PRELIMINARY RESULTS - Influence of management intensity on upland bird assemblages

Nick A. Littlewood[1], Mark J. Whittingham[1], Stephen G. Willis[2]

1. Newcastle University
2. Durham University

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Summary

- Bird surveys (following Brown & Shepherd, 1993) were carried out on 104 one-km squares, on 18 moorland estates in northern England and southern Scotland, during April to June 2017.
- Estates surveyed ranged from active grouse moors, with correspondingly high intensities of predator control and heather burning, to sites with only limited predator control and no grouse shooting or heather burning.
- Seventy-six bird species were recorded during the surveys including 21 UK Red Listed species and 22 Amber Listed species.
- Nine species of wading bird (sub-order Charadrii) were recorded.
- Three times as many Curlew territories and four times as many Golden Plover territories were found per survey square on intensively managed grouse moors compared to other moors surveyed.
- Around four times as many Red Grouse were recorded per survey square on high intensity management sites compared to other sites.
- Meadow Pipits (the most numerous bird across the surveyed sites) were found in greatest numbers on the least intensively managed sites. Trends for other frequently recorded passerines were mixed but they were generally found in greater numbers in medium or low intensity management sites.
- Data are being collated on a range of variables to quantify levels of predator control and heather burning and to categorise habitat, soils, topography and surrounding land use. Further analyses will assess the relative importance of these factors in shaping upland bird assemblages.

Introduction

Moorland (or upland heathland), dominated by the dwarf-shrub, Heather (*Calluna vulgaris*), is a highly valued habitat in the UK. Such moors formed over the past 3,900 years, following the onset of extensive upland deforestation (Birks 1988) and are now maintained through management intervention, in particular, through use of fire or through grazing by domestic livestock (Gimingham 1995). Heather moorland in the UK is often managed to maximise populations of Red Grouse (see Appendix 1 for scientific names of bird species) as a gamebird (Moss 1989, Hudson 1995). Although not species-rich, the habitat hosts a range of highly specialised plant and invertebrate communities (Littlewood et al., 2006) and a unique bird assemblage (e.g. Thompson et al., 1995) and is designated as a UK Biodiversity Action Plan Priority Habitat (Anon 1995).

The moorland bird assemblage contains internationally important populations of some species. These include eight that are listed on Annex 1 of the EC 'Birds' Directive 79/409/EEC. Densities of some common species may be especially high including, possibly, the highest recorded densities globally of Meadow Pipit and Skylark (Thompson et al., 1995). The recently published *Birds of Conservation Concern 4* (Eaton et al., 2016) highlights the precarious conservation status of several bird species that make substantial use of moorland. Included on the Red List are Black Grouse, Hen Harrier, Lapwing, Curlew, Cuckoo, Merlin, Skylark and Whinchat, whilst the Amber List includes moorland birds such as Red Grouse, Oystercatcher, Dunlin, Redshank, Snipe, Short-eared Owl and Meadow Pipit. Several other species are included on these lists that make at least some use of moorland areas.

Grouse moor management involves interventions that are aimed at generating optimal conditions for grouse production. Principal among these, in terms of managing and shaping the landscape and habitat, is heather-burning, or muirburn. Heather is the principal food of adult Red Grouse. It is burned in a mosaic of patches on a rotation that ensures that Heather of different ages, especially young and nutritionally-rich Heather, is available for the grouse. The other key management intervention, that directly shapes the make-up of the moorland fauna, is predator control. This involves removing or reducing populations of predatory birds and mammals that might affect survival rates of Red Grouse, especially of eggs and chicks. These two management interventions create habitat conditions and a low predator environment that may influence populations of other moorland bird species.

Several previous studies have investigated the link between moorland management and population densities and breeding productivity of moorland birds. For example, in northern England and eastern Scotland, Tharme et al. (2001) found Golden Plover and Lapwing densities to be five times higher on moors managed for grouse shooting than on other moors, with Red Grouse and Curlew densities being twice as high. Based on data collected between 1999 and 2003 from upland sites across Wales, northern England and southern Scotland, Buchanan et al. (in press) found that geographical location was the most important determinant of upland bird abundance but also that Red Grouse, Golden Plover and Curlew abundances were higher where there was evidence of predator control. Similarly, across a range of sites in southern Scotland and the south Pennines, nesting success of Curlew was positively correlated with gamekeeper density (Douglas et al., 2014). Further north, in the Scottish Highlands, Red Grouse and Curlew were among bird species found to be especially associated with moors managed for grouse shooting, with weaker associations also reported for Golden Plover and Snipe (Newey et al., 2016). Some species have been found to be negatively associated with management for grouse shooting. Meadow Pipit, Skylark and Carrion/Hooded Crow were each found in lower densities on grouse moors than other

moors by Tharme et al (2001). Similarly, Newey et al (2016) reported negative associations with grouse moors for Raven, Ring Ouzel, Meadow Pipit, Skylark and Wheatear. Some of the negative impacts from these two studies, especially for Carrion/Hooded Crows, were probably due directly to predator control being carried out on grouse moors. For other species, it is likely that grouse moors are sub-optimal habitat compared to other upland areas or that heather-burning removes an important element of the habitat that is required by a species.

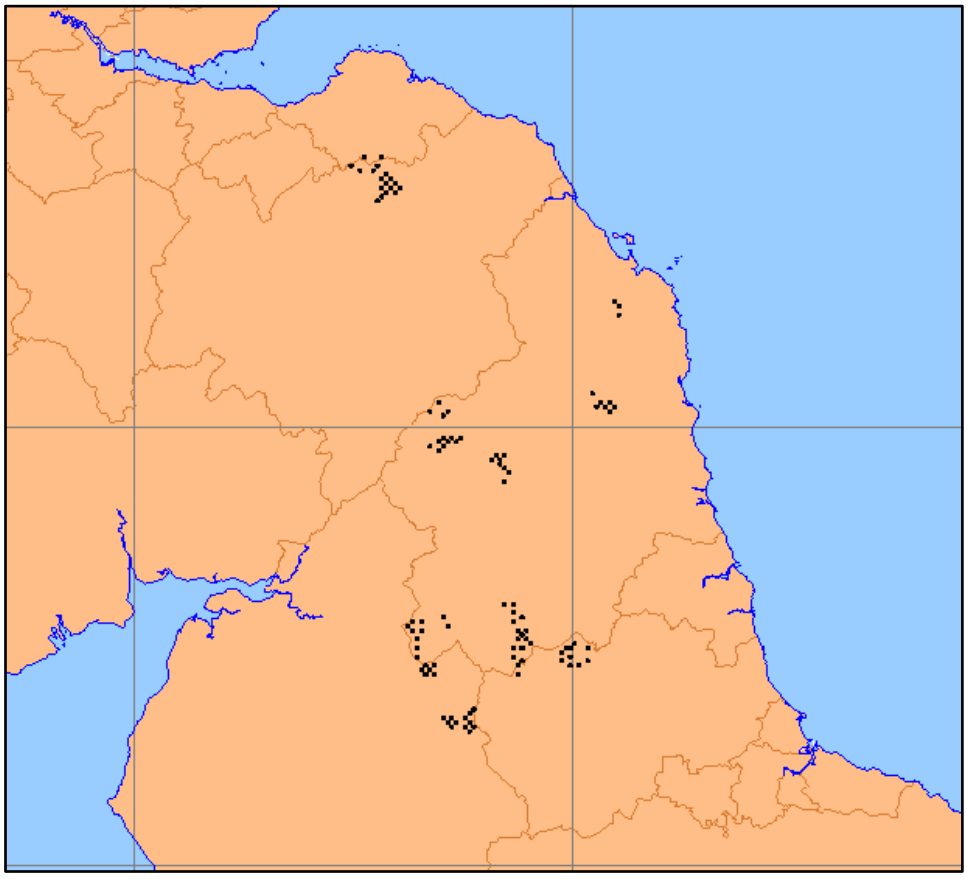
Teasing out specific influences of predator control and heather burning is difficult, as these two activities are usually carried out on the same sites. However, experimental treatments at single sites provide some evidence for such relative impacts. Under a low-level predator control regime in north Cumbria, for example, Golden Plover increased in number in the initial period after burning (Douglas et al., 2017). Most such studies assess only the breeding density of species on sites, and not their subsequent breeding success – which might lead to very different assessments of the conservation value of the different habitats. A rare example of assessing breeding success on moorland took place in Northumberland between 2001-2008. Under a continuation of a conventional heather-burning regime, predator control led to increases in breeding success of Lapwing, Golden Plover, Curlew, Red Grouse and Meadow Pipit, compared to areas without predator control (Fletcher et al., 2010). The study also recorded subsequent increases in breeding numbers of the first four named of these species.

The aim of the present study was to add to the body of evidence relating to the impact of grouse moor management on breeding bird assemblages, with a focus in this first year of study on the moorlands of northern England and southern Scotland. The study aimed to assess the relative influences of predator control and heather burning on waders in particular, along with potential impacts on the wider bird assemblage.

Methods

Study Sites

One hundred and four squares, each measuring 1 km × 1 km, were selected from 18 upland estates in County Durham, Cumbria, East Lothian, Northumberland and the Scottish Borders (Map 1). Between one and twelve squares were surveyed per site; numbers per site being related to site extent and the resource of heather moorland on the estate. Survey squares were situated so as to reflect the range of conditions of heather moorland at a site. Survey squares were not located directly adjacent to each other, though some surveyed squares met at their corners, i.e. they did not share a common boundary. There was one exception to this, where a 500 m border was shared between two squares. Survey square selection was based on information received from local contacts (typically gamekeepers) about habitat types and their distribution across an estate; though decisions on which sites to survey were independent of local contacts. Squares that were largely dominated by Heather were prioritised for surveying, though a minority of squares contained larger areas of grass-dominated habitats ("white ground"). No prior knowledge of the bird assemblages present on sites was used to inform the selection of squares for surveying.



Map 1: Location of the 104 survey squares in northern England and southern Scotland. The map shows UK National Grid 100 km grid lines and local authority boundaries, with the Solway Firth to the south-west and the North Sea to the north-east.

Bird Survey Fieldwork

Each 1 km square was surveyed using a method recommended by Brown & Shepherd (1993). This entails walking a route around the square that is likely to maximise bird encounters, within a 80 to 100-minute time duration. Thus, the route does not follow fixed transect lines but, instead, allows the surveyor to maximise route efficiency with respect to topography and to areas within the square that look most likely to hold populations of breeding birds. Birds encountered (by sight or call or both) were recorded on a large-scale map along with standard species and breeding behaviour codes. Specific notation was used where two registrations of the same species were thought or known to relate to different individuals and also in situations where it was thought that a bird may have moved some distance between sightings, to avoid inflated estimates of bird numbers. Due to their abundance, for Meadow Pipits a simplified notation was used with just the initial location of each new, or presumed new, bird noted and no behavioural codes used.

Each square was visited twice in the breeding season, once between 15 April and 21 May 2017 and once between 23 May and 26 June 2017. Second visits to a site was always at least 27 later than the initial visit (mean 36.1 days). This method ensures that both early and late breeding species are recorded adequately. Fieldwork was carried out between 8.30am and 6.00pm, thus avoiding periods of rapidly changing bird activity levels in the early mornings and evenings. Surveys were not carried out when winds exceeded force 5, in poor visibility or in rain in excess of lights spots. Surveying were suspended during periods of heavier rain and restarted after the rain had ceased. Surveys were carried out by three skilled field ornithologists and each square was visited by a different surveyor on the two visits.

Estimating territory numbers

Breeding bird territories were identified from the field maps compiled on each visit. For waders, birds present in breeding habitats and either alarm calling, in song or display, or exhibiting other breeding-associated behaviour were presumed to be occupying a breeding territory. A pair of birds in suitable habitat was also assumed to be on a territory but where a single bird was present and not displaying breeding associated behaviour, this was not counted as a separate territory. Likewise, congregations of likely non-breeding waders (such as early-season flocks of Golden Plover) were disregarded in estimating territory numbers. Notation on maps that indicated simultaneous observations, or birds thought by the fieldworker to be different, were used to determine which birds represented different territories. Where it was not possible to determine whether birds were likely to be the same or different individuals, an arbitrary cut-off of 500 m distance between map registrations was used to identify separate territories (Brown & Shepherd, 1993). Following estimation of the number of territories identified on each visit, the higher number was taken as the estimate for that square (following Calladine et al. (2009)).

Territories of passerine birds (songbirds) were determined in a similar way to waders except that single birds in suitable breeding habitat were also counted as representing a territory and a 200 m threshold was used to identify different territories within a survey visit when the surveyor was not able to determine this in the field. The same 200 m threshold was used to determine whether or not birds identified in different visits should be regarded as belonging to the same territorial pair (Calladine et al., 2009).

For Meadow Pipits, Skylarks, Red Grouse and Black Grouse, a simple index of abundance was used, consisting of the summed counts for the species across both visits to a square. For Red Grouse and Black Grouse, chicks were disregarded from the counts. For Meadow Pipit and Skylark, the counts were of adults and fledged juveniles (as these were often difficult to differentiate from adults unless a reasonably good view was obtained).

Site management

Information was collated from estate owners, tenants, agents, gamekeepers and managers to quantify, as far as possible, predator control activity and other land management, especially muirburn. The area of each survey square under muirburn management was estimated from online aerial photographs and classed as no muirburn, muirburn apparent but covering <50% of the area and muirburn covering >50% of the area.

Metrics on grazing were gathered in consultation with site contacts. In addition, during the second bird survey visit, an estimate of the number of adult sheep present in the 1 km square was made using the following bands: 0, 1-5, 6-20, 21-50, 51+.

Seven estates, containing 54 of the survey squares, were managed as grouse moors with sustained predator control and heather burning. These are classed here as high-intensity management sites. The remaining 11 estates, containing 50 survey squares, were less actively managed for grouse shooting and, in some cases, no grouse shooting was practiced on the sites. The degree of predator control and muirburn varied on these sites and they did not fall neatly into low and medium intensity categories. However, for presentation of results here, four sites (containing 16 survey squares) have been provisionally classified as medium intensity management and seven sites (34 survey squares) have been provisionally classes as low intensity management. Given the overlap in management between some of these sites, preliminary results are also shown in the tables below for all squares from these two categories combined whilst figures are presented comparing just the high and low/medium intensity categories.

Habitat and Landscape

Data are being collated on broad habitat metrics (proportion of Heather-dominated ground), soil type, aspect and slope, altitude and surrounding land cover (such as proximity of woodlands) and will be used in further analyses.

Preliminary Results

A total of 76 bird species was logged during the surveys (including birds flying over survey squares). These included nine wader species, five wildfowl, six raptors, one owl and five gamebird species. A full list of species, and the number of survey squares in which they were recorded, is given in Appendix 1.

Red Listed species (Eaton et al., 2016) recorded were: Black Grouse, Grey Partridge, Lapwing, Curlew, Woodcock, Herring Gull, Cuckoo, Merlin, Skylark, Grasshopper Warbler, Starling, Ring Ouzel, Fieldfare, Song Thrush, Mistle Thrush, Whinchat, Grey Wagtail, Tree Pipit, Linnet, Lesser Redpoll and Yellowhammer. Amber listed species recorded were: Greylag Goose, Gadwall, Teal, Mallard, Red Grouse, Oystercatcher, Dunlin, Common Sandpiper, Redshank, Snipe, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Stock Dove, Swift, Kestrel, House Martin, Willow Warbler, Dipper, Dunnock, Meadow Pipit and Reed Bunting. Note that not all of these species are Red or Amber listed due to trends in breeding populations and also that some species were solely encountered flying over, or on non-moorland habitat at the edge of survey squares.

Among the more frequently encountered wader species, Curlew and Golden Plover each displayed the largest density of territories found on intensively managed grouse moor. On average, three times as many Curlew territories were found on survey squares on intensively managed grouse moor as on other survey squares and for Golden Plover, there were four times as many territories on intensively managed squares compared to other squares (Table 1, Figure 1). Lapwing, Oystercatcher and Snipe all occurred in fewer squares overall but in all cases, more territories were found on grouse moor survey squares compared to the combined figure for other survey squares (Table 1). In particular, Lapwing territories were found on high intensity managed squares at almost three times the density of medium/low intensity managed squares, and approximately 50% more Snipe territories were identified on high intensity squares.

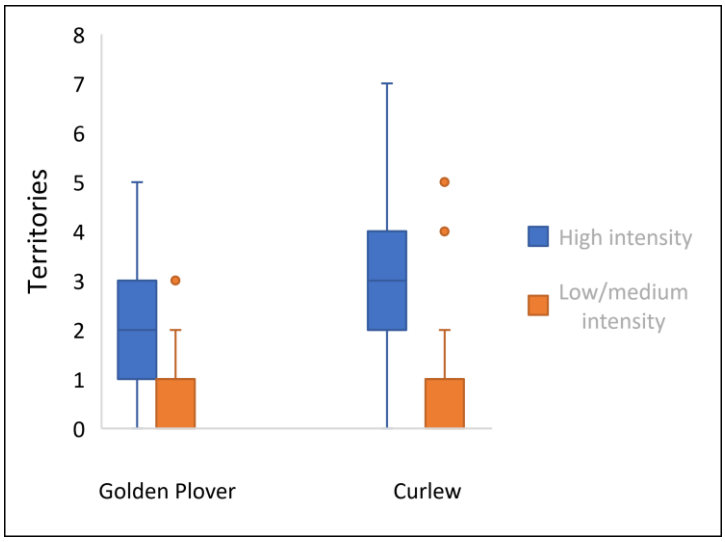


Figure 1: Boxplot and whiskers showing number of territories per survey square of the two most frequently recorded waders, Golden Plover and Curlew. The box shows the distribution of the central 50% of the data and the "whiskers" show the upper and (where applicable) lower 25% of data. The median value is shown by a horizontal line within the box. Where this is not visible, the median value is zero. Outliers are shown by dots (these are data points that are greater than 1.5 interquartile ranges from the closest quartile value).

Table 1: Territory numbers and the number of squares in which recorded for the five most frequently encountered wader species. Figures show mean number of territories found per survey square with standard error given in brackets. (Note that for most species, the data do not follow a normal distribution; mean and standard errors are presented here for illustrative purposes).

		Oystercatcher	Golden Plover	Lapwing	Curlew	Snipe
High intensity (n=54)	- territories	0.28 (0.09)	2.17 (0.16)	0.74 (0.15)	2.76 (0.17)	0.76 (0.13)
	- recorded squares	11	50	21	53	27
Medium intensity (n=16)	- territories	0.06 (0.06)	1.13 (0.30)	0.81 (0.34)	2 (0.41)	1 (0.24)
	- recorded squares	1	9	7	12	10
Low intensity (n=34)	- territories	0.00	0.26 (0.12)	0.03 (0.03)	0.41 (0.10)	0.24(0.07)
	- recorded squares	0	5	1	12	8
Combined medium/low (n=50)	- territories	0.02 (0.02)	0.54 (0.14)	0.28 (0.12)	0.92 (0.18)	0.48 (0.10)
	- recorded squares	1	14	8	24	18
Total recorded squares		12	64	29	77	45

Counts of Red Grouse were over four times higher on survey squares on high intensity moors than the combined average for other moors (Table 2, Figure 2). Black Grouse were encountered in lower numbers overall and at insufficient sites for any trend in numbers between different management intensities to be apparent (Table 2). Birds of prey (raptors and Short-eared Owl) were encountered on 47 sites. Most sightings were of birds flying over with fewer being of birds showing territorial behaviour. The combined counts for all birds of prey were for clear trends between different management intensities to be apparent (Table 2).

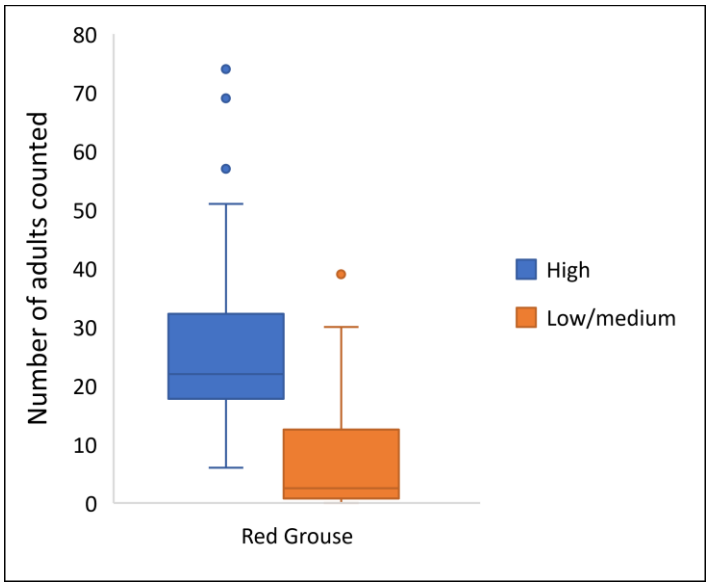


Figure 2: Boxplot and whiskers showing number of adult Red Grouse found per survey square, summed across both visits. See Figure 1 caption for further explanation.

Table 2: Counts and the number of squares in which recorded of selected non-passerine species. Figures show mean number seen per survey square, summed across both survey visits, with standard error given in brackets. (Note that for most species, the data do not follow a normal distribution).

	Red Grouse	Black Grouse	Raptors and owls
High intensity (n=54) - count	26.59 (1.94)	0.17 (0.06)	0.72(0.10)
recorded squares	54	7	27
Medium intensity (n=16) - count	8.31 (2.01)	0.75 (0.47)	1.31 (0.38)
recorded squares	14	3	10
Low intensity (n=34) - count	7.15 (1.93)	0.03 (0.03)	0.68 (0.21)
recorded squares	24	1	10
Combined medium/low (n=50) - count	7.52 (1.45)	0.26 (0.16)	0.88(0.19)
recorded squares	38	4	20
Total recorded squares	92	11	47

A wide range of passerine birds (colloquially, songbirds) was recorded. Many were seen in small numbers, and were more associated with woodland or scrub habitat that bordered survey squares, rather than moorland habitats themselves. The most common bird species across the survey was Meadow Pipit, which was found in all survey squares but occurred in highest numbers in squares of low management intensity. The lowest numbers of Meadow Pipit were found in high management intensity squares (Table 3, Figure 3). Comparing intensively managed squares with all other squares, Meadow Pipits were 39% more abundant in the latter. The next most abundant passerine was Skylark, with more seen in medium intensity squares than in other squares. Territories of Wren and Stonechat were located in higher numbers in low intensity management squares than in medium or high intensity management squares.

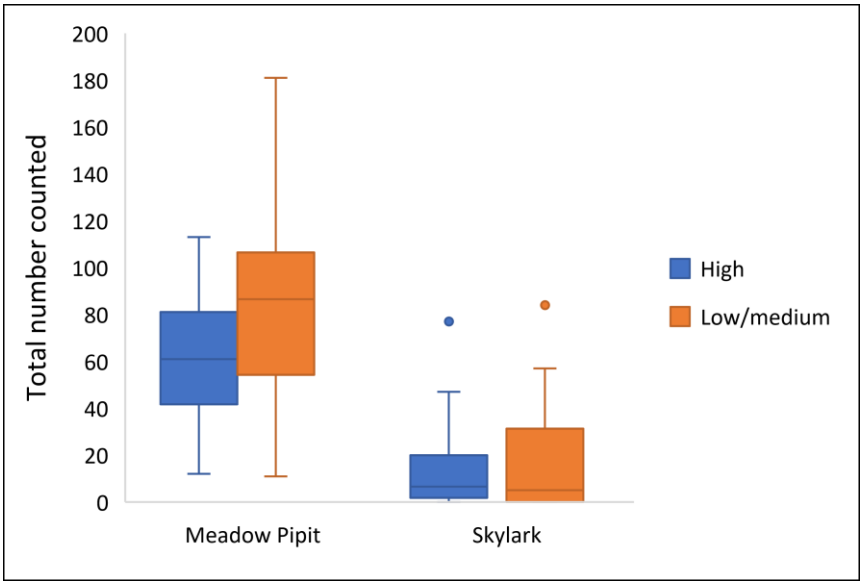


Figure 3: Boxplot and whiskers showing numbers counted per survey square (summed across both visits) of the two most frequently recorded passerines, Meadow Pipit and Skylark. See Figure 1 caption for further explanation.

Table 3: Counts and the number of squares in which recorded of selected passerine species. Figures for Meadow Pipit and Skylark show mean numbers (with standard errors) seen per survey square summed across both survey visits, with standard error given in brackets. For Wren and Stonechat, figures show the mean (and standard error) number of territories identified in each survey square. (Note that for most species, the data do not follow a normal distribution).

		Skylark	Wren	Stonechat	Meadow Pipit
High intensity (n=54)	- count	12.11 (2.02)	1.59 (0.21)	0.43 (0.09)	61.93 (3.46)
	- recorded squares	45	40	17	54
Medium intensity (n=16)	- count	30.44 (5.16)	1.75 (0.37)	0.50 (0.22)	75.31 (7.76)
	- recorded squares	15	12	5	16
Low intensity (n=34)	- count	8.26 (2.47)	1.94 (0.32)	0.79 (0.20)	90.88 (7.01)
	- recorded squares	20	25	14	34
Combined medium/low (n=50)	- count	15.36 (2.75)	1.88 (0.24)	0.70 (0.15)	85.9 (5.43)
	- recorded squares	35	37	19	50
Total recorded squares		80	77	36	104

Discussion

The preliminary results indicate the importance of grouse moors for a number of upland birds, especially waders. These findings are in line with those of previous research (e.g. Tharme et al., 2001; Newey et al., 2016; Buchanan et al., in press) which highlight that wader populations tend to be higher on sites that are subject to management associated with maximising grouse numbers. The relative importance of factors such as heather-burning and predator control have not yet been investigated but will form a major part of subsequent analyses (see Next Steps, below). It is also not possible from this pilot work to determine whether these management practices have an equally large benefit on wader breeding success.

The results further suggest that Meadow Pipit abundance may be negatively correlated with moorland management intensity. A decline in pipit abundance with increased Heather cover and muirburn has been previously noted (Smith et al., 2001) and it may be that this reflects land cover and management on our study sites. Some other passerines were also found in lower abundance on the intensively managed sites, consistent with Tharme et al. (2001).

The Brown & Shepherd (1993) survey method (or variants thereof) that we use has become widely adopted for surveying a wide range of upland birds, in addition to the wader species for which it was originally developed. However, the survey method does not necessarily result in the identification of all territories in a survey square. Brown & Shepherd (1993) themselves reported 53% accuracy in term of identifying Lapwings territories, 60% for Oystercatchers, 86% for Curlew and 91% for Golden Plover (though only 64% of Golden Plover territories were recorded on one of their study sites). Calladine et al. (2009) determined that more than two survey visits are required to derive robust estimates of the absolute populations of most species, though even with four visits a survey would be likely to underestimate populations of Red Grouse, Skylark and Wren. Our figures, therefore, should be taken to represent minimum values and be treated as indices that are comparable across sites (within this study), rather than absolute estimates of the actual populations of each species in each 1 km square. For future work, to provide more robust estimates of territories, moving to a three-visit census style would be preferable.

Next Steps

Further analyses will focus on exploring possible drivers of the observed differences in bird densities between different treatment intensities on our study sites. For example, Golden Plover, have previously been shown to be positively associated with short vegetation (Pearce-Higgins & Grant, 2006), to select burnt patches for nesting (Whittingham et al., 2002) and to increase in number following burning (Douglas et al., 2017), and our analyses will assess the relative importance of burning alongside predator control and other potential explanatory factors. The landscape in which a study area is situated may also influence the bird assemblage, with proximity of forestry and agricultural land having a potential to negatively influence populations of some birds (e.g. Dallimer et al., 2010; Wilson et al., 2014). Thus, it might be expected that larger moors may have the potential to harbour larger densities of some species than do smaller, more isolated moors in mixed land use settings. Disentangling the relative importance of such factors is important for understanding the direct influence of grouse moor management on moorland bird populations.

Data detailing site management, habitat characteristics, topography, basic soil types and other factors that could affect breeding bird populations, such as the extent of woodland in surrounding areas, and seasonality of grazing, are being collated. A rigorous analysis of these data, in association with the bird census data collected, will be carried out with the aim of determining to what extent grouse moor management, particularly predator control and heather burning, may be related to the populations of breeding birds.

Analyses will focus on the more frequently encountered waders and other bird species that were found in sufficient numbers to carry out assessment of trends between different management regimes. Analyses may also look at wider responses to management at the avian community level. Whilst we will aim to demonstrate the impacts of management on the numbers of key bird species on upland moorlands, this will not necessarily indicate their ability to sustain healthy populations of these species. It is only by following the fate of nesting birds and their offspring that the true importance of management strategies in the uplands on such species can be assessed.

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Appendix 1: Bird species recorded during surveys in 104 survey squares, April to June 2017, with total number of squares in which recorded (includes birds flying over survey squares).

English name	Scientific name	Number of squares
Greylag Goose	*Anser anser*	24
Canada Goose	*Branta canadensis*	8
Gadwall	*Anas strepera*	1
Teal	*Anas crecca*	2
Mallard	*Anas platyrhynchos*	14
Red-legged Partridge	*Alectoris rufa*	4
Red Grouse	*Lagopus lagopus*	92
Black Grouse	*Tetrao tetrix*	11
Grey Partridge	*Perdix perdix*	2
Pheasant	*Phasianus colchicus*	17
Grey Heron	*Ardea cinerea*	1
Red Kite	*Milvus milvus*	3
Goshawk	*Accipiter gentilis*	1
Sparrowhawk	*Accipiter nisus*	1
Buzzard	*Buteo buteo*	24
Oystercatcher	*Haematopus ostralegus*	12
Golden Plover	*Pluvialis apricaria*	64
Lapwing	*Vanellus vanellus*	29
Curlew	*Numenius arquata*	77
Dunlin	*Calidris alpina*	1
Common Sandpiper	*Actitis hypoleucos*	1
Redshank	*Tringa totanus*	3
Woodcock	*Scolopax rusticola*	1
Snipe	*Gallinago gallinago*	45
Black-headed Gull	*Chroicocephalus ridibundus*	28
Common Gull	*Larus canus*	3
Lesser Black-backed Gull	*Larus fuscus*	10
Herring Gull	*Larus argentatus*	11
Feral Pigeon	*Columba livia*	3
Stock Dove	*Columba oenas*	2
Woodpigeon	*Columba palumbus*	12
Cuckoo	*Cuculus canorus*	6
Short-eared Owl	*Asio flammeus*	10
Swift	*Apus apus*	1
Kestrel	*Falco tinnunculus*	4
Merlin	*Falco columbarius*	12
Peregrine	*Falco peregrinus*	2
Jackdaw	*Corvus monedula*	5
Rook	*Corvus frugilegus*	3
Carrion Crow	*Corvus corone*	21
Raven	*Corvus corax*	12
Coal Tit	*Periparus ater*	1

Skylark	*Alauda arvensis*	80
Sand Martin	*Riparia riparia*	7
Swallow	*Hirundo rustica*	26
House Martin	*Delichon urbicum*	2
Chiffchaff	*Phylloscopus collybita*	5
Willow Warbler	*Phylloscopus trochilus*	16
Blackcap	*Sylvia atricapilla*	1
Garden Warbler	*Sylvia borin*	1
Grasshopper Warbler	*Locustella naevia*	1
Wren	*Troglodytes troglodytes*	77
Starling	*Sturnus vulgaris*	8
Dipper	*Cinclus cinclus*	6
Ring Ouzel	*Turdus torquatus*	3
Blackbird	*Turdus merula*	5
Fieldfare	*Turdus pilaris*	1
Song Thrush	*Turdus philomelos*	6
Mistle Thrush	*Turdus viscivorus*	6
Robin	*Erithacus rubecula*	1
Whinchat	*Saxicola rubetra*	1
Stonechat	*Saxicola rubicola*	36
Wheatear	*Oenanthe oenanthe*	11
Dunnock	*Prunella modularis*	3
Grey Wagtail	*Motacilla cinerea*	8
Pied Wagtail	*Motacilla alba*	7
Tree Pipit	*Anthus trivialis*	2
Meadow Pipit	*Anthus pratensis*	104
Chaffinch	*Fringilla coelebs*	10
Greenfinch	*Chloris chloris*	1
Linnet	*Linaria cannabina*	6
Lesser Redpoll	*Acanthis cabaret*	15
Crossbill	*Loxia curvirostra*	2
Goldfinch	*Carduelis carduelis*	3
Yellowhammer	*Emberiza citrinella*	2
Reed Bunting	*Emberiza schoeniclus*	12