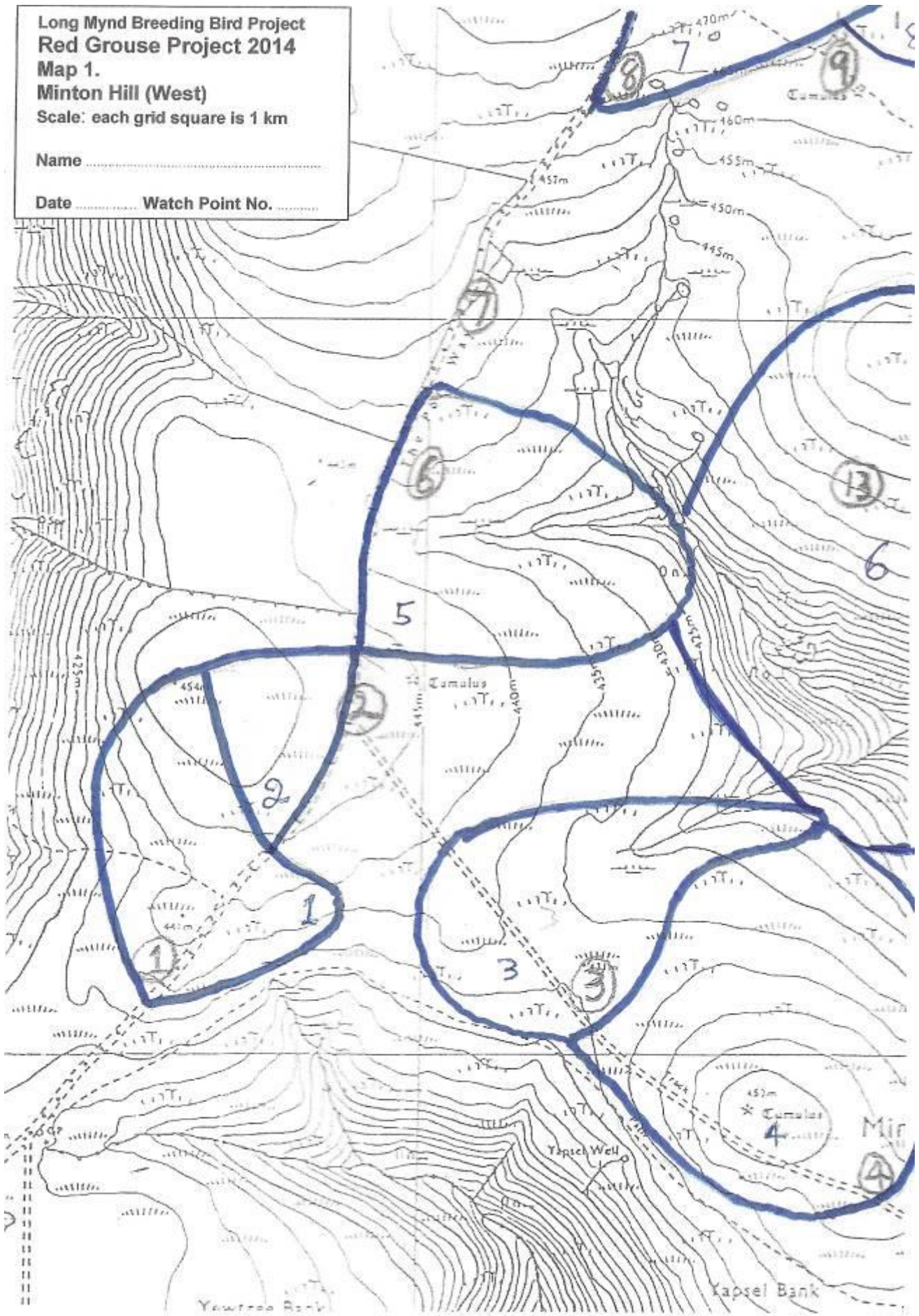
However, one of the surveyors reported a male Grouse seen whilst mountain biking, close to WP5 (500 metres east of WP4), suggesting that a territory found to be occupied in 2012, but not in 2013, was also occupied in 2014.

**The total population estimate for 2014 is  
56 - 58 territorial males.**

Long Mynd Breeding Bird Project  
Red Grouse Project 2014  
Map 1.  
Minton Hill (West)  
Scale: each grid square is 1 km

Name .....

Date ..... Watch Point No. ....

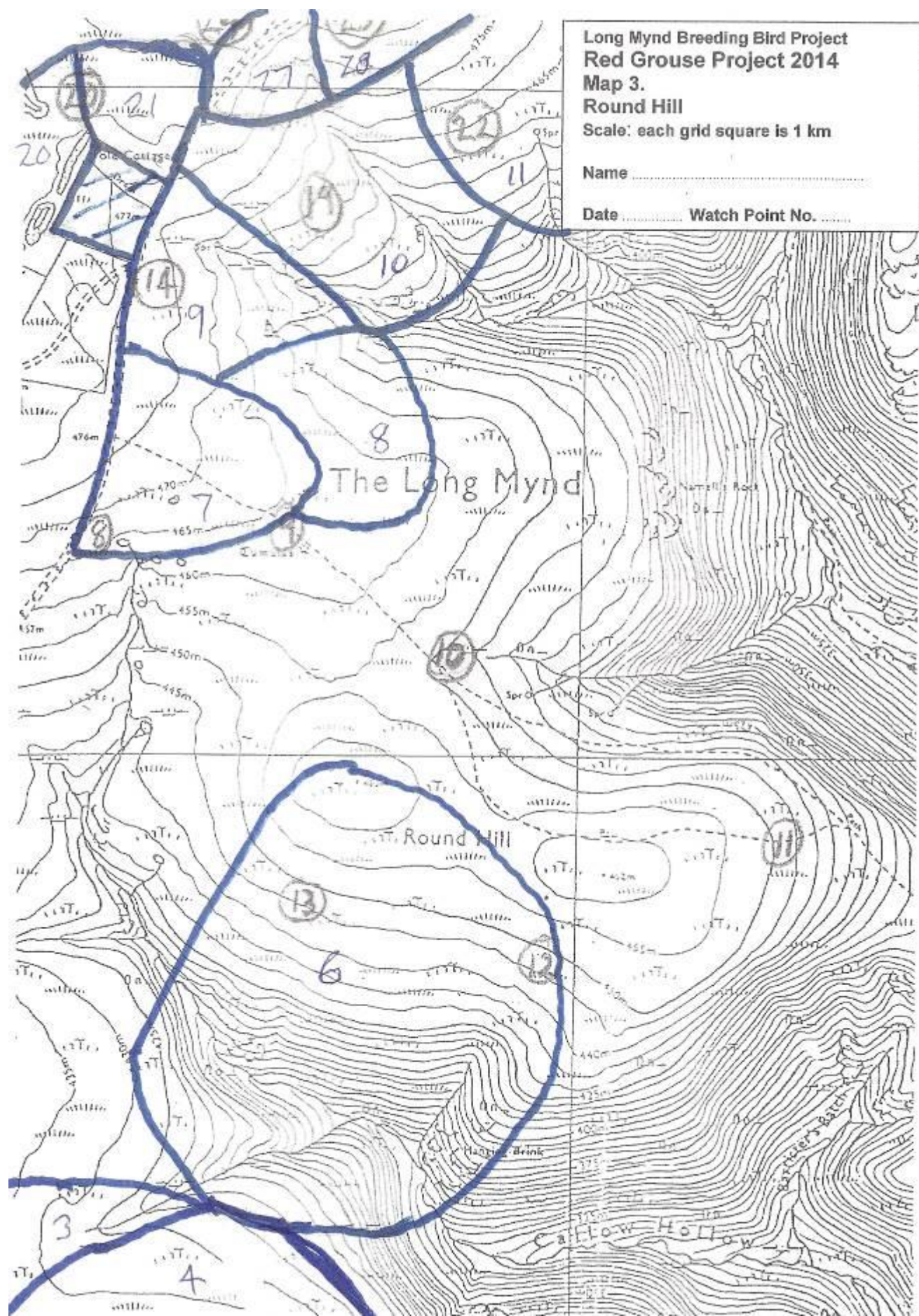




Long Mynd Breeding Bird Project  
Red Grouse Project 2014  
Map 3.  
Round Hill  
Scale: each grid square is 1 km

Name .....

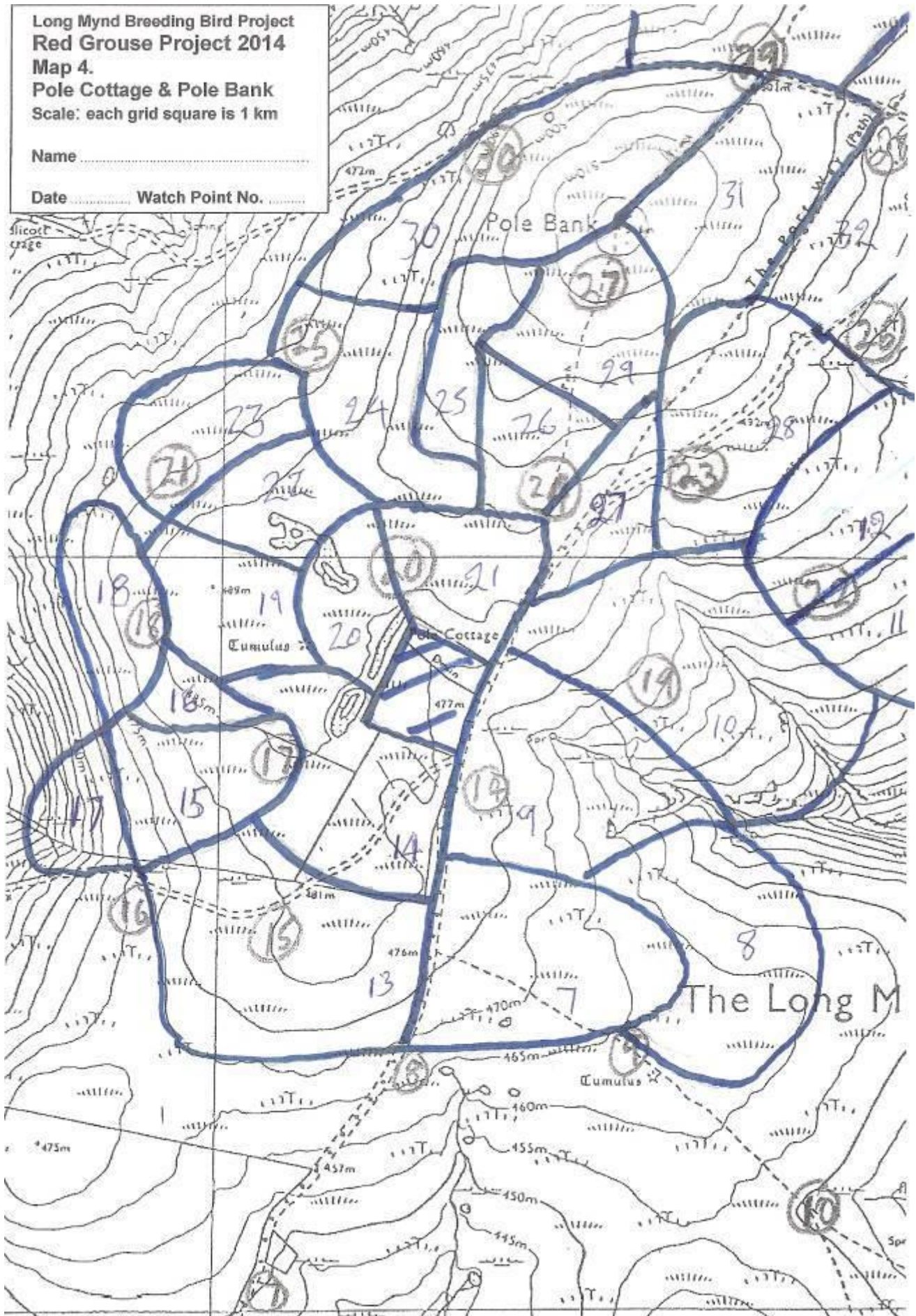
Date ..... Watch Point No. ....

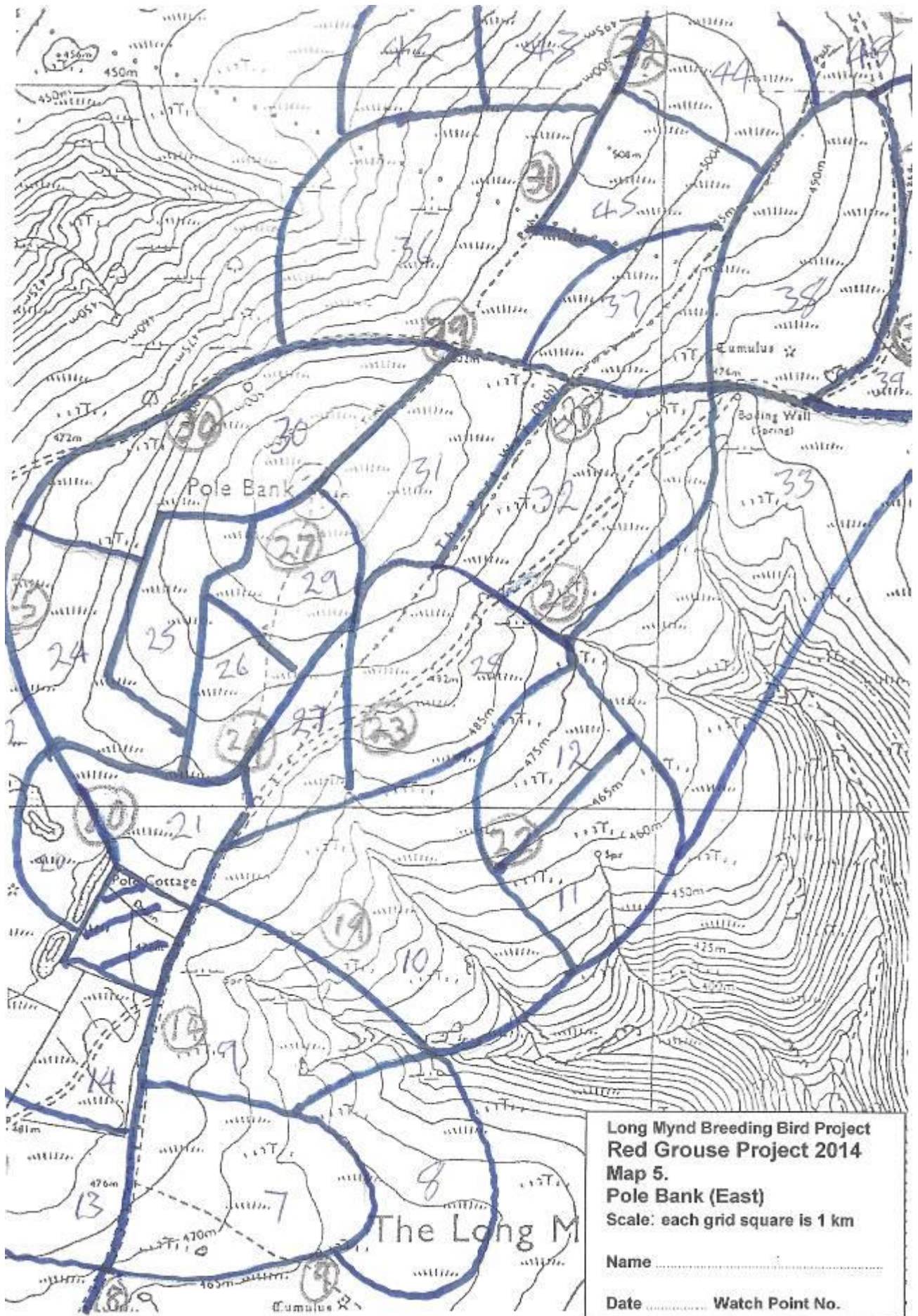


Long Mynd Breeding Bird Project  
Red Grouse Project 2014  
Map 4.  
Pole Cottage & Pole Bank  
Scale: each grid square is 1 km

Name .....

Date ..... Watch Point No. ....

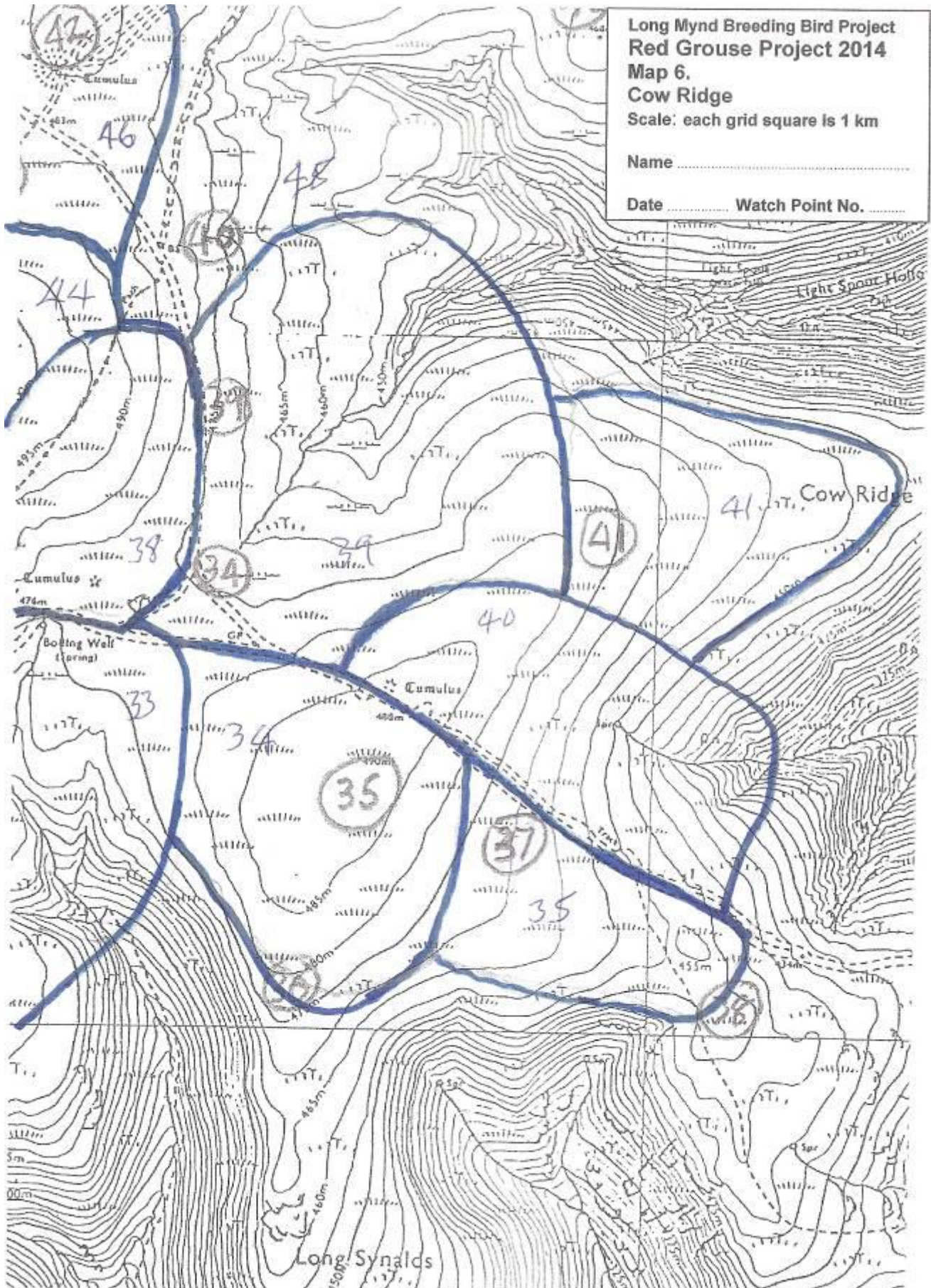




Long Mynd Breeding Bird Project  
Red Grouse Project 2014  
Map 6.  
Cow Ridge  
Scale: each grid square is 1 km

Name .....

Date ..... Watch Point No. ....

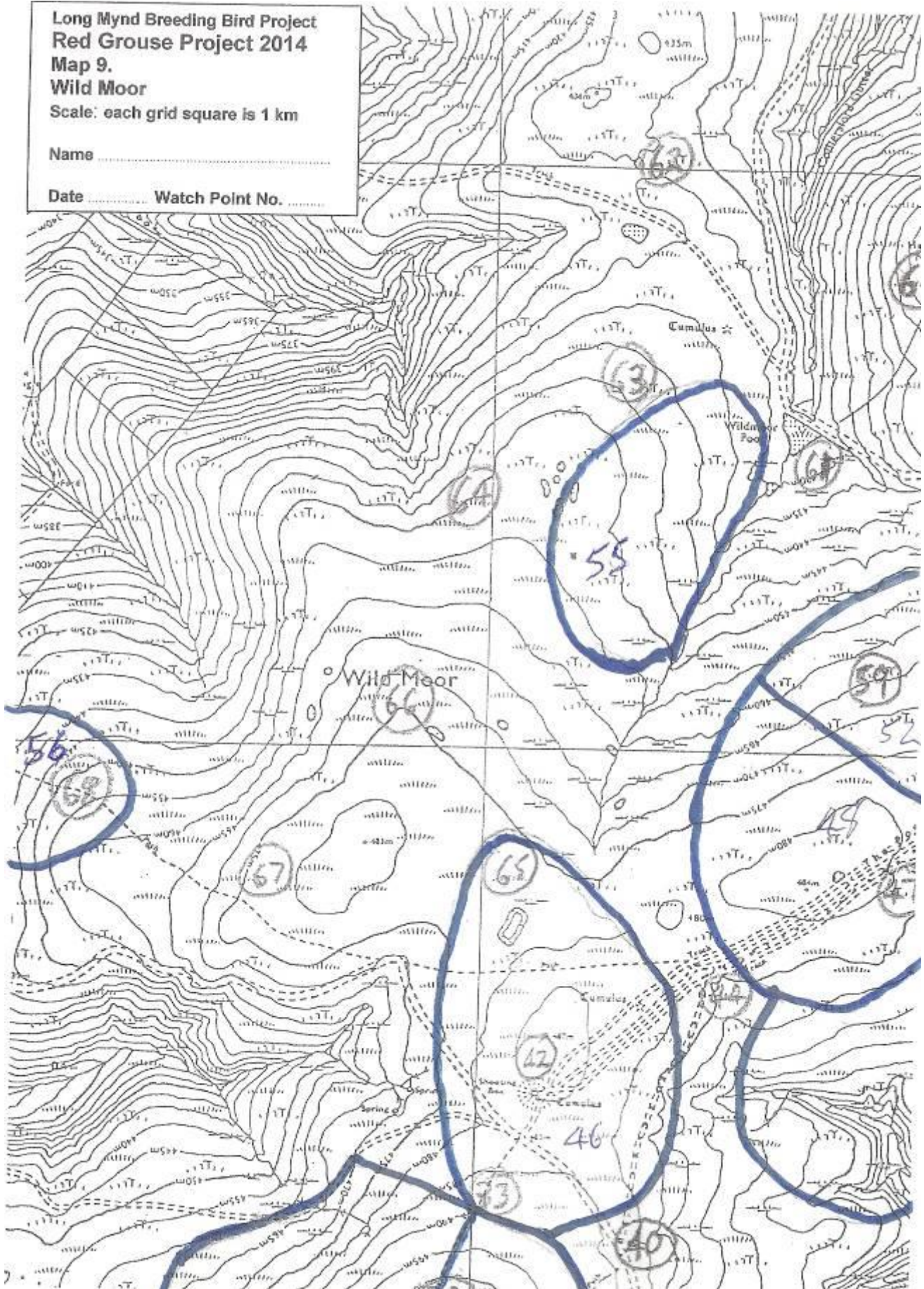




Long Mynd Breeding Bird Project  
Red Grouse Project 2014  
Map 9.  
Wild Moor  
Scale: each grid square is 1 km

Name .....

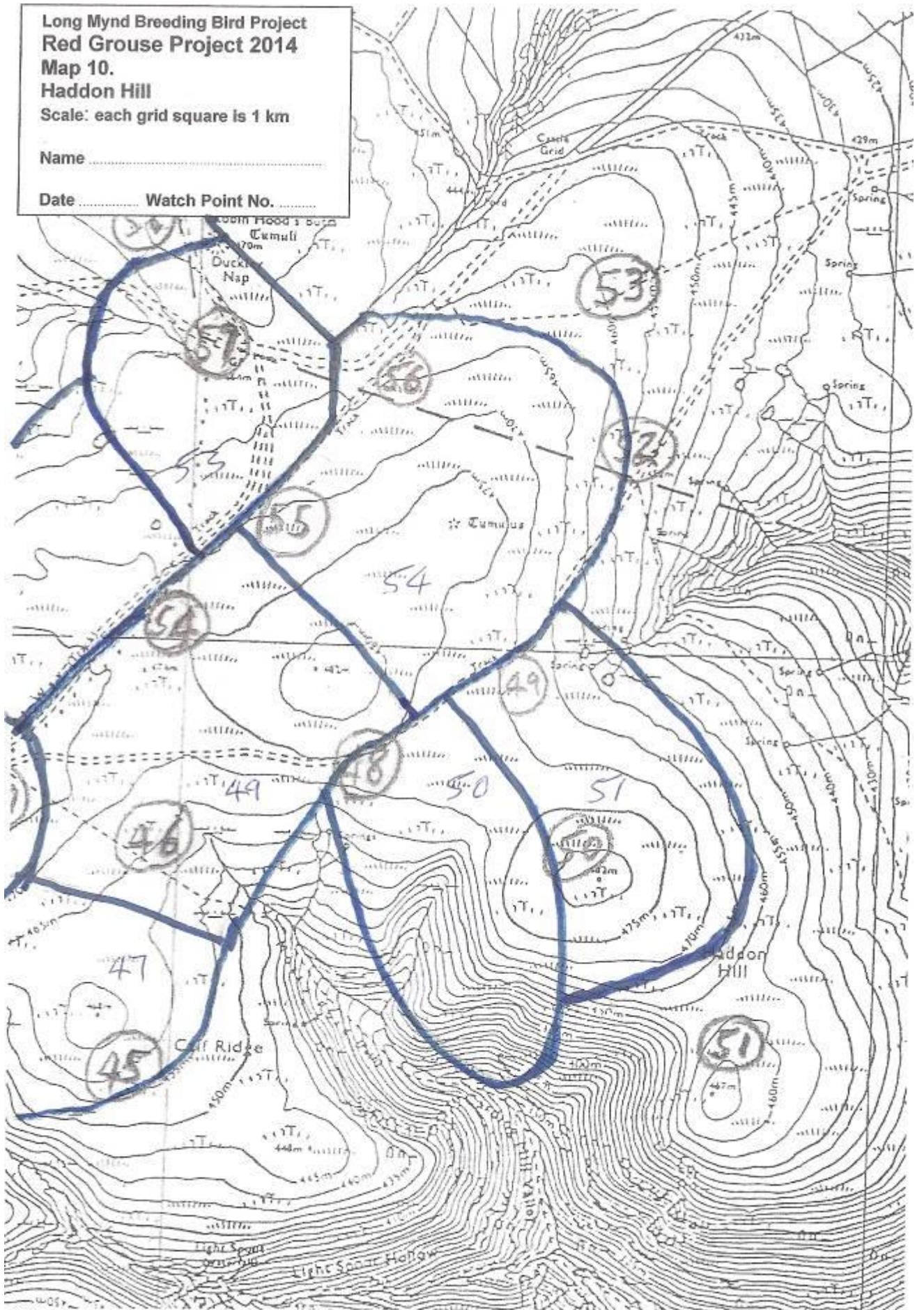
Date ..... Watch Point No. ....



Long Mynd Breeding Bird Project  
Red Grouse Project 2014  
Map 10.  
Haddon Hill  
Scale: each grid square is 1 km

Name .....

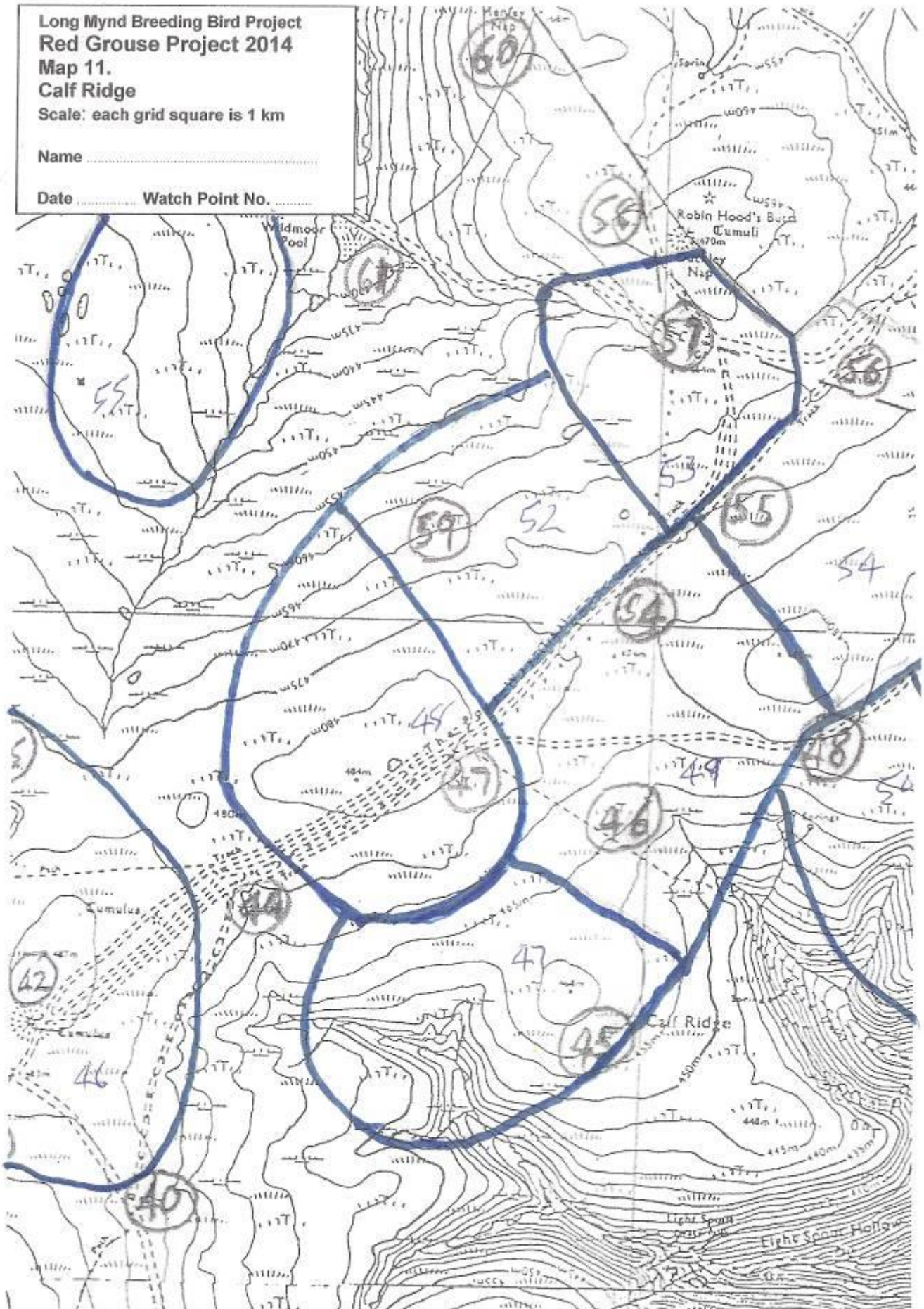
Date ..... Watch Point No. ....



Long Mynd Breeding Bird Project  
Red Grouse Project 2014  
Map 11.  
Calf Ridge  
Scale: each grid square is 1 km

Name .....

Date ..... Watch Point No. ....





## Population Trends – Summary

The population estimate made in each year is shown in the Table

**Table 3. Annual Population Estimate**

Year	2011	2012	2013	2014
Population Estimate	60 - 63	63 - 66	53 - 54	56 - 58

The 2013 survey was the most disrupted by bad weather, and the average number of records per count was the lowest for the four years, in spite of four of the six counts being disrupted by bad weather in 2012. Not surprisingly, the level of activity recorded in 2013 was lower than in other years. This may be because the Grouse were present but inactive, or because there were fewer to count, due to birds not coming into breeding condition because of the unusually late bad weather at the start of the season, or high mortality.

The 2014 count showed an increase over the 2013 estimate, but the population still appears to be less than that found in 2011 and 2012. Therefore it is likely that the bad weather at the start of the 2013 breeding season did have a real impact on the population, which partially recovered in 2014.

Many species occupy the same territories year after year, but it is difficult making such comparisons in this case. The maps show notional territories, rather than the areas actually occupied by the Grouse, and there will be rearrangement of territories, year on year, after burning when areas become initially unsuitable, and then improve in subsequent years; and again when the heather matures, and becomes too thick and overgrown.

## Recording Conditions

The activity levels of the Grouse, and the likelihood of them being observed and recorded, vary according to the weather conditions. Although conditions may vary across the whole plateau, so they were not the same at every Watch Point, in general they were good on six of the seven survey dates. In summary, the conditions during the survey periods were:-

- 10 April – High cloud (75%), some blue sky, slight breeze from the west
- 17 April – High cloud (100%) stiff breeze from the west, very cold
- 24 April – Warm, almost still, high thin cloud (100%)
- 28 April – Very warm (16°C at start), a heavy shower 19.20 – 19.38 only, otherwise no wind (very still), high thin cloud, sunny periods
- 12 May – High thin cloud (66%), some blue sky, light breeze from the west
- 13 May – Sunny, blue sky, cold, initially still but increasing gusty breeze from west
- 15 May – Warm, still, high thin cloud (50%), sunny periods

The cancellation of several planned surveys (including rearranged dates) because of forecast bad weather meant that, in general, conditions were relatively good on all dates, but the period over which the counts were conducted was extended by a week, and three of the counts occurred in the second and third week in May, when Grouse activity has usually declined because territories have been established and egg-laying starts.

## Comparison with Recording Conditions in Previous Years

In 2011, there was no rain on any evening that the survey was conducted, although some of the evenings were quite windy. The total number of record sheets submitted was 147, containing 818 records. The average number of Grouse records per sheet was 5.66. No Grouse at all were recorded on only 12 (8.2%) record sheets.

In 2012, conditions on the first two dates were reasonably good (good visibility, slight breeze, no rain), on the third date conditions during the actual survey period were also reasonable, but heavy rain all day depressed Grouse activity. There was rain, mist and wind on the three final dates. The total number of record sheets submitted was 204, containing 816 records. The average number of Grouse records per sheet was 4.0. No Grouse at all were recorded on 51 (23.9%) record sheets. The poor weather meant that, although there were far more counts than in 2011, the number of records was virtually the same.

In 2013, heavy snow at the beginning of April, and then a prolonged period of cold wet weather, meant the first survey was not carried out until 25 April, and it was cold on that date. Indeed, nationally, this was the coldest spring for over 50 years. Several new dates were fixed and then cancelled, and the last three surveys were carried in the second half of May, well after the normal time of peak Grouse activity. Although conditions were good for all except the first date, the average number of Grouse recorded on each survey sheet was the lowest of the four years (see Table 1)

## Peak Grouse Activity

The 2012 survey started two weeks earlier than in 2011, because the level of observed activity reached a peak at the end of April, and then declined considerably.

A similar timetable was planned for 2013, but the actual event was substantially different. That year had the worst weather of the four, so more planned counts had to be rearranged, and the final survey was not undertaken until 30 May.

A similar timetable to 2012 was planned for 2014, but the first and last two planned surveys had to be cancelled and rearranged. However, one was rearranged for 28 April, and all were finished by 15 May.

Table 3 shows the average number of Grouse records per survey sheet for all the survey dates over the four years of the project, in date order. Not surprisingly, the average depends more on the weather conditions during the survey, and the area being covered (some parts of the area have higher densities of Grouse than others). However, in general, April counts recorded more Grouse than May counts, because territorial activity declines as territories are established and egg-laying starts. In future years, efforts should be made to reschedule any April dates that are cancelled within April, rather than add new dates onto the end of the survey period.

Table 4 also shows the effect of carrying out counts in bad weather in 2012. The procedure of cancelling and rearranging counts when the Met Office forecasts rain or strong winds, introduced in 2013, has increased the number of records / count.

The low number of records / count on 17 April 2014 suggests that low temperatures may reduce Grouse activity too, and this should be monitored in 2015.

**Table 4. Average number of Grouse records per survey sheet**

Year	March	April											May										Average		
	29	10	12	14	17	19	21	24	25	26	28	30	2	3	5	7	10	12	13	15	16	19		21	30
2011				6.1			6.3				7.3				5.0			5.2				2.9			5.6
2012	6.0		5.9			3.0				1.7				3.9			1.9								4.0
2013									1.6			3.6	5.1			4.1					7.8		3.7	1.0	3.8
2014		3.3			1.7			9.3			6.8							4.4	6.2	2.5					4.8
Average	6.0	3.3	5.9	6.1	1.7	3.0	6.3	9.3	1.6	1.7	7.0	3.6	5.1	3.9	5.0	4.1	1.9	4.8	6.2	2.5	7.8	2.9	3.7	1.0	4.5

## **Distribution of Territories and Heather Management areas**

There are approximately 700 hectares of heather dominated heathland owned and managed by the National Trust on Long Mynd. Of this area, approximately 60% is targeted for active management by burning or cutting on a long rotation (a planned cycle of around 16 years). This management started in 2001. Up until 2012, approximately 160ha of heather have been cut or burnt in scattered patches. Burning can only take place in favourable conditions during a limited winter period, and none was possible in 2013. A further 25ha was burnt in the spring of 2014. This is done primarily to add structural diversity to the heathland whilst maintaining heather as the dominant species. It benefits a range of wildlife species, but in particular the Red Grouse. The young areas of heather resulting from the management are also more accessible and nutritious to livestock than the old heather. The remaining 40% of heather dominated heathland is left as 'non-intervention' to support less mobile species which may be negatively affected by burning or cutting.

All the territories shown on Maps 1 – 9 on pages 6 - 14 have been input into the National Trust's GIS system, *Map Info*, to produce a summary Map 10 as shown on page 18. This map also shows the contours, and confirms that the Red Grouse only inhabit the relatively flat plateau.

Map 11 shows the results for 2013, to facilitate comparison.

Map 12 shows all areas of heather, and the areas where management has been carried out since 2001.

Map 13 overlays the 2014 Territories Map onto the Heather Management map.

It will be seen that some areas which have been managed recently, and have short heather, should be good for Grouse e.g. the north end of Wild Moor, but none were found there. Conversely, some apparently 'unsuitable' areas where there has been no management do have Grouse, such as south-west of Pole Cottage (not NT land).

## **Comparison of Results with Previous Years**

The 2014 results are summarised in Map 10, and a direct comparison can be made with the 2013 results in Map 11.

Comparison of the number of territories found each year in the main range is difficult, as the maps are a product of the methodology, rather than a reflection of the actual area occupied by each Grouse.

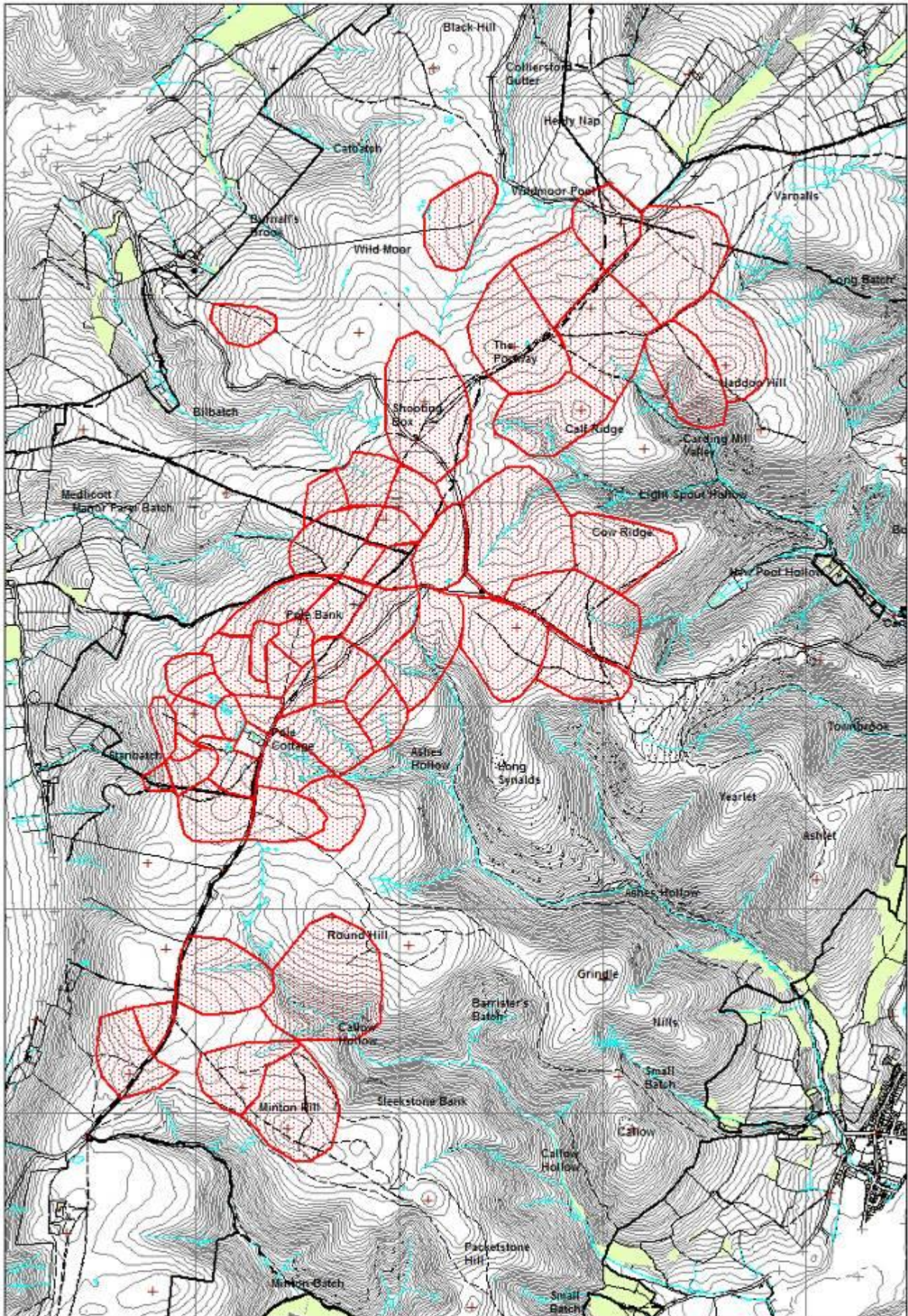
However, the number of territories found on the edge of the core area grew in 2012, reflecting the continued growth in the population since 1994. The apparently reduced population found by the 2013 survey is reflected mainly in the disappearance of many of the territories on the edge of the range. If the population really declined, then contraction of the range is likely. However, birds occupying such territories are likely to be less active, as they have fewer neighbours to compete with (display against) so they are more likely to be overlooked.

More positively, it appears that a recent burn (2009) has allowed the creation of one or two new territories on Haddon Hill, where no Grouse were found in 2012.

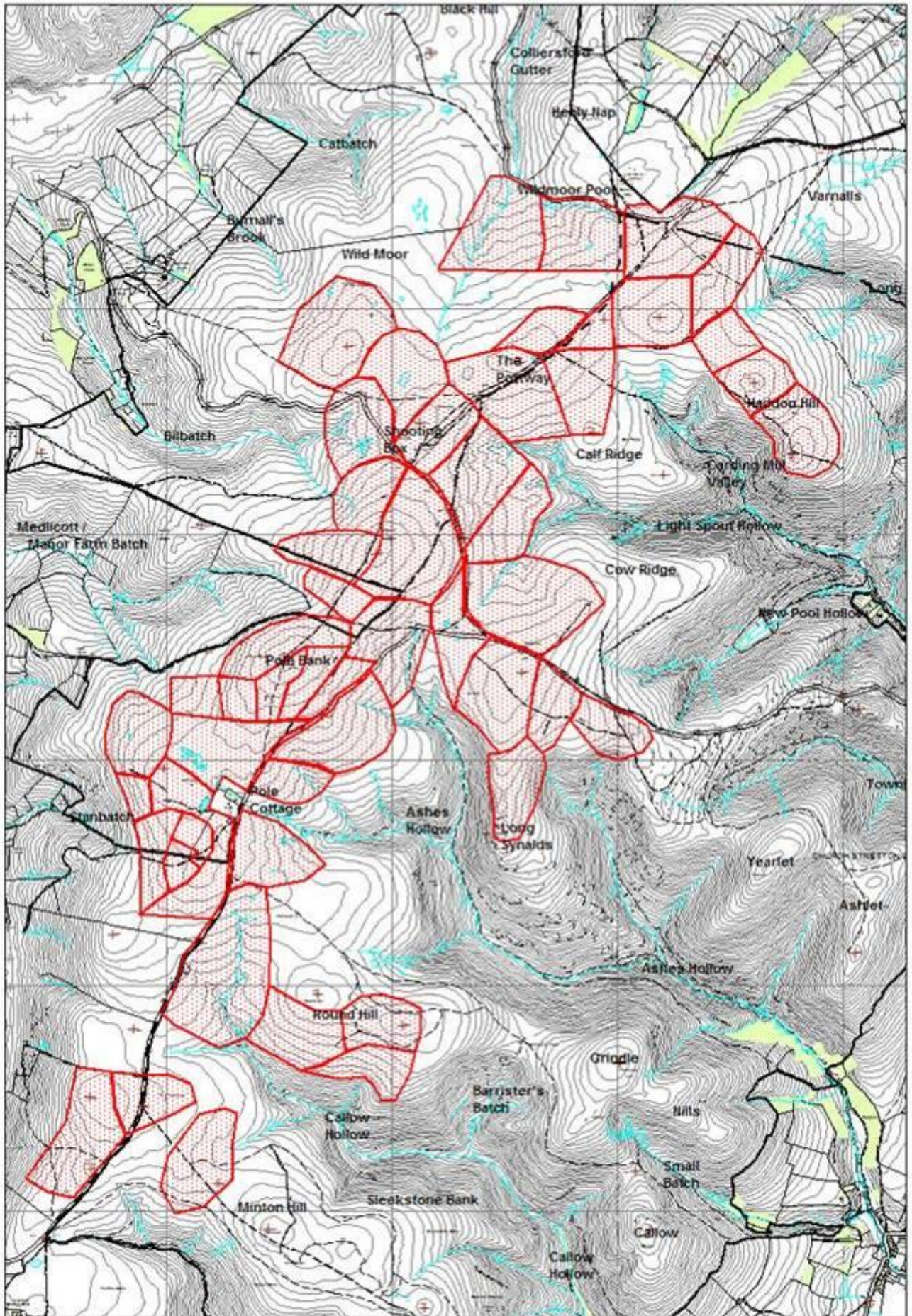
In general most territories have some area of short heather in them. It appears that the heather management being carried out by the Trust is continuing to benefit Red Grouse.

It is possible that some of the recently managed areas of heather have not yet had sufficient time to regenerate to suitable conditions. Some additional Watch Points were added to the 2012 survey to monitor such areas, and potential new areas should also be monitored in future years.

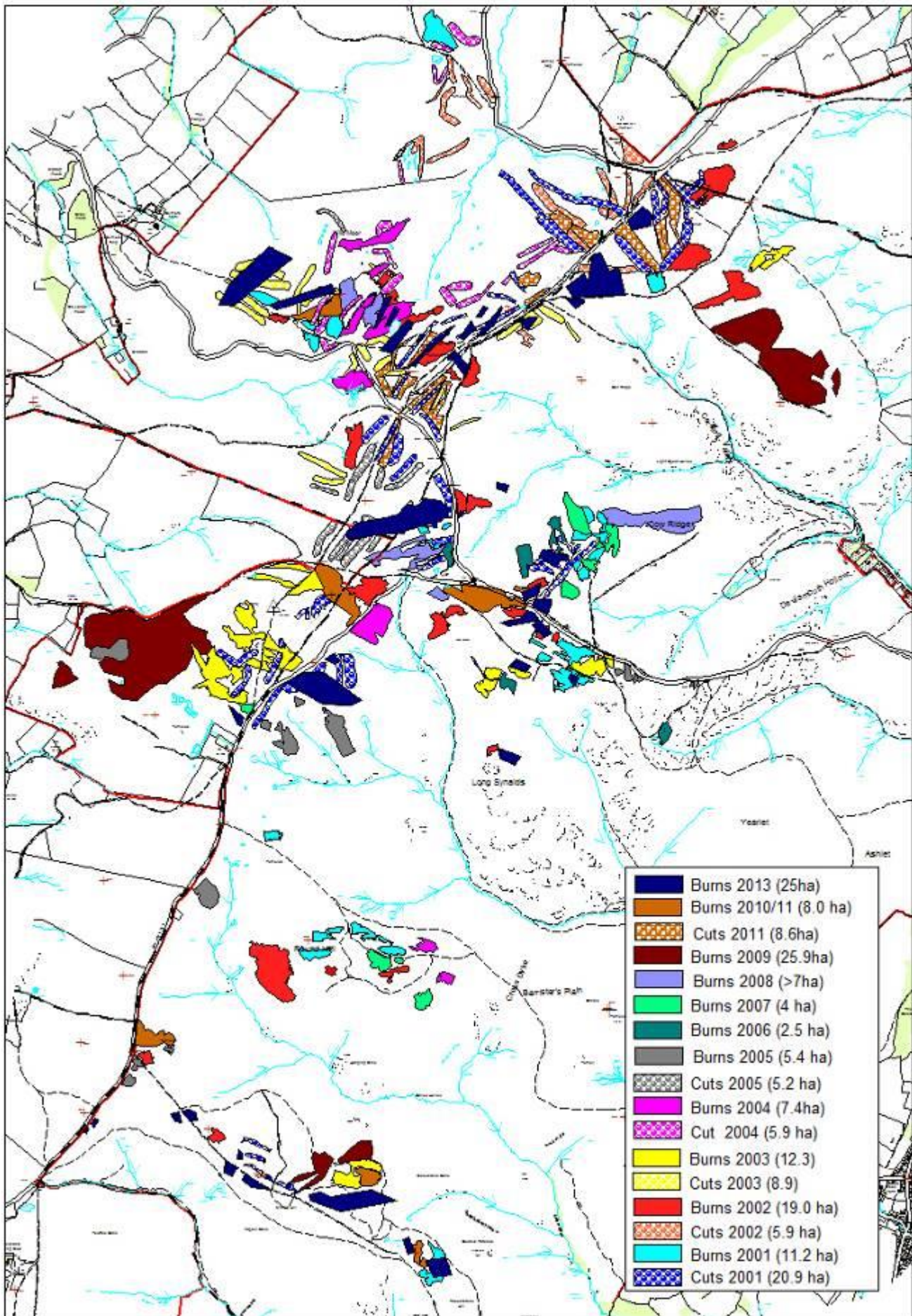
Map 10. Summary Map (with contours) – All Territories 2014



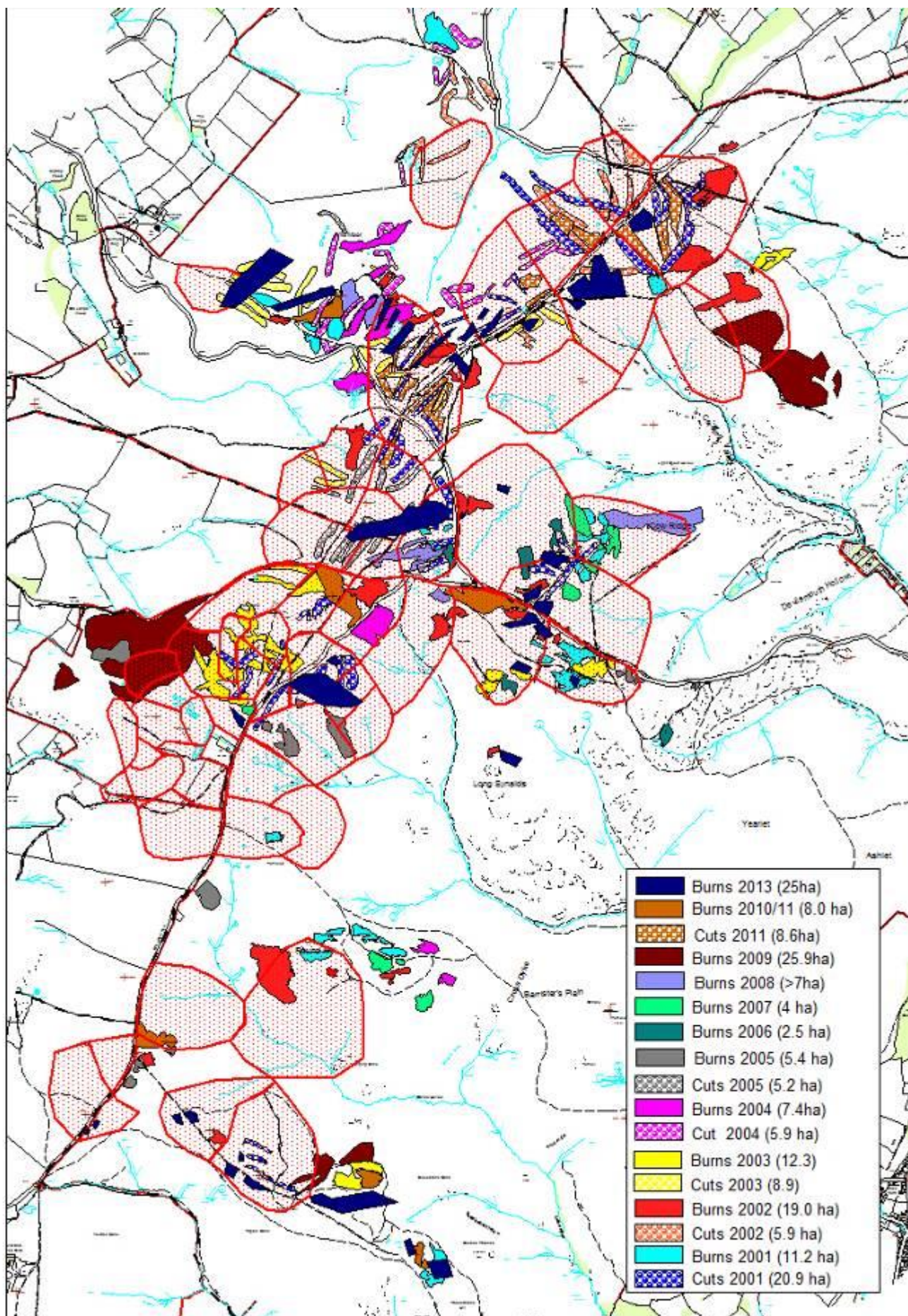
Map 11. Summary Map (with contours) – All Territories 2013



Map 12. Heather Management Areas 2001 – 13



**Map 13. Grouse Territories 2014 overlain on Heather Management Areas 2001-13**



## Notes of Caution

In 2011, the survey produced a more accurate (and higher) population estimate than that obtained by the three counts made at dawn by National Trust staff and volunteers in the preceding winter. The large number of participants, with systematic coverage of the whole of the Long Mynd over six separate evenings, produced excellent results. However, the Report listed several notes of caution, some of which were addressed by changes in the methodology in 2012, but some of them still apply.

It should be noted that:-

1. Poor weather conditions during individual surveys, especially strengthening wind over the course of an evening, and rearranged dates for surveys which then occurred in May, after the peak of territorial activity, may have limited the number of occasions when two or more displaying males were recorded concurrently. Such observations are crucial for locating territory boundaries, so it is possible that there are two males in some of the larger "territories", as no observations were made during the surveys to separate them.
2. Every effort was made to select Watch Points with a good field of view (some new Watch Points were added in the light of experience in 2011, and seven more were added in 2013), and participants were asked to move slightly if they could obtain a better field of view in the vicinity of the Watch Point, rather than at it. Even so, some Watch Points, particularly those on the hilltops, had fairly restricted fields of view. Records from these Watch Points were generally of calls, rather than of seen birds, with some resulting inaccuracy in the mapping.
3. There were Watch Points within hearing range of all places where Grouse had been seen prior to the start of the Survey, and the Heather Management map on page 20 shows some areas which should be suitable for Grouse, but where none were found. Grouse may perhaps have been overlooked there, and these areas should be monitored thoroughly in future years.
4. Concurrent observations of the same Grouse activity from different Watch Points would not necessarily have mapped the observation in the same position. This is particularly true for records of calls heard faintly in the distance.
5. Although the scale of the maps provided to participants was increased after 2011, there were still a few occasions where the scale was too small – the observations could not all be clearly differentiated.
6. Participants' experience of Red Grouse, and their experience of bird watching generally, varied tremendously. Some may have missed birds, and / or were not confident enough to summarise their observations into the number of definitely different and probably different males.

However, inaccurate mapping of observations did not present any apparent problems during the analysis, and concurrent observation of (or hearing) adjacent males usually included one made from the nearest Watch Point, which was presumably reasonably accurate. Therefore the potential limitations of the survey methodology do not appear to be reflected in the mapping, although they may lead to the number of territories being underestimated.

## Considerations for the Future

The method has generally produced excellent results, and it will be repeated annually, so long as sufficient volunteers can be recruited, to monitor the Red Grouse population on the Long Mynd.



As a result of lessons to date:-

1. Even stronger encouragement will be given to observers in future years to summarise their observations, so they record which observations relate to each bird, and which are definitely different birds.
2. Observers will again be requested to notify the organisers as soon as possible if they do not carry out a survey at a Watch Point they have been allocated.

## Enjoyment

Most participants said they enjoyed their time on the Long Mynd in the evening, not least for the birds, but also, for some, beautiful clear long distance views, spectacular sunsets and / or a moonlit walk home.

Margaret Mitchell, who writes poetry as her way of remembering enjoyable activities, summed it all up

### ***The Watchers***

*Along the winding Burway, clinging bravely to the hill,  
Past the dark, majestic heights, shadowy and chill  
That delve down to the valley, mysterious and deep,  
The slopes a home for rabbits and gentle roaming sheep.*

*The roadway twists and turns through a sea of purple haze  
Of heather standing tall beneath the sun's fading rays.  
The silence spreads her cloak, across the heath it lies,  
And a flock of golden plover flush high to fill the skies.*

*Silhouetted on the skyline, on the brow of every hill,  
The sentinels stand watching, patient, calm and still,  
For a spectacle of red grouse, with their low swooping flight  
And their loud call of warning as they plummet out of sight.*

*This simple act of nature is repeated every night,  
Yet I watch in awe and wonder with a shiver of delight.  
For beneath the mounds of heather, safely sheltered from the wind,  
Lies a secret, hidden treasure, held in trust on the Long Mynd.*

## Red Grouse Elsewhere in Shropshire

Apart from The Long Mynd, the only other established population of Red Grouse elsewhere in Shropshire is on The Stiperstones. Details of monitoring results there are shown in Annexe 2. The population in 2014 was estimated at 33 – 38 territorial males, compared to 18 - 21 in 2013, 18 in 2012 and 11 in 2011. This was the first time more than 30 have been found since monitoring started in 1989. The total number of Grouse counted in August, including fledged young, was also the highest ever recorded, reaching over 100 for the first time.

Red Grouse used to breed on Brown Clee (five pairs in 1989 - *Atlas 1992*), but none have done so there since the mid 1990s, and there are none there currently (information from the Game Keeper in 2011, via Gareth Thomas, *pers.comm.*).

They have also bred on Heath Mynd in the past, but attempts to reintroduce them there have not been successful (Neil Wainwright, *pers.comm.*).

The Bird Atlas survey 2007-13 found no Red Grouse during the breeding season anywhere other than on the Long Mynd and the Stiperstones, but during the winter period two were seen on Heath Mynd (in December 2008), as well as on the Long Mynd and the Stiperstones.

## Other Species

Participants also recorded Golden Plover, Curlew, Merlin, Kestrel, Red Kite, Marsh Harrier, Buzzard, Whinchat, Grasshopper Warbler, Raven and Reed Bunting, as well as several other more common species.

## Acknowledgements and Distribution

Most importantly, thanks to the 40 individuals who participated in the Project, and submitted survey maps:

John Arnfield	Peter Jackson
Katherine & Pauline Baggott	John Knowles
Steve Baker & Brenda Crosby	Liz Knowles
John Bent	Simon Lovell
Lesley Brown	Anna McCann
Chris Cooke	Andrew Middleton
Mags Cousins	Jim Mitchell
Tim Davanney	Stephen & Margaret Mitchell
Sylvia Davidson	John Morgan
Vince Downs	Peter Nicholls
Mike Flavell	Josie Owen
Jeremy Freeland	Dave Pearce
Julian French	Sam, Hannah, Joseph & Esther Price
Helen Griffiths	Barry Raynor
Jonathan Groom	Simon Sholl
Richard Halahan	Mike Shurmer
John & Anne Hanley	Leo Smith
Heather Hathaway	Mike Streetly
Frank Hinde	Caroline Uff
Ruth Holmes	Tom Wall
David Holmes	Heather Williams
Alison Hopewell	David Woodhouse
Jane & Tony Howsam	John & Helen Worrell
Peter Howsam	

Thanks also to Caroline Uff, National Trust Ecologist, for providing the results of previous monitoring of Red Grouse on The Long Mynd, information about the Heather Management policy, and the maps from the Trust's GIS system.

The data in Annexe 2 has been provided by Simon Cooter, Stiperstones NNR Site Manager

The photograph on the cover is © Jenny Steel. Thanks to her for permission to use it.

Electronic versions (.pdf format) of this Report have been supplied to all the participants.

A paper copy has been supplied to the National Trust, together with all the fieldwork observations and analysis.

The report can be viewed on, or downloaded from, the Strettons Area section of the Shropshire Community Wildlife Groups website, [www.ShropsCWGs.org.uk](http://www.ShropsCWGs.org.uk)

## **Summary and Conclusion**

**The total estimated population of Red Grouse in Shropshire in 2014 is therefore at least 89 - 96 territorial males (compared to 70 – 75 in 2013 and 81 - 84 in 2012), of which around two-thirds are on The Long Mynd.**

**It appears that the heather management being carried out by the National Trust is continuing to benefit Red Grouse.**

Leo Smith  
Long Mynd Breeding Bird Project  
January 2015

## Appendix 1. Project Recruiting Leaflet (size reduced)



# Red Grouse Survey 2014

### Introduction

For the last three years, the Red Grouse population on the Long Mynd has been counted by the co-ordinated efforts of volunteers at dusk on each of six evenings between late March and early May. Volunteers have included participants on the National Trust *Introduction to Bird Watching* courses, members of the local SOS, SWT and RSPB groups, National Trust Volunteers and members of the Strettons Area Community Wildlife Group, as well as other people interested in birds. There were 37 volunteers in 2011, 70 in 2012 and 40 in 2013.

This project has been very successful, and is being repeated in 2014. The Strettons Area Community Wildlife Group is leading the project.

We want to recruit as many helpers as possible for the 2014 survey. New participants will be very welcome. Counts will be held on six successive Thursdays in April and early May. Participants do not need to come to every count. Please come to as many as you can.

### Method

Pairs are secretive in the breeding season, and stay in the deep heather, so they are difficult to count. However, territorial males display around sunset. Most territories are within sight and hearing distance of the road along the top, between the Gliding Station and the Shooting Box car park. The display flight is noisy, conspicuous and unmistakable, and can be observed over long distances, so this is a suitable project for anyone interested in birds or conservation. No special knowledge or skills are needed.

A number of Watch Points on or near the road are marked on large scale Ordnance Survey maps. Each participant will be allocated a Watch Point, and go to it around one and a half hours before sunset, and stay there until about 15 minutes after sunset. The location and activity of all Grouse seen or heard will be marked on a map (recording instructions and a map will be provided). A population estimate can be made by collating all the observations.

The methodology is very straightforward, and will be explained at the Briefing Meeting for new participants. In addition, new participants can receive "on the job" training on the first survey date you can attend, rather than go to a Watch Point on your own, if you want.

Anyone who misses the Briefing, and wants an explanation, can meet at the Pole Cottage car park at the appropriate Start Times, and come on the "on the job" training. You can just turn up on the first date, but it will be necessary to make specific arrangements on later dates.

### Project Briefing & Methodology

7.30pm – 8.30pm Thursday 27<sup>th</sup> March 2014  
Carding Mill Valley Tea Room (Refreshments provided)

### Observation Dates (All Thursdays) and start times

Sunset is about 7.50pm on the first date, and gets later by 15 minutes per week

- 6.20pm, 3<sup>rd</sup> April
- 6.30pm, 10<sup>th</sup> April
- 6.45pm, 17<sup>th</sup> April
- 7.00pm, 24<sup>th</sup> April
- 7.10pm, 1<sup>st</sup> May
- 7.20pm, 8<sup>th</sup> May

Watch Point allocations for each date will be sent out by email the day before. Wherever possible, participants should go straight to their allocated Watch Point. It is only necessary to meet at Pole Cottage Car Park (OS Grid Reference SO413937), at the stated Start Time, to collect paperwork (if you don't use email) or receive training. After the first survey date it will only be possible to meet at Pole Cottage by prior arrangement.

People who want a lift up should meet at the car park in Carding Mill Valley just before the Tea Room half an hour earlier. N.B. Lifts must be booked in advance. Arrangements for doing this will be announced at the Briefing, and emailed to other participants.

### **Participant Form**

To enable us to plan the survey, every participant will be asked at the briefing to complete a form, indicating which of the Observation dates you can attend, and contact details. People who have helped before, and who do not wish to attend the briefing, should request a form by email, and return it no later than Friday 28<sup>th</sup> March.

### **Weather Warning**

It can get very cold or wet, so please bring plenty of warm and weatherproof clothing.

### **Why Count Red Grouse?**

The Long Mynd holds most of the Shropshire population. Many years ago, numbers were considerably higher than they are now, but suffered a substantial decline. They now appear to be recovering as a result of the heather management carried out by the National Trust. This project helps the Trust assess the effectiveness of the heather management by providing annual population estimates, and a population trend.

Adding these to The Stiperstones counts gives an estimate of the total Shropshire population.

Red Grouse was added to the *Amber List of Birds of Conservation Concern* in the 2009 review, as the population is dwindling across the Country as a whole. The Shropshire population is the most southerly in England, apart from a few on Dartmoor. The Exmoor population has recently died out. Monitoring the population is therefore important nationally as well as locally.

The usual survey method involves mapping territorial displaying males on several dawn visits in spring, and analysing the comparative results (the "Territory Mapping Method"). The Long Mynd is a large area, and the National Trust had difficulty organising three dawn counts between December and February each year (poor weather, and not enough helpers). This project method produced better results than the previous NT dawn counts in 2011, so it replaced them in 2012 and 2013. It is continuing in 2014, and it is hoped to repeat the project each year, to provide on-going monitoring of the Red Grouse population on the Long Mynd.

A copy of the 2013 Survey Report has supplied to everyone who participated last year. New participants can download it from the Community Wildlife Group website, [www.ShropsCWGs.co.uk](http://www.ShropsCWGs.co.uk). The 2012 report is also on the website.

### **Other Bird Species**

In the last three years, some participants have been lucky enough to see or hear Hobby, Merlin, Peregrine, Hen Harrier, Short-eared Owl, Curlew, Snipe, Golden Plover, Cuckoo, Stonechat, Grasshopper Warbler and Reed Bunting. As an optional extra, participants are requested to record any Curlew, Snipe or Grasshopper Warbler you see or hear, if possible.

### **Bird monitoring on the Long Mynd**

The project will be part of the bird monitoring on the Long Mynd carried out for the National Trust as part of their Environmental Stewardship Higher Level Scheme Agreement with Natural England, which is co-ordinated by *Leo Smith Ornithological Surveys and Consultancy*

### **Further Information**

Leo Smith  
01694 720296  
[leo@leosmith.org.uk](mailto:leo@leosmith.org.uk)

Leo Smith  
January 2014

## **Appendix 2. Project Briefing Note (size reduced)**

### **Strettons Area Community Wildlife Group & Long Mynd Breeding Bird Project Estimating the Red Grouse Population on the Long Mynd Project Briefing 2014**

#### **Complete the Participant Details Sheet**

Which dates can you come? (Extremely helpful for our planning)

Are you willing to cover a Watch Point on a main footpath, or on the open heath, rather than on the road?

Training is available in the field, if you want it, on the first evening you are able to attend.

N.B. Mobile Phone Number is important, if you have one. We will give it out to other participants, partly so you can confer with adjacent observers, and partly for health and safety reasons.

We will endeavour to provide lifts from Carding Mill Valley to Pole Cottage for those that want them, but that is conditional on other people being willing to offer them, and on someone organising it all. If you want a lift, or can offer lifts, please complete the relevant parts of the Participant Details form.

#### **Observation Dates (All Thursdays) and times**

Sunset is about 7.50pm on the first date, and gets later by 15 minutes per week

- 6.20pm, 3<sup>rd</sup> April
- 6.30pm, 10<sup>th</sup> April
- 6.45pm, 17<sup>th</sup> April
- 7.00pm, 24<sup>th</sup> April
- 7.10pm, 1<sup>st</sup> May
- 7.20pm, 8<sup>th</sup> May

#### **Watch Points**

The survey will be carried out by watching and listening from a series of pre-determined Watch Points. All Watch Points are marked on the survey map which will be issued to you. You will be allocated a Watch Point number on each evening you have told us you can come on the Participants Form. Watch Point numbers and survey Maps will be sent out by email by Wednesday afternoon. Go directly to your Watch Point by the Start Time for that date. Otherwise meet at Pole Cottage Car Park (OS Grid Reference SO413937) on the first two dates, or meet just east of the Carding Mill Valley Tea Room (by the staff car park) half an hour earlier if you've booked a lift up. N.B. Lifts must be booked in advance. See above. If you need to meet up to collect maps, etc. this will need to be by prior arrangement after the first two dates.

The Watch Points have been selected to give a good field of view over places where Grouse have been recorded before. At some Watch Points, note the contour lines on the map around the Watch Point to determine the direction you should be looking. They are not necessarily at the highest point, as that may offer a poor field of view. Use your discretion on where to stand / patrol – maximise your field of view. Stepping up onto the bank next to the road / path may provide a much better view.

If there is a particular hot-spot of Grouse activity, you may wish to leave the Watch Point to investigate. Be careful on rough terrain!

You don't need to stand still for the whole period (you'll need to keep warm!), but please spend almost all of your survey time within 50 metres of the Point marked on the map.

If possible, stay at the Watch Point until 15 minutes after sunset (but make sure you can get back to your car in daylight, if you don't have a torch).

#### **Change of Plans**

If you've said you're coming, but find you can't, please leave a message 07791 901732.

If you've requested a lift up from Carding Mill Valley, or offered to provide lifts for other people, you will be provided with a different number to ring.

**N.B. If you are allocated a Watch Point on any date, but you cannot get there, for whatever reason, please email or phone Leo Smith the following day.** This is essential in planning subsequent surveys, as we aim to cover each Watch Point three times, and if you don't tell us your Watch Point wasn't covered, we'll assume that it has been.

#### **Estimating Distance**

It is important that your observations are mapped as accurately as possible. Use the features on the map (especially the contours) to determine locations. If you aren't familiar with the terrain, or estimating distances, you may want to pace out 100 metres before you start to help you to estimating distance

#### **What to Record on the Site Visits**

Name, Date & Watching Point Number

Start Time and Finish Time at Watch Point

Mark your observations on your Survey Map as accurately as possible, particularly the landing point at the end of the Display Flight. Number each observation.

Use the symbols below (they are all reproduced on the Fieldwork Record sheet).

The most useful observations are of two birds seen or heard concurrently. **Therefore using the dotted line, to distinguish two separate birds, is particularly important.**

### Symbols to use on Map

- M = male Red Grouse (seen - position certain)  
P = pair of Red Grouse (seen - position certain)  
? = Unseen Male calling in distance, position uncertain  
D = Display flight  
→ = Direction Of Flight  
→ = Bird disappeared from view  
—X = Landing Place  
—D = Landing Place

### Two males seen concurrently

 Territorial Aggression

M — M = Same bird moved  
(solid line)

M - - - M = Two different birds  
(dotted line)

### Clearly identify observations that are definitely different Males

**Put the Map and the Fieldwork Record Sheet on separate pieces of paper. Put Name and WP Number on both. Write neatly – if the observations are illegible, there's no point in sending them in!!!!**

### Different Males heard Simultaneously

You are more likely to hear two male birds than see them, as they display against each other. These calls are usually not simultaneous, but the second will be heard a minute or so after the first. **If it's not physically possible for a single bird to fly the distance between the two different locations in the time interval, or if you have a clear field of view of the ground between the two calls and no Grouse flew across it, mark the two calls as definitely different birds with the dotted line. Use your judgement.**

### Liaison with Neighbour

Are any of your observations also on your neighbour's map, or not (use mobile phone for contact – enter result in comments column "Also recorded from WPx". Check that your neighbour's watch says the same time as yours does!!!).

### Other Species – Optional Extra

If you can, please record any Curlew, Snipe, Red Kite Whinchat and Grasshopper Warbler you see or hear.

### What to bring

Coloured pen (fine felt tip best) & clipboard / book to rest on  
Watch & Mobile phone. NB Check the watch is accurate, or adjust the times you record so they are correct.  
Very Warm, Windproof and Waterproof Clothing (it can get very cold)  
Possibly a Torch, if you volunteer to leave the road  
Possibly a compass, if you have one, to help map the direction of your observations

### Inclement Weather

We won't be able to have last – minute cancellation arrangements but the weather forecast will be checked the day before, and information will be sent out via the email list when possible (this will necessarily be last minute). Check your email before setting off. If it's misty, please come – Grouse call more in the mist!!! If it's raining hard, or it's very windy, and it's not going to change, don't come. If in doubt, turn up. If you don't turn up, let us know the next day.

### Handing in Survey Maps

If you can, hand them in to Leo Smith or John Arnfield before going home.  
If not, either bring them next week, or post to Leo Smith; The Bryn, All Stretton, Shropshire SY6 6JP

### Casual Records

If you are on Long Mynd any other time, and see 2 male Grouse displaying against each other, or a pair, please mark the locations on a Survey Map.  
If it's on the same map as you use for your next Survey, mark the locations on that (but clearly record that observation as on a separate date). If you want more maps for such records, please ask

### More Information

If in doubt, ask - Leo Smith 01694 720296, leo@leosmith.org.uk

### Feedback - Project Report

By comparing the information on all the maps at the end of the survey period, plus casual records collected between now and July, we hope to be able to define the different territories, and count them. The results will be presented in a report which will be sent to all participants.

### Repeat Next Year

Long term monitoring is important, so hopefully participants will join in again next year.

Leo Smith  
March 2014

### Appendix 3. Fieldwork Recording Sheet

Strettons Area Community Wildlife Group & Long Mynd Breeding Bird Project

## RED GROUSE SURVEY 2014

Name \_\_\_\_\_ Date \_\_\_\_\_ Watch Point Number \_\_\_\_\_

Start Time \_\_\_\_\_ Finish Time \_\_\_\_\_ (At Watch Point)

**Symbols to use on Map**

M = male Red Grouse (seen - position certain)

P = pair of Red Grouse (seen - position certain)

? = Unseen Male calling in distance, position uncertain

D = Display flight

➔ = Direction Of Flight

➔ = Bird disappeared from view

➔X = Landing Place

—D = Landing Place

Two males seen concurrently

**M:M** Territorial Aggression

M — M = Same bird moved  
(solid line)

M - - - M = Two different birds  
(dotted line)

Number each observation recorded on the Survey Map , using the Ref. No. below

Ref		OBSERVATION	COMMENTS (Clearly identify observations that are definitely different Males)
No.	Time		
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
<p><b>Summary</b> (Please summarise the records above - Number of Definitely Different Males and Probably Different Males. Group the observation numbers that you think are the same bird e.g. 1, 4 &amp; 5 same bird, 2 &amp; 3 same bird, different from 1. 6 is another different bird. 7 may be the same as 3. Total definitely 3, possibly 4 different males)</p>			

Contact Number: Leo Smith 07791 901732



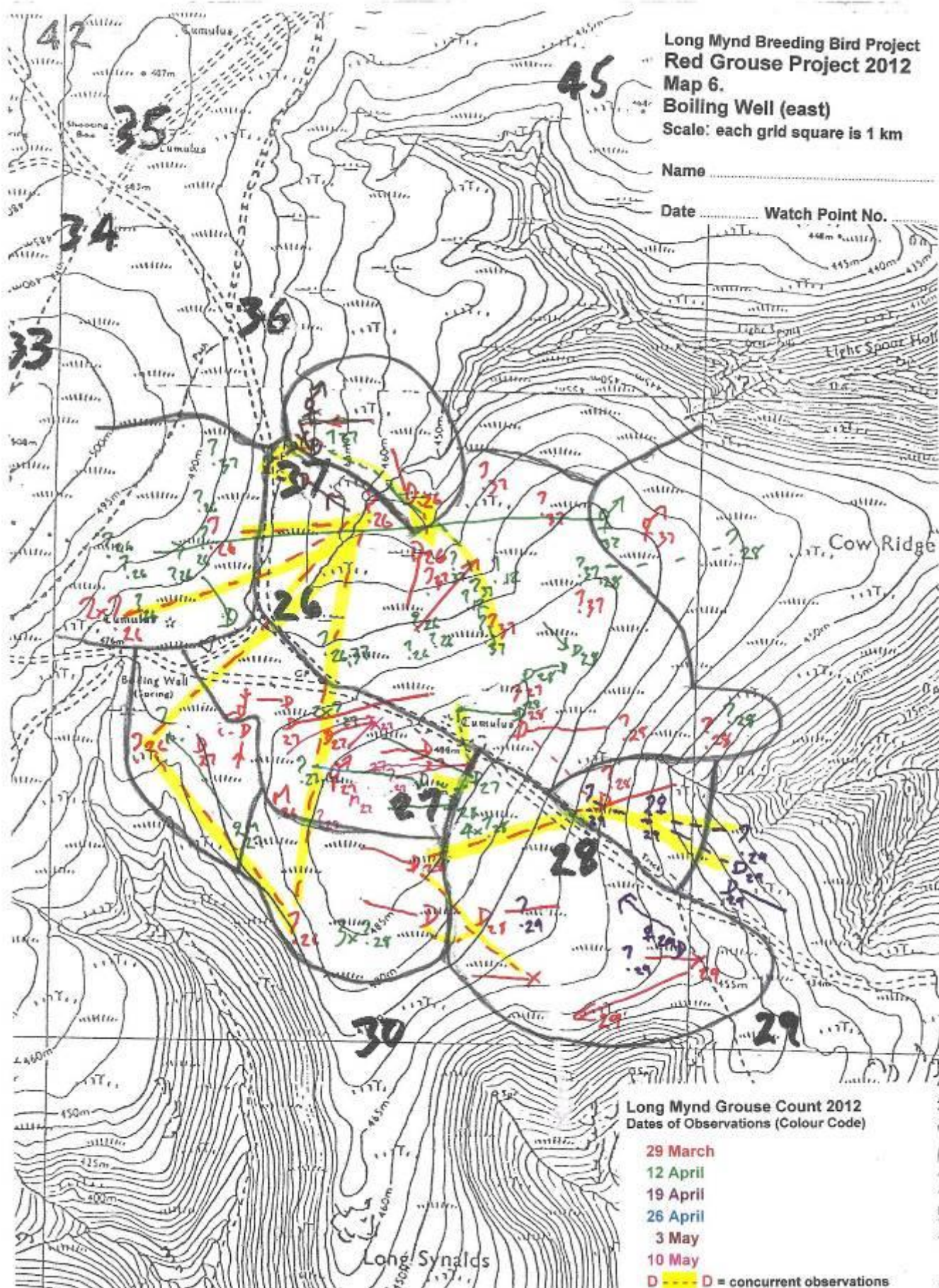
## Appendix 4. Fieldwork Recording – Summary

WP	April				May			Total Counts
	10	17	24	28	12	13	15	
1	Baker		Devaney			Baggott		3
2			Halahan			Hathaway		2
3	Davidson		Holmes, R			Wall		3
4	Brown		Owen			Holmes, D		3
5	Cooke		Holmes, D			Flavell		3
6	Raynor		Knowles, J					2
7	Hopewell		Knowles, L					2
8	Williams		Baker			Raynor		3
9	McCann		Davidson			Howsam, J		3
10	Holmes, D		Brown			Howsam, P		3
11	Downs		Cooke			Owen		3
12	Cousins		Morgan			Halahan		3
13	Uff		Sholl			Cousins		3
14	French		Raynor			Mitchell, S		3
15						Williams		1
16	Lovell		Hopewell			French		3
17	Mitchell, S		Groom			Davanney		3
18	Groom		Cousins					2
19	Wall		Howsam			Woodhouse		3
20	Knowles, J		Woodhouse					2
21	Sholl		Downs					2
22	Howsam		McCann			Smith		3
23	Arnfield		French			Hanley		3
24	Smith		Smith			Price		3
25	Owen		Shurmer			Downs		3
26	Freeland		Williams			Hinde		3
27	Shurmer		Hathaway			Shurmer		3
28	Griffiths		Mitchell, S				Williams	3
29	Hanley		Hinde				French	3
30	Price		Mitchell, J				Groom	3
31	Morgan		Bent				Davanney	3
32		Nicholls		Halahan			Howsam, P	3
33		Mitchell, S		Lovell			Howsam, J	3
34	Jackson	Bent	Freeland	Howsam				4
35		Halahan	Price					2
36		Hathaway		Sholl				2
37		Raynor		Mitchell, S				2
38		Hopewell		Streetly				2
39	Pearce	Pearce		Knowles, J				3
40	Nicholls	Arnfield		Griffiths				3
41	Middleton			Groom				2
42		French		Holmes, R				2
44		Williams		Hanley				2
45		Sholl		Hinde			Woodhouse	3
46		Morgan		Holmes, D			Hanley	3
47		Price		Hathaway				2
48		Hinde		Morgan	Price		Price	4
49		Worrell		Downs	Woodhouse			3
50		Woodhouse			Halahan		Halahan	3
51		Mitchell, J			Groom		Holmes, D	3
52		Brown			Holmes, D			2
53		Davidson			Hathaway			2
54		Holmes, D			French		Flavell	3
55		Griffiths		Jackson	Williams		Davidson	4
56		Baker			Jackson		Jackson	3
57		Baggott			Raynor		Raynor	3
58		Holmes, R					Baggott	2
59		Downs		Wall			Pearce	3
60		Lovell			Hinde			2
61		Shurmer		Shurmer	Arnfield		Arnfield	4
62		Middleton			Hanley		Mitchell, S	3
63		Groom					Shurmer	2
64		Jackson			Uff		Owen	3
65		Smith		Smith			Smith	3
66		Owen			Smith			2
67		Streetly			Wall			2
68		Flavell			Freeland			2
	33	35	32	20	17	22	22	181

## Appendix 5. Fieldwork Recording – All Observations

Survey Dates	April		May					Totals		
	25	30	2	7	16	21	30	Counts	Records	Average
1	0			2				2	2	1.0
2	1			5				2	6	3.0
3	0			2				2	2	1.0
4	0			0				2	0	0.0
5	0			0				2	0	0.0
6	0			4				2	4	2.0
7	6			2				2	8	4.0
8	3			2				2	5	2.5
9	2			5				2	7	3.5
10				5				1	5	5.0
11				2				1	2	2.0
12	0			3				2	3	1.5
13	3			1				2	4	2.0
14	6			5				2	11	5.5
15	3			8				2	11	5.5
16	2			9				2	11	5.5
17	2			10				2	12	6.0
18	5			9				2	14	7.0
19		0			0			2	0	0.0
20	0				7			2	7	3.5
21	0				4			2	4	2.0
22		1			7			2	8	4.0
23	0				11			2	11	5.5
24	0	1			8			3	9	3.0
25	0	3			5			3	8	2.7
26		6			14			2	20	10.0
27	2	1			10			3	13	4.3
28		2			14			2	16	8.0
29		0			5			2	5	2.5
30		3			8			2	11	5.5
31		0						1	0	0.0
32		4				4		2	8	4.0
33		4	9			5		3	18	6.0
34	1	3				5		3	9	3.0
35		3				3		2	6	3.0
36		3				5		2	8	4.0
37		3				3		2	6	3.0
38		2						1	2	2.0
39	2	10						2	12	6.0
40		6	5			5		3	16	5.3
41		0				4		2	4	2.0
42		13	11			2		3	26	8.7
44		13	0			7		3	20	6.7
45		2				1		2	3	1.5
46								0	0	0.0
47			5				1	2	6	3.0
48							0	1	0	0.0
49			2				2	2	4	2.0
50			8				2	2	10	5.0
51			2					1	2	2.0
52			4					1	4	4.0
53			4					1	4	4.0
54			12				1	2	13	6.5
55			10				1	2	11	5.5
56			8				1	2	9	4.5
57			6					1	6	6.0
58			13					1	13	13.0
59							2	1	2	2.0
60			0					1	0	0.0
61			1				0	2	1	0.5
62								0	0	0.0
63			5					1	5	5.0
64			0					1	0	0.0
65			8			0		2	8	4.0
66			3				0	2	3	1.5
67			2					1	2	2.0
68			0					1	0	0.0
<b>Total Counts</b>	24	23	23	18	12	12	10	122		
<b>Counts of No Grouse</b>	11	4	4	2	1	1	3	26		
<b>Total Grouse Records</b>	38	83	118	74	93	44	10		460	
<b>Average Records per Count</b>	1.6	3.6	5.1	4.1	7.8	3.7	1.0			3.8

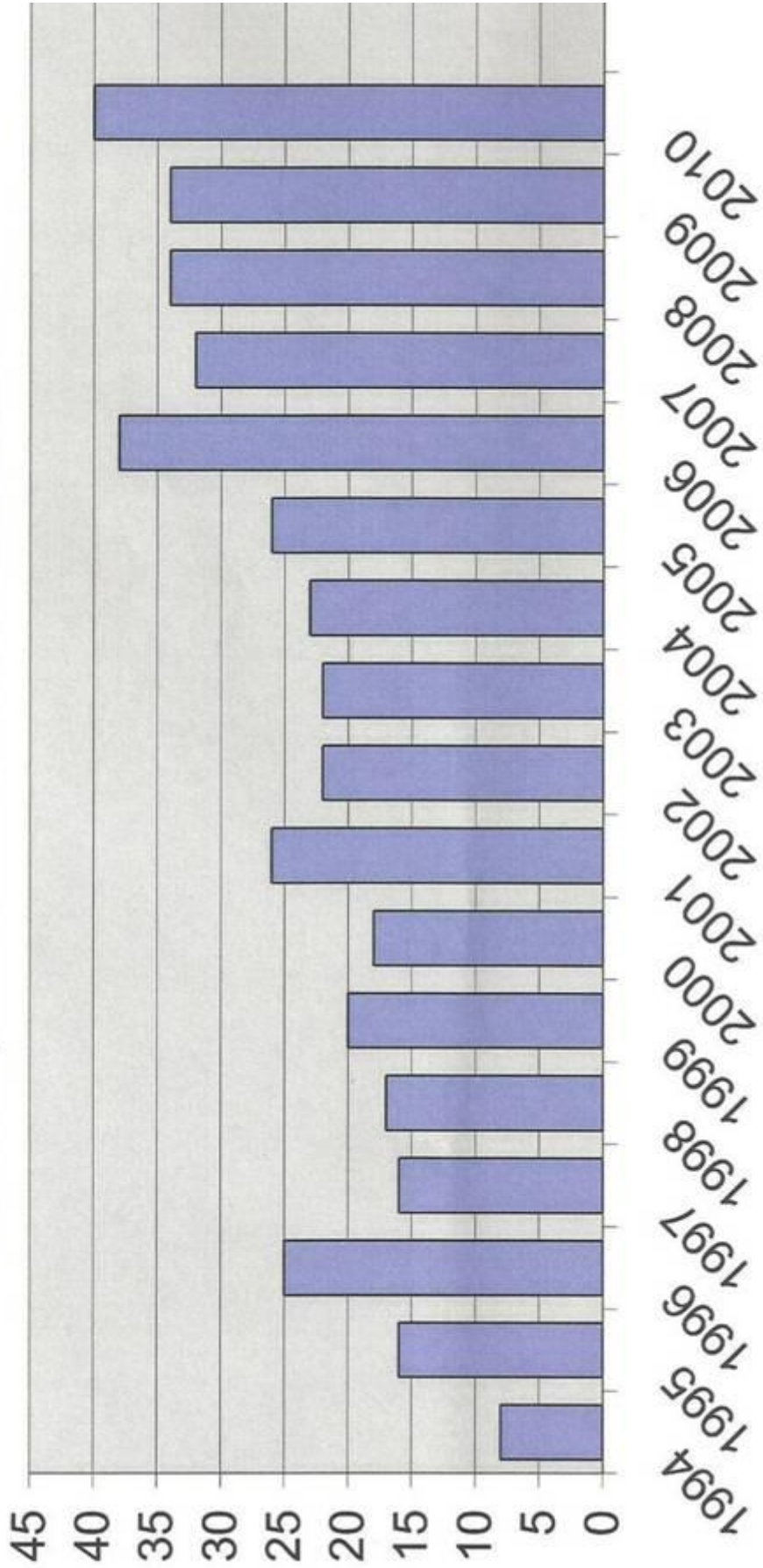
**Appendix 6. Sample Master Map, showing all Fieldwork Observations**



**Annexe 1. Results of National Trust Dawn Counts on The Long Mynd**

**Number (minimum) of Red Grouse Territories on Long Mynd**

min no. usually relates to territorial males recorded in at least 2 /3 visits



## **Annexe 2. Results of Natural England Monitoring on The Stiperstones**

Natural England do two counts each year.

The first, mapping calling males at dawn in Spring, is similar to the monitoring previously carried out by the National Trust on The Long Mynd.

The second count involves several volunteers dragging a rope across the heather at the end of the breeding season, usually in August. Most of the Grouse habitat is covered, and the same area is covered each year. All flushed birds are counted, and the number of recently fledged young within the total are estimated. This provides an indication of breeding success.

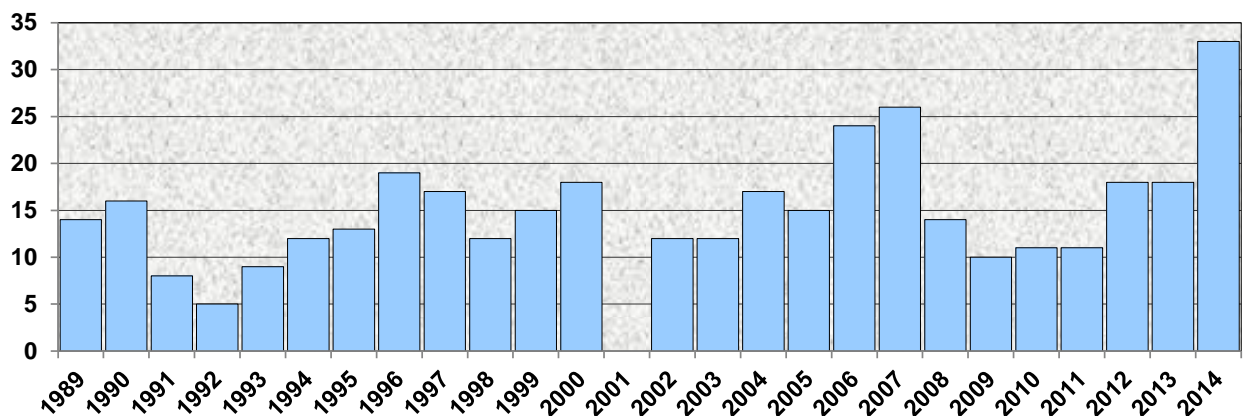
The high counts in 2005-07 resulted from intensive predator control on and around the NNR, which resumed in 2012.

**2013 was the best year for Grouse on the Stiperstones for 20 years, when English Nature first started monitoring. 2014 was better still.**

Between 33 and 38 territorial males were counted in spring.

A total of between 107 and 134 birds were counted, including a good number of large family groups. This is the highest autumn count since records began in 1993, and the first time that over 100 birds have been counted. There may be several reasons for this increase, but the working partnership between Natural England and the owner of the shooting rights in relation to heather burning and predator control will certainly have played its part.

**Minimum Spring Count (Calling Males at Dawn)**



**Minimum Summer/Autumn count (Whole Population)**

