

## Mitigating against the impacts of human disturbance on black grouse *Tetrao tetrix* in northern England

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**Abstract.** Black grouse may be affected by increased human recreational disturbance. In England, the Countryside and Rights of Way (CRoW) Act became law in 2000, providing a statutory right of access to mountain, moorland, heath, downland and common. Black grouse during the winter gather at residual patches of heather moorland at relatively low altitudes, which were mapped as Open Access land. Field surveys were conducted in winter 2004/05 to ascertain the extent and importance of these sites. A total of 52 heather moorland areas were identified, 30 were areas of enclosed moorland and 22 unenclosed moorland. A total of 143 males and 249 females were recorded in the enclosed areas, at a mean density of  $55 \pm 14$  SE birds per km<sup>2</sup>. Enclosed areas were on average  $0.68 \pm 0.13$  SE km<sup>2</sup>. A total of 61 males and 114 females were recorded in the unenclosed areas, at a mean density of  $11 \pm 2$  SE birds per km<sup>2</sup>. Unenclosed moorland areas were on average  $0.98 \pm 0.11$  SE km<sup>2</sup>. Black grouse may be susceptible to increased recreational disturbance at winter feeding areas. As a precautionary approach, Natural England excluded human access from these areas from 1<sup>st</sup> October to 31<sup>st</sup> March.

**Key words:** Open Access, CRoW Act, winter feeding, heather moorland

### Introduction

Black grouse *Tetrao tetrix* are a species of high conservation concern in Britain, recognised as a 'Red List' species (Gregory et al. 2002) and a priority species for the UK Government's Biodiversity Action Plan (UK BAP 2001). Black grouse were once widespread in Britain, occurring in most parts of southern and central England and Wales during the late 19<sup>th</sup> century (Gladstone 1924), in addition to their current distribution in Scotland and northern England (Sharrock 1976, Gibbons et al. 1993). The decline in numbers and contraction in range has continued, with national surveys in the early 1990s (Baines & Hudson 1995) estimating the population at 25 000 displaying males, but only 6506 in 1995/6 (Hancock et al. 1999) and 5078 in 2005 (Sim et al. 2008).

In England, the population is now restricted to a small section of its former range in the Pennine hills encompassing four counties, Northumberland, County Durham, North Yorkshire and Cumbria, with 83 % of the population found in the North Pennines Area of Outstanding Natural Beauty (AONB) (Warren & Baines 2008). Following the instigation of a recovery programme in 1996 (Warren & Baines 2004), numbers have increased from 773 males in 1998 to 1029 in 2006 (Warren & Baines 2008). Here, black grouse are found associated with the fringes of heather *Calluna vulgaris* moorland managed for red grouse *Lagopus lagopus scoticus* shooting (Hudson 1992), where they

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use a mosaic of habitats including heather moor, rough grassland, species rich hay meadows and small native woodlands (B a i n e s 1994).

Black grouse were identified as a species which may be affected by increased human recreational disturbance following the implementation of the Countryside and Rights of Way (CRoW) Act (L i l e y 2002). The CRoW Act provides a statutory right of access to mountain, moorland, heaths, downland and common (B a t h e 2007) and became law in England and Wales in 2000, with full implementation of the component of the Act dealing with access in May 2005. The moor fringe habitat mosaics utilised by black grouse are in close proximity to the access points to these public access areas. Black grouse during the winter months, feed predominantly on ericaceous species, particularly heather (S t a r l i n g - W e s t e r b e r g 2001, B e e s t o n et al. 2005) and gather at favoured localised feeding points (B a i n e s et al. 2002). These areas tend to be residual patches of heather at relatively low altitudes and may only be tens of hectares in size, but can support high densities of birds throughout the winter period. Given the high concentrations of black grouse and their tendency to flush at considerable distances (B a i n e s & R i c h a r d s o n 2007), the small patches of favoured habitat and the absence of trees and tall shrub cover (B e e s t o n et al. 2005) to conceal birds, these may be circumstances whereby disturbance could have a considerable impact.

The aim of the study was to identify black grouse winter feeding areas within the North Pennines AONB. This information was used by the UK Government's conservation agency Natural England to assess the potential impacts of recreational disturbance on black grouse and instigate management to mitigate against any negative impacts.

## **Study Area**

The North Pennines AONB covers an area of approximately 2 000 km<sup>2</sup> and incorporates parts of County Durham, North Yorkshire, Cumbria and Northumberland. The open, treeless landscape is shaped by the two main land uses, red grouse shooting (H u d s o n & N e w b o r n 1995) and hill sheep farming (W a r r e n & B a i n e s 2002). Unenclosed heather moorland and blanket bog dominate the upper slopes of the valleys, with the lower valley slopes consisting of a mosaic of enclosed rough grazing pastures, hay meadows and semi-improved pastures. In the region, black grouse habitat is considered to be atypical due to the scarcity of trees and shrubs (B e e s t o n et al. 2005).

The North Pennines AONB holds 83 % of England's remaining black grouse (W a r r e n & B a i n e s , 2008) and has a high proportion of nationally and internationally important conservation sites, with 37 % of the area designated as Sites of Special Scientific Interest. There are also two National Nature Reserves, five Special Areas of Conservation (SAC) under the EU Habitats Directive, with five more under consideration, and a Special Protection Area (SPA) under the EU Birds Directive. The area has a small population of 12 000 people, but is within one hour car journey of conurbations in north eastern England.

## **Materials and Methods**

To identify winter feeding areas in the North Pennines AONB we conducted a desk based search to identify potential areas, before undertaking field surveys to establish their presence. To identify areas we used a MapInfo GIS package (M a p I n f o 2000) with the 1998 and

2002 distribution of black grouse leks (Warren & Baines, 2008), overlaid onto a map of the heather moorland area. We utilised aerial photos of the study area to identify areas of heather moorland close to black grouse leks and at lower altitudes to surrounding heather moorland. We also consulted the DEFRA Magic website ([www.magic.gov.uk](http://www.magic.gov.uk)) to identify moorland areas where sheep grazing had been reduced to promote heather recovery through agri-environment schemes as these have previously been shown to favour black grouse (Baines et al. 2002, Calladine et al. 2002). In association with these data, further wintering areas were identified from use by radio tagged black grouse in the study area (Warren & Baines 2002, Baines & Richardson 2007). Finally, moorland gamekeepers from twenty one grouse moors in the North Pennines and the reserve wardens of three nature reserves were interviewed to identify further areas where aggregations of birds were observed in the winter.

Field surveys commenced in November 2004 and were completed in January 2005. Each recognised potential wintering area was visited once between 09:00 and 15:00 when weather conditions allowed good visibility. The observer walked parallel transects at 100 m intervals in accordance with known mean black grouse flushing distances (Baines & Richardson 2007) across each site and within 100 m of all the boundaries, recording the number and sex of all birds flushed.

The location and extent of each wintering area where birds were found was mapped using MapInfo. Heather cover was measured using aerial photos. To ascertain whether the area was in an agri-environment scheme we used DEFRA's Magic ([www.magic.gov.uk](http://www.magic.gov.uk)) website. Existing access routes were recorded including public footpaths, bridleways, by-ways and frequently used tracks, identified from 1:25000 Ordnance Survey maps.

## Results

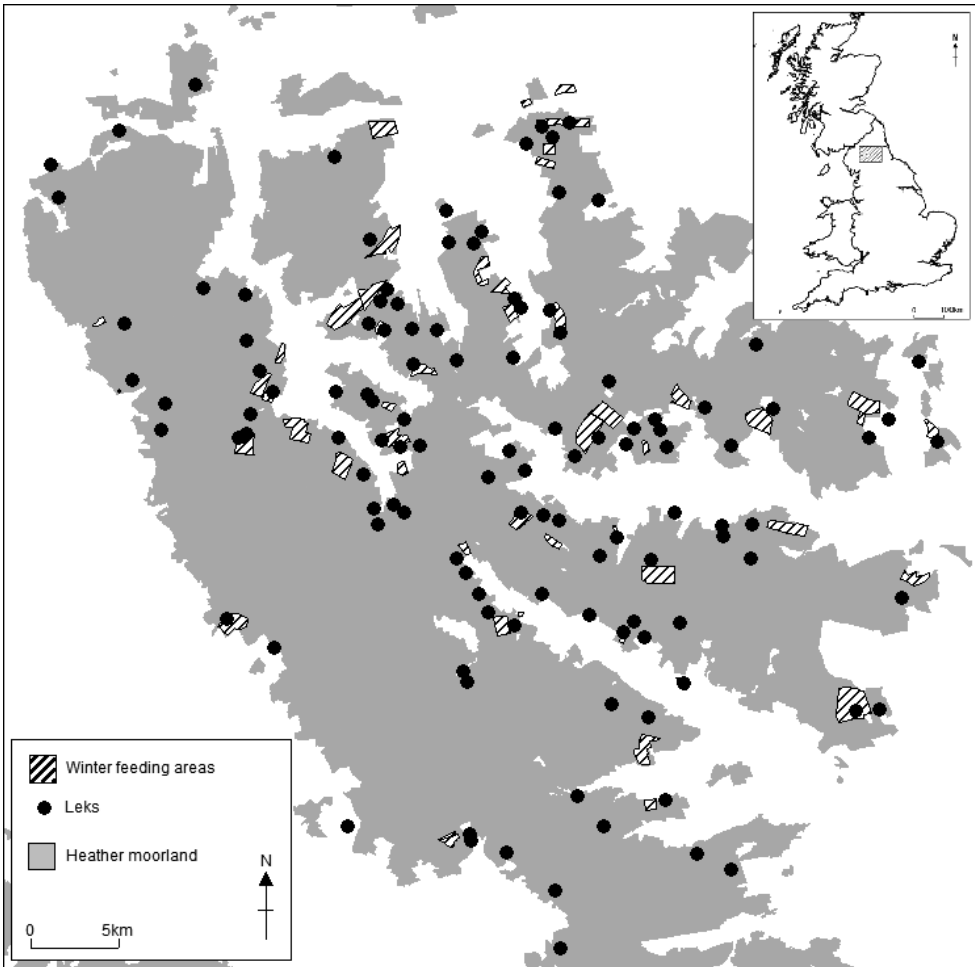
We identified 52 black grouse wintering areas, 30 on enclosed moorland and 22 on unenclosed moorland (Fig. 1). These contained 204 males and 363 females, approximately 41 % of black grouse in the North Pennines AONB (1400 birds), based on lek count results in 2002 and assuming an equal sex ratio.

In the 30 enclosed moorland areas we observed 143 males and 249 females (Table 1.), approximately 28 % of black grouse in the North Pennines AONB at a mean density of  $55 \pm 14$  SE birds/ km<sup>2</sup>. These areas were on average  $0.68 \pm 0.13$  SE km<sup>2</sup> and all had heather present, comprising on average 31 %  $\pm 3$  SE of the sward. The majority of these areas (83 %) were in agri-environment schemes to restore heather cover, with 53% having existing Public Rights Of Way through them.

Overall 61 males and 114 females were recorded on the 22 areas of unenclosed moorland, approximately 13 % of black grouse in the North Pennines AONB at a mean density of  $11 \pm 2$  SE birds/ km<sup>2</sup>. These areas were on average  $0.98 \pm 0.11$  SE km<sup>2</sup> and all had heather present, comprising on average 34 %  $\pm 3$  SE of the sward. Two thirds of the unenclosed moorland areas were in agri-environment schemes to restore heather cover, with half having existing Public Rights Of Way.

## Discussion

The study identified 52 black grouse winter feeding areas in the North Pennines AONB containing 567 birds. Highest densities (55 birds/ km<sup>2</sup>) were found on areas of enclosed



**Fig. 1.** The distribution of black grouse winter feeding areas in the North Pennines in relation to the black grouse leks in 2002 and heather moorland designated as Open Access land under the CRoW Act.

heather moorland. Agri-environment schemes to promote heather recovery through reduced winter sheep grazing were also important with 75 % of all areas in schemes. These heather restoration schemes are also important to breeding black grouse, with Calladine et al. (2002) finding that black grouse bred better at sites where sheep grazing had been reduced.

Winter feeding areas were distributed around the edges of heather moorland, designated as public access areas under the CRoW Act. As many of these areas are at potential access points to Open Access moorland, increased human recreational disturbance, may impact negatively on black grouse. During the winter and spring, deliberate increased disturbance of black grouse as part of an experiment, increased flushing distances by 60%, with birds exposed to high disturbance rates flushing on average at 55 m, compared to 34 m at moderate disturbance rates (Baines & Richardson 2007). Seemingly, regular or increased disturbance at winter feeding areas could, impact negatively on survival rates, if alternative feeding areas were of poorer quality or were limited in extent (Liley & Sutherland 2007, Mallord et al. 2007). However, in the North Pennines AONB, human induced

**Table 1.** The characteristics of black grouse winter feeding areas on enclosed and unenclosed heather moorland in the North Pennines AONB.

	Number of sites (n)	Mean (min- max) area (km <sup>2</sup> )	Total black grouse Cocks	Hens	Mean (min-max) black grouse density (birds /km <sup>2</sup> )	Mean (min-max) heather cover (%)	Number of sites in agri-environment schemes (%)	Number of sites with existing Public Rights of Way (%)
Enclosed moorland	30	0.68 (0.05- 3.1)	143	249	55 (3-13)	31 (2-75)	25 (83%)	16 (53%)
Unenclosed moorland	22	0.98 (0.27- 2.1)	61	114	11 (1-18)	34 (10-60)	14 (64%)	11 (50%)

disturbance of black grouse appears low, with Baines & Richardson (2007) reporting only 29 human encounters during 476 man days of field work. This contrasts markedly with disturbance studies on lowland heathland, in southern England (Murison et al. 2007, Underhill-Day & Liley 2007), with up to 0.24 people per hour recorded (Langston et al. 2007).

Despite this, a precautionary approach was adopted by the UK government's conservation advisory agency, Natural England to protecting black grouse winter feeding areas by excluding human access from 1<sup>st</sup> October to 31<sup>st</sup> March inclusive. Following the onset of public access in May 2005 there has however been little evidence of change in the public's behaviour. Most stay on existing linear marked footpaths rather than straying from them and there has been no obvious increase in the number of people using such areas. If future human recreational use in the North Pennines AONB should increase then there may be cause for conflict and management to mitigate against the negative impacts of human disturbance instigated. This would require the precautionary approach of excluding access from winter feeding areas and improving linear routes to encourage people not to wander at will (Pearce-Higgins et al. 2007).

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