

GAME & WILDLIFE CONSERVATION TRUST

A feasibility study to assess the potential for restoring black grouse to the Bowland Fells

Report commissioned by United Utilities PLC

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Restoring black grouse to the Bowland Fells - a feasibility study

Summary

The GWCT were commissioned by United Utilities PLC in autumn 2012 to undertake a study to assess the feasibility of restoring black grouse in the Bowland Fells.

Main findings

- Black grouse were widespread in the Bowland Fells, but by the mid-1990s were considered locally extinct. Historically they formed part of a larger contiguous north of England population connected with birds in the Yorkshire Dales.
- Black grouse disappeared due to a combination of factors which reduced the extent and condition of suitable habitat mosaics, particularly through the intensification of agriculture and the maturation of conifer plantations. In the past 20 years significant landscape habitat conditions have been implemented.
- We assessed conditions at 21 historic lek sites identified within the Bowland Fells. Through this process only four met all three criteria of a suitable habitat mosaic, an infrastructure of predator control and connectivity and considered suitable to support lekking groups. We identified a further 12 areas where conditions were suitable.
- In theory, the Bowland Fells could support between 80 and 105 males. This is a best case scenario, and still only gives potential for a relatively small population which would be limited by environmental stochastic events. To ensure long term sustainability, a population here needs to be connected to those in the neighbouring Yorkshire Dales.
- Black grouse in the Bowland Fells once formed part of a contiguous population with birds in the Yorkshire Dales. Two historic connection zones are evident, through Ingleborough and east through Langbar. Restoration of suitable conditions here is key to restoring numbers and is considered achievable.
- Restoring black grouse in the Bowland Fells is dependent on continuing to increase numbers and range in the Yorkshire Dales, initiating conservation measures to restore connecting links through the Ingleborough corridors, and continuing to restore and improve habitat mosaics in the Bowland Fells, particularly on the north eastern fringes, where natural re-colonisation is the most likely.

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1. Introduction

Black grouse in the UK have been in decline for the last 150 years, with this decline accelerating in recent decades from an estimated 25,000 males in the early 1990s to 5,000 males in 2005 (Baines & Hudson 1995, Sim *et al.* 2008). Range contraction and fragmentation means that two thirds of the remaining population of this once widespread bird are now found in Scotland, with the remainder found in northern England and North Wales (Sim *et al.* 2008). In England, they are now restricted to the northern Pennine Hills within the counties of Northumberland, Durham, Cumbria and North Yorkshire where c.1000 males remain. Black grouse are now recognised as a species of high conservation concern (Gregory *et al.* 2002), Red-listed and are a UK Biodiversity Action Plan (BAP) 'Priority' species with the GWCT and RSPB joint lead partners responsible for the delivery of the species action plan.

In England, following the instigation of conservation measures through the work of the North Pennines Black Grouse Recovery Project (1996 – 2010) numbers have stabilised, with range expanding southward into formerly occupied areas. The conservation of black grouse in northern England is dependent on maintaining and restoring an inter-connected population which is large enough to withstand environmental stochastic events, and to maintain genetic variability and gene flow. Therefore the drive is now on to meet the BAP targets of increasing numbers to 1200 males and occupied range from 43 to 52, 10 km grid squares by 2015 (Warren *et al.* 2011). To achieve these challenging targets we need to increase numbers within the core of the range, whilst simultaneously promoting the improvement of conditions on the fringes of their range to enable re-colonisation and range expansion.

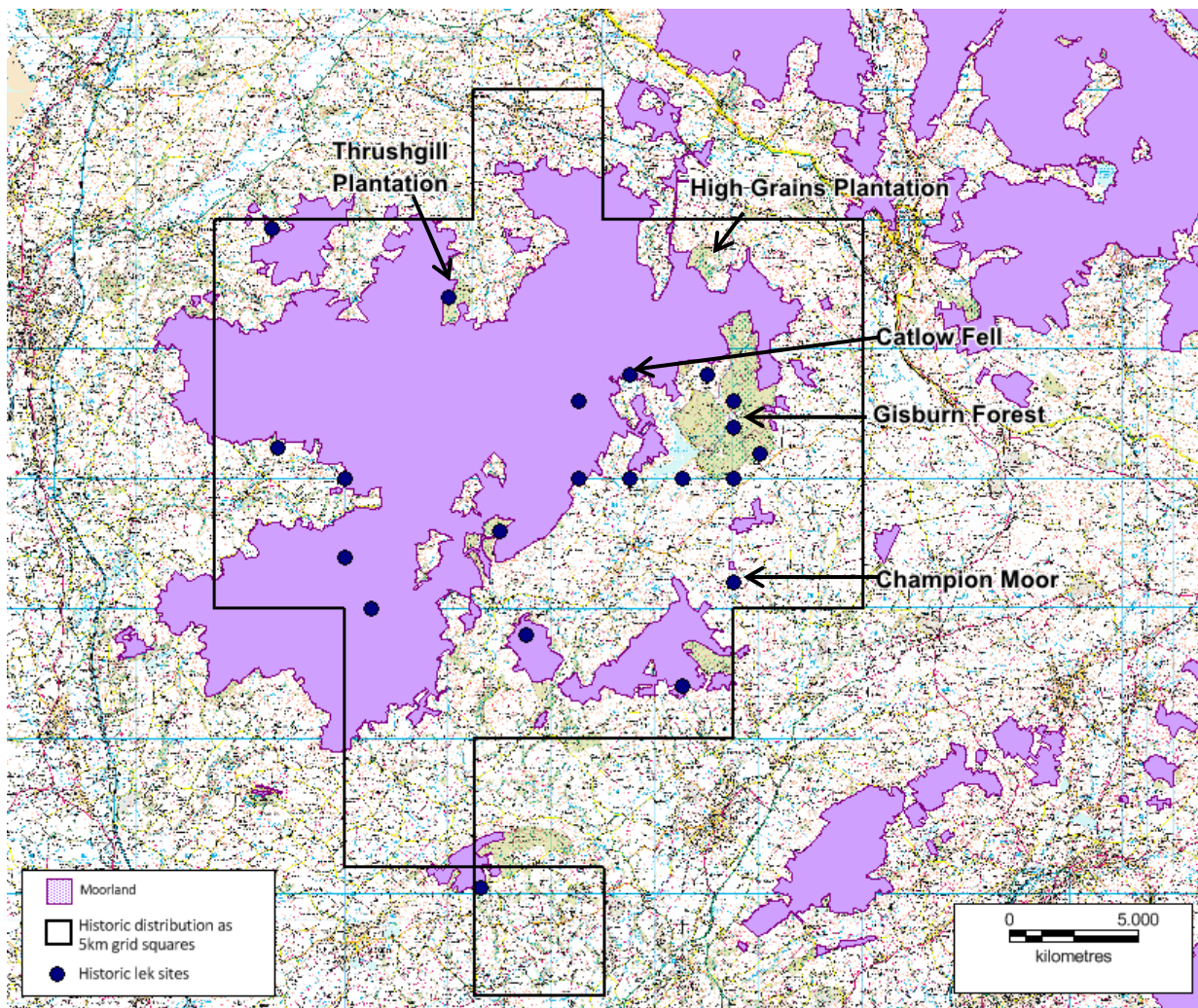
Black grouse were present in the Bowland Fells up until the early 1990s and there have since been significant moorland habitat enhancements implemented throughout this area. In recent years, black grouse in the Yorkshire Dales to the north have increased in both numbers and range, with the nearest populations now within 20 km and the dispersal range of females. To evaluate the feasibility of restoring black grouse to the Bowland Fells, the GWCT were commissioned by United Utilities PLC in autumn 2012. United Utilities is a major water company which owns over 55,000 ha of mainly upland catchment in north west England, including 10,000 ha in the Forest of Bowland. United Utilities aims to conserve and enhance biodiversity wherever it can on its land holdings. This report included:

- (I) An assessment of the current extent, condition and connectivity of suitable habitat mosaics and predator control infrastructure in the Bowland Fells to support a viable population of black grouse.
- (II) Evaluate the connectivity with existing black grouse populations in the Yorkshire Dales and identify potential stepping stones and barriers to linking populations.
- (III) Provide a blueprint of the management required to re-establish black grouse in the Bowland Fells

1.1 Historical distribution

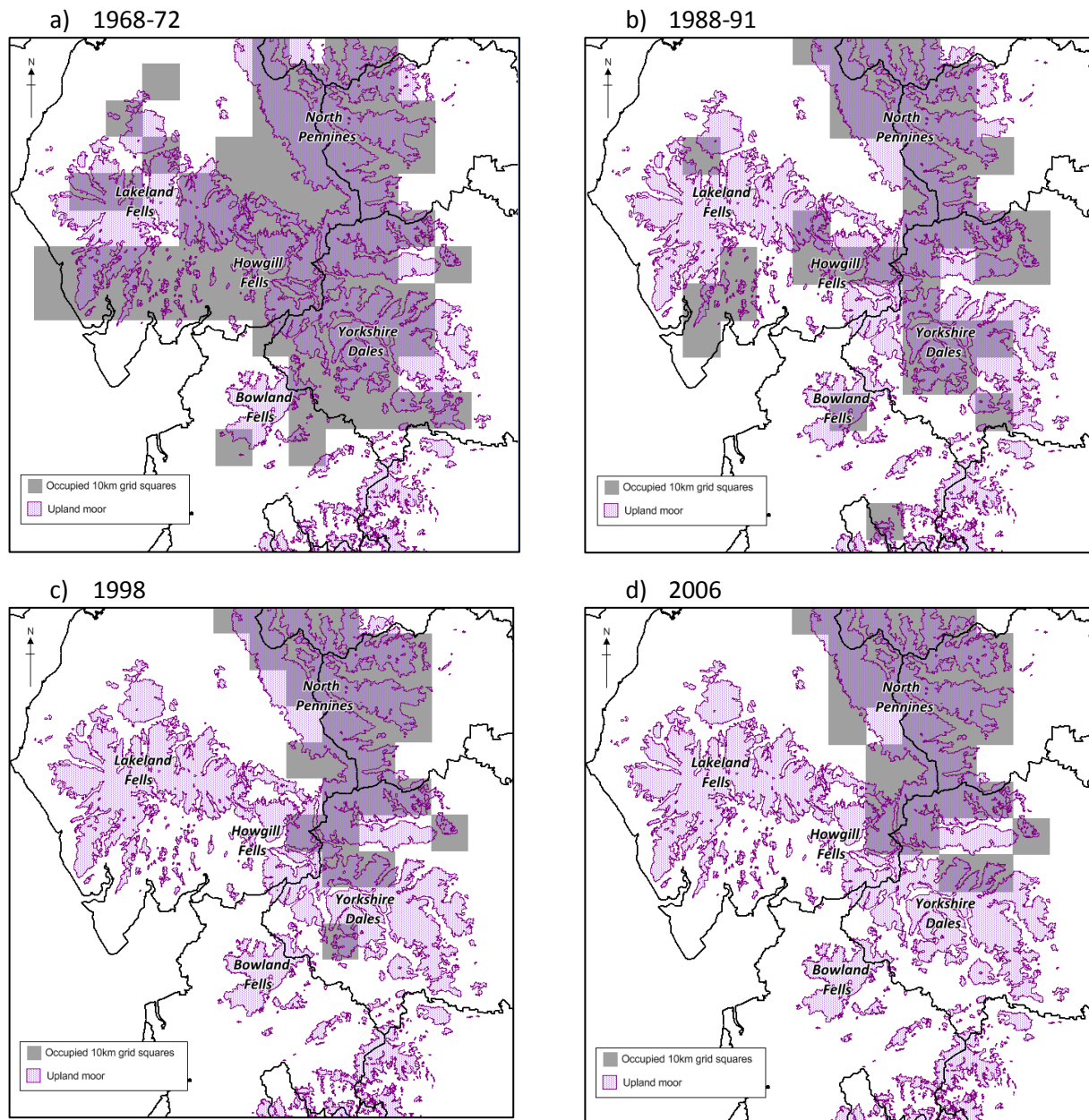
A black grouse survey commissioned in 1992/1993 collected information on historic records, recent sightings and the location of leks in Bowland (Bowland Report Autumn/Winter 1992/93). The report found that black grouse were widespread in the Bowland Fells between the 1950s and 70s. We mapped the location of leks and all recorded sightings from this report (presence or absence within a 5 x 5 km grid square) to illustrate their once previous widespread distribution here (Figure 1). It appears from the report, that prior to their ultimate disappearance the largest populations in the 1970s and 80s were associated with the newly planted commercial forests at Gisburn Forest (30 cocks late 70s), Thrushgill Plantation (25 cocks in 1983) and High Grains Plantation (30-40 birds in late 70s), but upon canopy closure black grouse were lost from all these sites. The last remaining records of birds are from the early 1990s from Catlow Fell (3 cocks and a hen 1992) and Champion Moor (cock and hen in 1993). In the past decade there have been occasional reliable sightings of black grouse on moors in the north east corner of the Bowland Fells.

Figure 1. Historic records of black grouse in the Bowland Fells (location of leks and sightings of birds within 5 x 5 km grid squares)



Black grouse in the Bowland Fells once formed part of a contiguous population that ran through the Yorkshire Dales, Howgill Fells, Lakeland Fells and the North Pennines (Figure 2a). Their range since the early 1970s has contracted northwards (Figure 2a, b & c), and by 2006 the nearest populations were found 30 km to the north in Swaledale.

Figure 2. Changes in distribution of black grouse (as presence within 10 x 10km grid squares) from the 1968-72, 1988-91, 1998 and 2006 surveys



1.2 Reasons for the decline

The decline of black grouse in the Bowland Fells is related to a combination of land use changes particularly in the post Second World War period. Farming became more intensive, with increases in the numbers of sheep driven by headage payments which led to the direct loss, degradation and fragmentation of heather moorland habitats. Simultaneously, moorland fringe habitats favoured by black grouse, such as areas of low lying moorland, rough pastures and species rich hay meadows were agriculturally 'improved' through draining, fertiliser and reseeded.

With increases in grazing pressure on moorland habitats, a temporary boost was given to black grouse numbers during the 1960s and 70s with the establishment of a number of commercial conifer plantations. Conifer plantations are attractive to black grouse while the young trees are becoming established. During this early stage, the ground vegetation, often containing heather and bilberry, thrives as a result of the exclusion of sheep. This provides black grouse with more nesting cover and food, and nomadic young hens in particular are drawn to these areas to settle and breed in quite high densities. After 10 to 15 years, the extent of suitable conditions for black grouse rapidly diminishes as the forest matures and the canopy closes. Reviewing the historical records suggest that black grouse took advantage of the conditions created by the young plantations at Gisburn, Thrushgill and High Grains, but when the canopies closed, they had insufficient alternative habitats available to persist.

In summary, black grouse disappeared from Bowland due to a combination of changes in land use which reduced both the condition and extent of suitable habitat mosaics available. Unfortunately, birds were already absent before the recent change in emphasis in upland management, which commenced in the early 1990s which has seen considerable improvements to moorland habitats and which continues to this day.

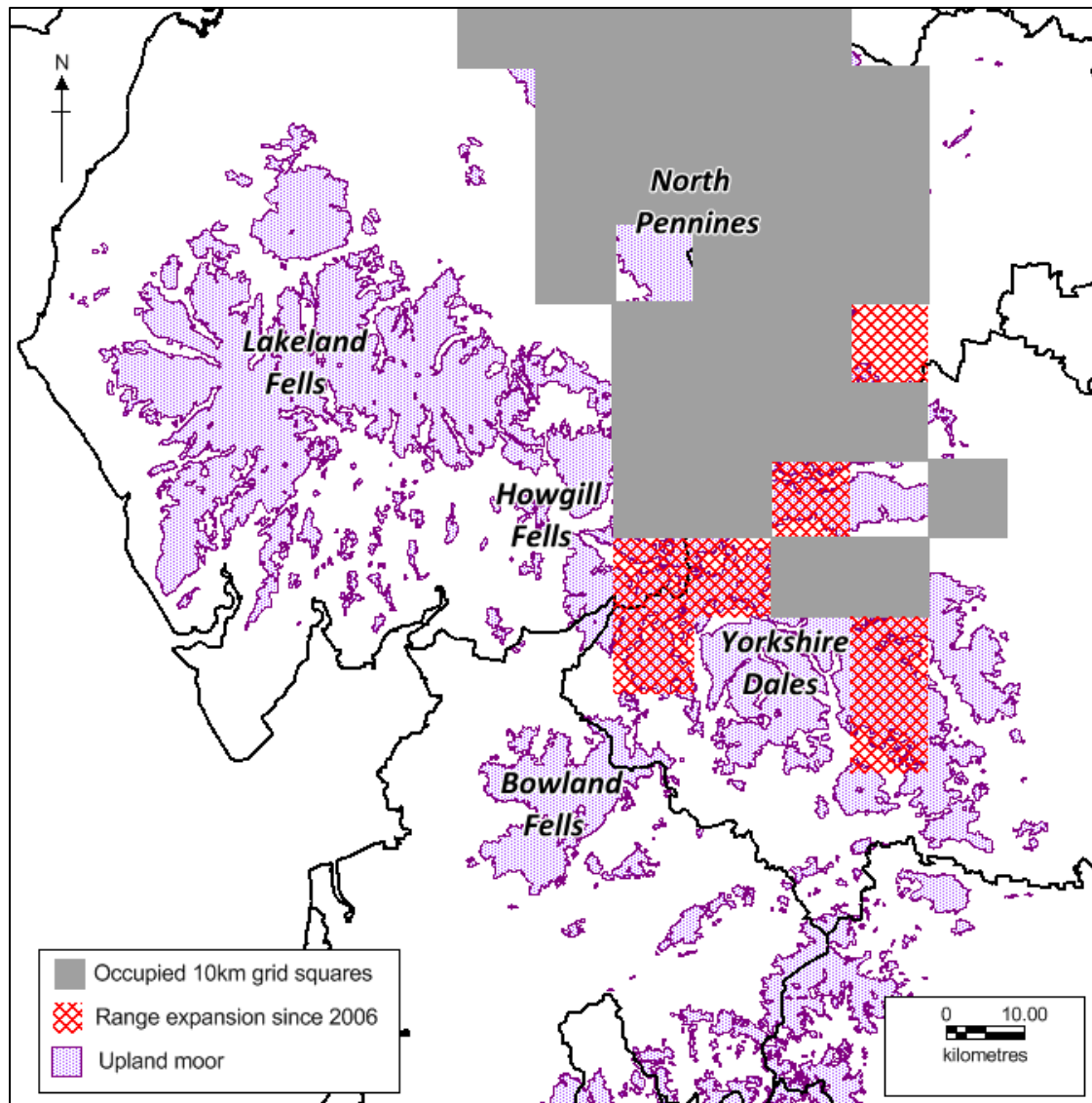
1.3 Recovery of black grouse in northern England

By the late 1990s the decline and contraction of black grouse in northern England had stabilised, with numbers increasing from 773 males in 1998 to 1029 in 2006. This recovery was achieved through conservation measures including targeted habitat improvements on the fringes of moorland managed for red grouse shooting (Calladine *et al.* 2002). On the southern fringe of the range in the Yorkshire Dales in the same time period, numbers increased from 57 to 137 males. Although numbers increased, range remained stable, therefore to assist range expansion, a translocation project commenced in 2006 which moved wild males from core populations, and released them at specially selected release sites on the southern fringe of the range in the Yorkshire Dales where habitat conditions were suitable and predator control operated. This project has helped re-establish breeding groups in Widdale and Ribblesdale. In 2011 an extension of this project was rolled out in Nidderdale which is showing similar positive results at the south eastern fringe of the range.

Since 2006, occupied range has increased occupying a further seven, 10 km grid squares (Figure 3). In 2006, the nearest black grouse from the Bowland Fells were 30 km away, but by 2012 this distance had reduced to 17 km. This is within the dispersal capacity of juvenile females (average 9 km, up to 30 km),

but natural re-colonisation may be limited by the low dispersal of males which only disperse on average 1 km.

Figure 3. The distribution of black grouse in spring 2013 (occupied 10 x 10 km grid squares), illustrating range expansion since 2006



The Yorkshire Dales have been identified in the English black grouse BAP group's 'A Strategic Approach to Delivering Black Grouse Biodiversity Action Plan Targets in Northern England' (Warren *et al.* 2011) as the key area for delivering black grouse range expansion objectives in the short term. In this region suitable habitats are present which are being improved through agri-environment schemes, moorland gamekeepers are present providing protection from predators and importantly habitat mosaics are connected at a landscape scale. The Bowland Fells were identified in the same document as a potential longer term objective, dependant on first achieving objectives in the Yorkshire Dales.

2. An assessment of the extent, condition and connectivity of suitable habitat mosaics in the Bowland Fells

To re-establish a viable black grouse population there needs to be sufficient suitable connected habitats in combination with predator control to support a network of inter-connected lekking groups. Black grouse require a mosaic of habitats which contain heather *Calluna vulgaris*, cotton grass *Eriophorum vaginatum*, the leaves, flowers and seeds of grasses and herbs, and the buds and berries of various broad-leaved trees and shrubs, plus insect rich areas for foraging chicks (Baines 1994, Beeston *et al.* 2005). In good continuous habitats, black grouse leks are distributed at 2-3 km intervals, hence most birds attending leks are found within 1.5 km radius of the lek. Therefore suitable habitat needs to be provided within an area of 300 – 500 ha.

2.1 Habitat

An analysis of lek habitat composition within a 1.5 km radius of all lek sites in northern England (n=155), found that 99% of leks were associated with upland heath and blanket bog, which comprised an average 41% of habitats within a 1.5 km radius (Table 1). Grass moor and rough grazing were also important, comprising 28% and 17% of the respective habitats. In-bye fields were present at three quarters of leks, where they comprised an average 11% of the habitat. Woodland cover was present at almost half of leks, but only comprised 2% of available habitats.

Table 1. Habitat composition within a 1.5 km radius of 155 leks (≥ 2 males) in northern England

Habitat type	% of leks present	% cover	Maximum (%)
Upland heath and blanket bog	99	41	100
Grass moor	92	28	76
Rough grazing	83	17	89
In-bye/ improved grasslands	74	11	68
Woodland	46	2	26
Other	7	0	16

The importance of woodland within the home range of black grouse to provide emergency food sources, shelter and cover from predators during periods of prolonged snow was highlighted through the effects of the severe winter of 2009/10. Black grouse with access to pockets of scrubby woodland survived better than those at sites without woodland. Therefore there has been an increased drive in establishing pockets of broadleaf woodland for black grouse in northern England to help improve their survival through severe winters.

2.2 Population connectivity

Most young females disperse from their natal areas, with a mean distance of 9.3 km (Warren & Baines 2002), whereas males and adult females hardly move at all. This implies that a group of birds centred on a lek, may only be viable in the long term if they are within the dispersal range of young females from neighbouring leks. In northern England, leks are found 2-3 km apart and this degree of connectivity

between birds from neighbouring leks is essential to maintain genetic diversity and to prevent inbreeding through genetic and physical fragmentation of social structure, gene pool and habitat.

2.3 Infrastructure of predator control

There is growing scientific evidence that populations of ground nesting birds, including black grouse, are more likely to be limited by predation than other groups (Gibbons *et al.* 2007, Fletcher *et al.* 2010). In northern England, 95% of leks are found on the fringes of grouse moors with full-time moorland gamekeepers operating (Warren & Baines 2004). Therefore suitable connected habitats, with an infrastructure of predator control operating are viewed as the best conditions for black grouse utilising the moorland fringe habitats typical of the English uplands.

2.4 Availability of suitable conditions in the Bowland Fells

We assessed the current conditions at previously occupied lek sites, and at new areas across the Bowland Fells to assess potential for supporting black grouse based on the following criteria:

- i. the availability of a suitable habitat mosaic,
- ii. full-time moorland gamekeepers to control predators,
- iii. connectivity with other groups.

These criteria have recently been used when assessing the suitability of release sites for the translocation projects in the Yorkshire Dales. Habitat conditions were assessed using habitat information on upland heath and blanket bog from Natural England GIS datasets (www.natureonthemap.naturalengland.org.uk), aerial imagery (Google Earth) and confirmed through site visits (figure 4). We also mapped the extent of where full-time moorland gamekeepers are employed to produce driven red grouse shooting in the Bowland Fells and areas where part-time predator control was operating (figure 5).

Historic leks

We assessed the conditions at 21 historic lek sites identified within the Bowland Fells (Table 2). Through this process only four of the 21 met all three criteria of a suitable habitat mosaic, an infrastructure of predator control and connectivity and were therefore considered suitable to support black grouse lekking groups. A further five, had suitable habitats and were connected, but failed this process due to only part-time gamekeepers operating. Of the remaining 12 sites which failed, ten were due to insufficient habitat mosaics. Six of these were associated with Gisburn Forest (Leks 1-6) where moorland fringe habitats have been replaced with commercial woodland. A further four, Hollins, Champion Moor, Longridge Moor and Claughton Moor failed due to insufficient heathland and grass moor habitats which in the intervening years have been agriculturally improved to more intensively managed pasture. The historic leks at Easington Fell and Hodder Bank Fell, despite having suitable habitats were considered too isolated to realistically support black grouse in the future.

Figure 4. The distribution of historic leks across the Bowland Fells and the coverage of heath and blanket bog (Leks are numbered in reference to Table 2).

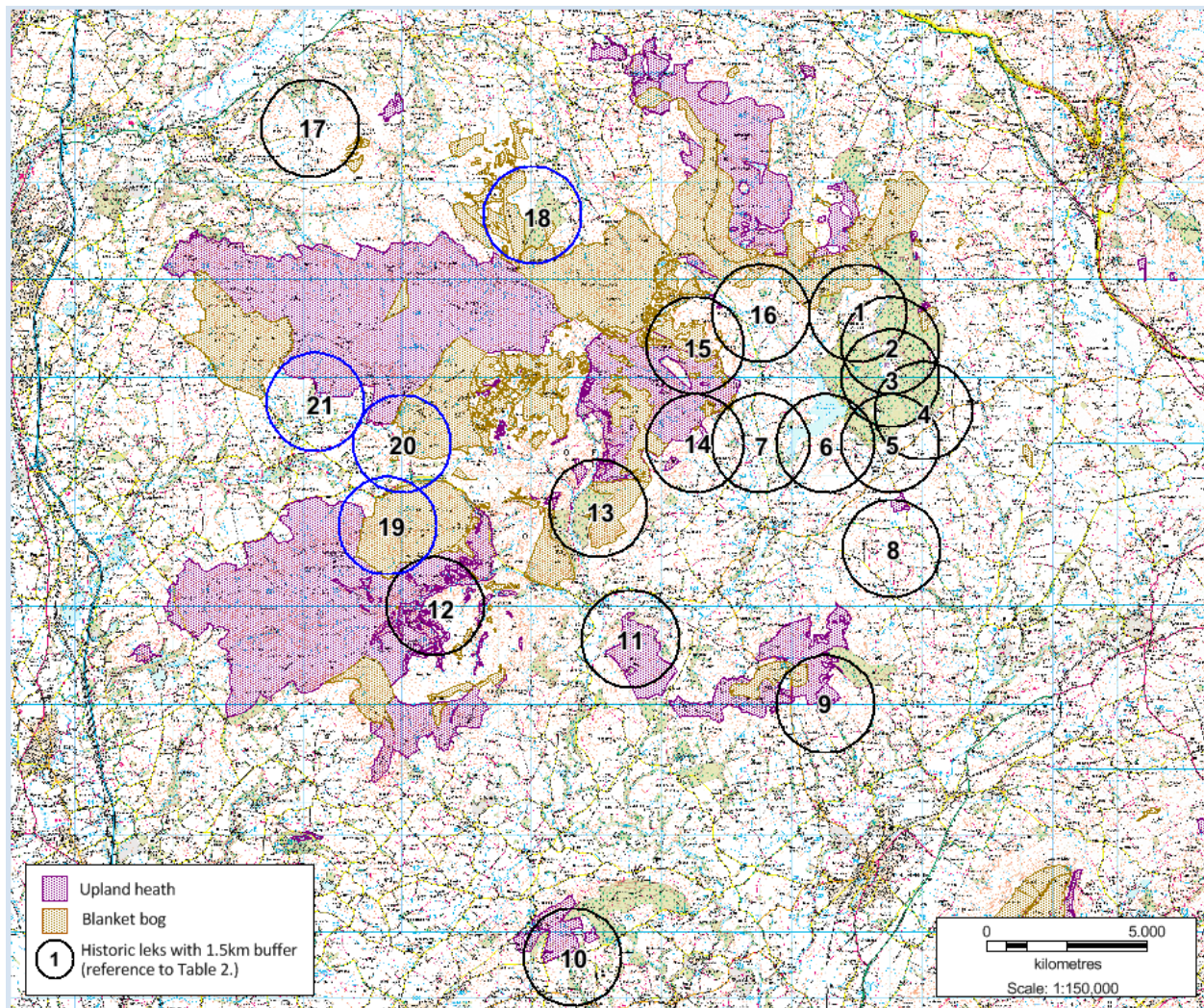


Figure 5. The distribution of historic leks across the Bowland Fells and the presence of moorland game keepers (Leks are numbered in reference to Table 2).

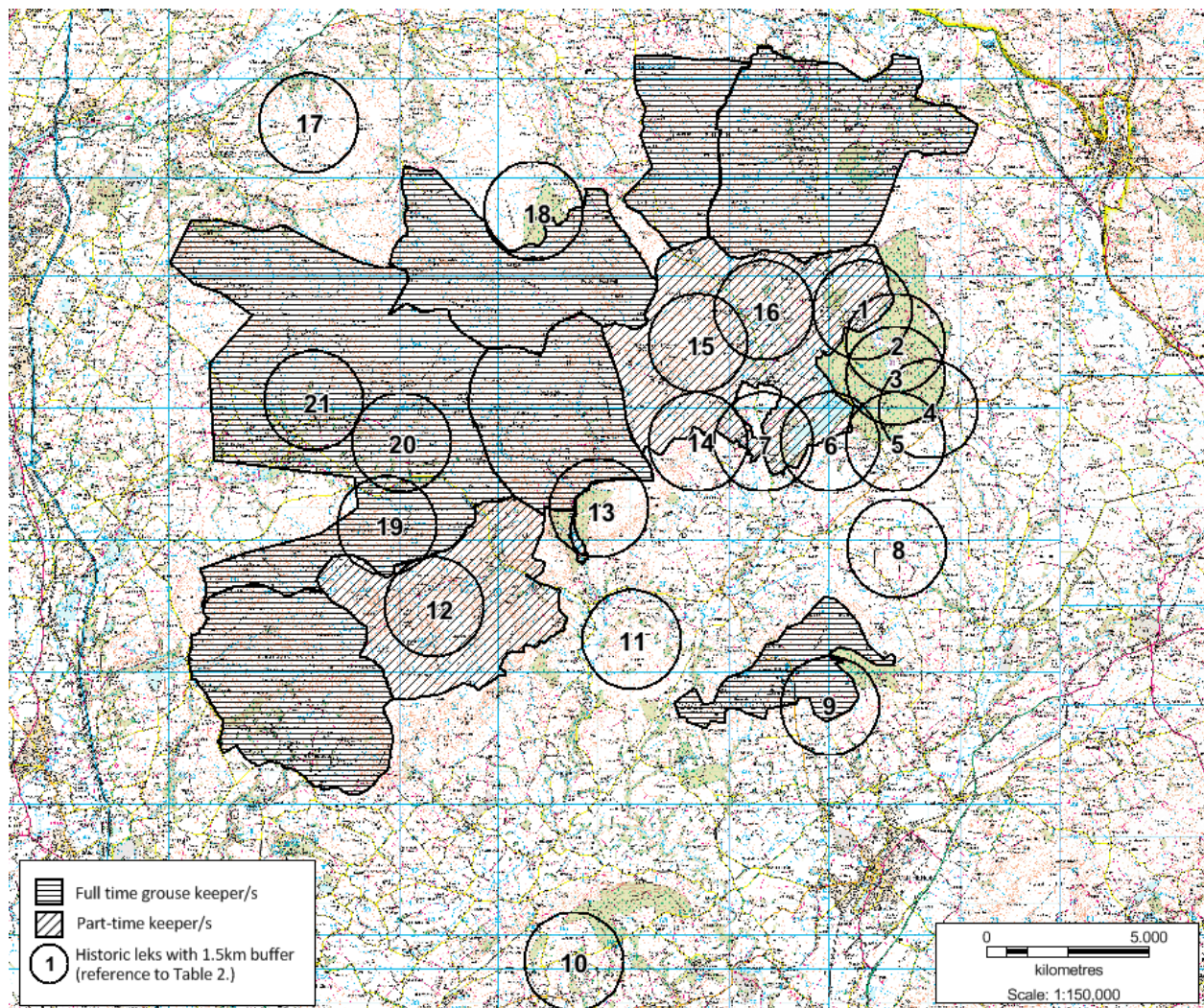


Table 2: Historic black grouse lek sites (referenced to figures 4 & 5) across the Bowland Fells and surrounding environs assessed by current habitat suitability, whether predator control is operating, whether the area is linked in the landscape to other suitable habitats and the possibility of the area supporting black grouse in the future.

Site	Last Record	Habitat composition (%)					Habitat Suitability	Moorland gamekeepers	Connectivity	Comments / recommendations	Potential re-colonisation?
		Heath	Grass moor	Rough grazing	In-bye	Woodland					
1. Halsteads Moor	'small lek' 1990	18	10	20	11	41	X	X	N/A	Although there are aspects of all the required components here this lek is now considered unsuitable due to the large proportion of mature forestry.	X
2. Hindley Head	Small number of males 1980's	0	10	0	0	90	X	X	N/A	Required mosaic of habitats replaced by plantation forestry. Not considered feasible to restore a suitable extent of open habitats.	X
3. Hesbert Hall	2 females 1990	0	0	0	17	83	X	X	N/A	Required mosaic of habitats replaced by plantation forestry. Not considered feasible to restore a suitable extent of open habitats.	X
4. Longton Farm	30 males in late 1970's	0	0	0	48	52	X	X	N/A	Suitable habitats have been lost here through maturation of the Gisburn Forest and intensive management of the adjoining in-bye.	X
5. Brockthorn Farm	Late 1980's	0	0	0	52	48	X	X	N/A	Suitable habitats have been lost here through the maturation of Gisburn Forest and intensive management of the adjoining in-bye.	X
6. Hammerton Mere	1 male 1992	0	0	0	70	12	X	X	N/A	Suitable habitats no longer exist in this area due to the maturation of Gisburn Forest and intensive management of the adjoining in-bye. Habitat calculation includes 18% coverage of water.	X

7. Hollins	1 male 1992	0	0	9	81	5	X	X	N/A	No heather moorland component. Habitat calculation includes 5% water coverage.	X
8. Champion Moor	6 males in 1990	5	0	20	75	0	X	X	N/A	Insufficient moorland or grass moor habitats, and is not deemed feasible to restore .	X
9. Easington Fell	6 males 1989	25	23	0	46	6	✓	✓	X	Suitable habitats persist here but are too isolated from the main Bowland Fells to consider as a priority for re-colonisation.	X
10. Longridge Fell	3 males early 1970's	24	0	0	64	12	X	X	N/A	Insufficient habitat to support black grouse and severely isolated from the moorland habitats to the north.	X
11. Hodder Bank Fell	6 males 1982	32	4	0	59	5	✓	X	X	Suitable habitats exist here but lack of predator control and direct connectivity make it unlikely to be re-colonised.	X
12. Holdron Castle	1 female 1992	65	35	0	0	0	✓	X	✓	Suitable habitats are present, and recently planted gill woodland will enhance the mosaic. This lek fails the criteria on lack of full time predator control.	X
13. Beatrix Fell	2 males 1990	41	32	3	4	20	✓	X	✓	This area has all the required habitat components and will benefit further from the restoration of the plantation forestry to a more open scrubby woodland. The natural regeneration of heather and scrub on the eastern side of Whitendale River as a result of stock exclusion has produced some excellent black grouse habitat. This lek fails the criteria on lack of full time predator control.	X
14. Croasdale	1 male 1991	35	23	5	35	2	✓	X	✓	All the required habitat components are present here and connected to other potential areas for re-colonisation. This lek fails the criteria on lack of full time predator control.	X
15. White Syke Clough	1 male 1992	55	42	2	0	1	✓	X	✓	All the required habitat components are present here and connected to other potential areas for re-colonisation. This lek fails the criteria on lack of full time predator control.	X
16. Catlow Plantation	1 male 1992	12	54	9	20	5	✓	X	✓	All the required habitat components are present here and connected to other potential areas for re-colonisation. This lek fails the criteria on lack of full time predator control.	X

17. Claughton Moor	1 male 1991	1	43	8	40	8	X	✓	N/A	There is insufficient heather cover here to support a lekking group	X
18. Thrushgill Plantation	20 males in 1984	36	17	11	17	19	✓	✓	✓	Suitable habitat conditions are present here and there are full-time gamekeepers operating. The plans to clear fell Thrushgill Plantation give the opportunity to restore more favourable habitats for black grouse.	✓
19. Blaze Moss	Not known	74	10	8	4	4	✓	✓	✓	The heather and white ground is in good condition here and would support a lekking group with the protection of full time predator control. There is no woodland within the immediate home range which could be considered under habitat enhancements, There is however some good mixed woodland just below Blaze Moss along Marshaw Wyre.	✓
20. White Moor	Not known	49	2	16	30	3	✓	✓	✓	This mosaic has all the habitat components present combined with full time predator control. There are plans to create a grazing enclosure on a section of White Moor which will help restore the blanket bog, further improving habitats for black grouse.	✓
21. Dunkenshaw	Not known	28	14	20	34	4	✓	✓	✓	All the required habitat components are present and full time predator control is in place. This is the most westerly of the sites suitable for re-colonisation. Towards Hare Appletree Fell conditions get too dry and the wet flushes needed for good brood rearing habitats are absent.	✓

(b) Other potential sites

In addition to the four historic lek sites where suitable conditions were identified, a further 12 sites were considered as suitable to support black grouse lekking groups based on the earlier selection criteria (Figure 6 and Table 3). Four of these were located on the Abbeystead estate, a further two on the United Utilities estate, one on Botton Head and five on Burnmoor and Fourstones in the north east.

Figure 6. Other potential habitats mosaics to support black grouse leks in the Bowland Fells

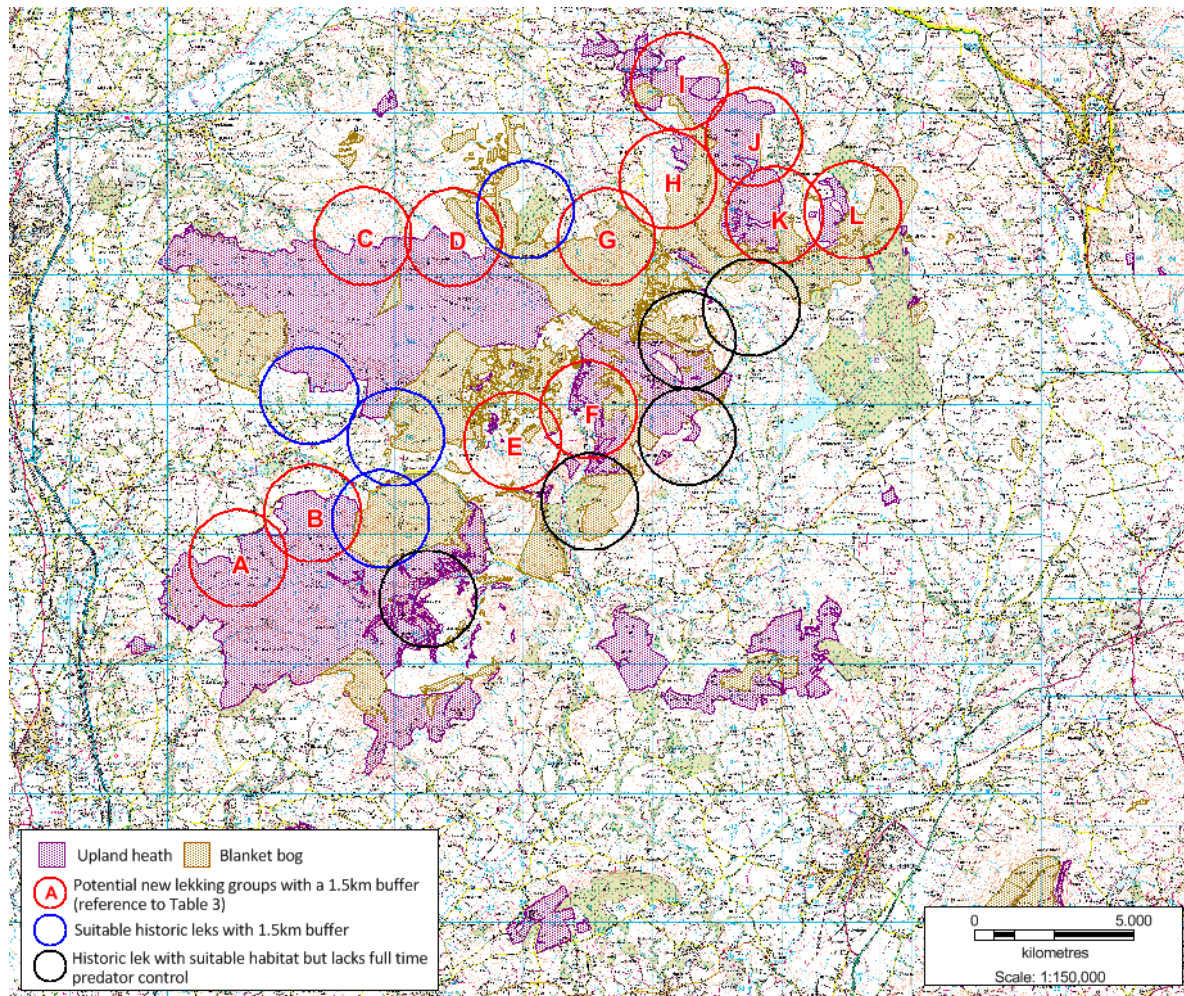


Table 3. Potential black grouse lek sites (referenced to figure 6) across the Bowland Fells, assessed by current habitat suitability, whether predator control is operating, and connectivity to other suitable habitats in the landscape.

Site	Habitat composition (%)					Habitat Suitability	Moorland gamekeepers	Connectivity	Comments / recommendations
	Heath	Grass moor	Rough grazing	In-bye	Woodland				
A. Catshaw Fell	51	13	7	27	2	✓	✓	✓	This is the most westerly of the sites considered suitable for black grouse. The heath and moor fringes are in good condition to provide feeding and brood rearing habitat, with woodland on the lower ground to provide winter feeding opportunities. Conditions could be improved by maintaining a transitional zone between moorland and farmland through encouraging less intensive management on the in-bye.
B. Hawthornthwaite	55	15	17	12	1	✓	✓	✓	This potential site is connected along the moor fringe to Catshaw Fell and the historical lekking groups at Blaze Moor. All the required habitat components are present but could be enhanced by some woodland planting on the moor fringe.
C. Haylot Fell	41	39	9	8	3	✓	✓	✓	This site has a good balance of all the habitat components and is connected to suitable habitats to the east through Mallowdale and Thrushgill. Habitats to the west of here however become too dry to be optimal conditions for black grouse.
D. Mallowdale	67	28	3	1	1	✓	✓	✓	The heather cover here is concentrated on Mallowdale Fell, with the adjoining grass moor providing sufficient breeding habitat. There is some woodland on the lower ground but there are opportunities for establishing woodland pockets along the river Roeburn and the connecting ghylls.
E. Brennand	39	47	9	1	4	✓	✓	✓	Heather and dwarf shrub are recovering well here as a result of significant grazing reductions. There has also been approximately 30ha of native woodland planted recently along the Brennand River which will provide a substantial area for feeding and cover.

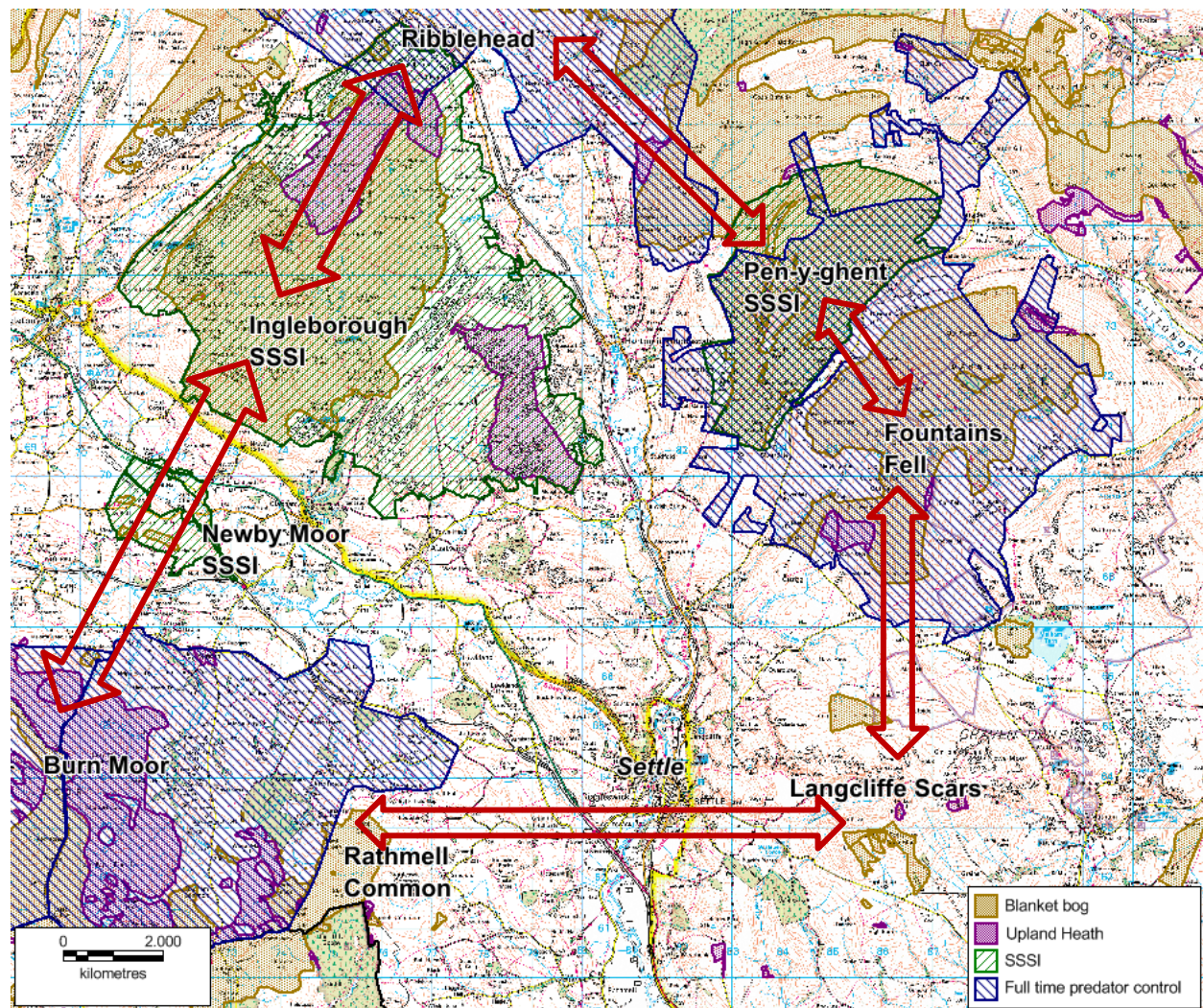
F. Whitendale	64	25	6	1	4	✓	✓	✓	Grazing reductions have improved conditions here and new native woodland planting along Whitendale River will provide a stretch of open woodland for feeding and cover in time. Felling the existing conifer blocks and replacing with more scrubby woodland favoured by black grouse would be beneficial.
G. Botton Head	37	35	16	10	2	✓	✓	✓	There is a good balance here of heath/blanket bog and grass moor here providing potential breeding and brood rearing habitats. This area is connected to historic leks sites to the north west at Thrushgill and the south east at White Syke Clough.
H. Lythe Fell	43	40	4	12	1	✓	✓	✓	Lythe Fell is part of a cluster of leks along the northern fringe of the Bowland Fells, concentrated around the edges of Burn Moor. The heather ground here is well managed but conditions could be enhanced through extensive management of the rough grazing and in-bye.
I. Red Mire	55	28	2	14	1	✓	✓	✓	This is the most northerly site identified as suitable for re-colonisation and potentially the most important as it is the closest to most feasible link through to the core population in the Yorkshire Dales. Conditions are currently suitable, but further enhancement particularly of the lower ground northwards would improve chances of connectivity to the north.
J. Keasden Head	61	6	1	27	5	✓	✓	✓	This is another important site on the northern tip of the Bowland Fells. The heather cover here is in good condition, and there is a sufficient amount of woodland on the low ground. There is only a small amount of rough grazing and white ground, with some of the in-bye quite intensively managed. Extensive management would help improve conditions here and possibly help attract hens dispersing out from the Yorkshire Dales
K. Clapham Common	69	21	5	4	1	✓	✓	✓	This site has a good balance of habitat components and is linked to historic leks sites to the south at Catlow Plantation. Birds were last seen using this area and Austwick Common in the XXXXs and current habitats have the potential to support a lekking group.
L. Austwick Common	58	23	3	8	8	✓	✓	✓	This is the most easterly of the identified sites with potential to support a lekking group. As with the areas at Red Mire, Keasden and Clapham Common, these areas on the northern fringe are most important for attracting hens that may be dispersing from the Yorkshire Dales.

In summary, through the assessment approach we have identified that the area could potentially support 16 individual lekking groups, with a further five qualifying if part-time predator control was increased to full-time, which can be achieved relatively quickly in comparison to restoring suitable habitat mosaics. This in theory, using a North of England average lek size of 5 males (Warren & Baines 2008), means that the Bowland Fells could support approximately 80 males, which with full-time predator control instigated on the other five sites would increase this to 105 males. This is a best case scenario, and still only gives potential for a relatively small population which would be limited by environmental stochastic events such as poor breeding seasons and severe winters. Therefore to ensure long term sustainability, a population of black grouse in the Bowland Fells needs to be connected to those in the neighbouring Yorkshire Dales. It is therefore important that habitat improvements continue with one of the main delivery mechanisms to achieve this being through the uptake of agri-environment schemes. It is important that agri-environment schemes incorporate the needs of black grouse, to continue to restore and maintain a mosaic of hill fringe habitats in these areas.

3. Connectivity with existing populations in the Yorkshire Dales

Black grouse in the Bowland Fells once formed part of a contiguous population with birds in the Yorkshire Dales and the North Pennines (Figure 2a). Two historic connection zones are evident, the first is from Ribbleshead, Ingleborough through Newby Moor to Burnmoor, and the second is from Ribbleshead, south through Pen-y-ghent to Langbar and then west to Rathmell Common (Figure 7). We assessed connectivity based on the extent of suitable connected habitat mosaics, the infrastructure of predator control operating and the distances between suitable habitats.

Figure 7. Potential habitat corridors to facilitate connectivity with the Yorkshire Dales



3.1 Ribbleshead, Ingleborough, Newby Moor to Burnmoor

Suitable pockets of blanket bog and upland heath habitat are present on the southern and eastern slopes of Ingleborough which are contiguous and have the potential to support black grouse lekking groups. The area is a designated SSSI and targeted agri-environment scheme agreements have delivered improvements in the condition of the moorland habitats here. A limiting factor here is the lack of predator control operating on Ingleborough, with no moorland gamekeepers employed.

Moorland habitats are not contiguous with the Bowland Fells, separated by a 5 km wide area in the valley floor dominated by improved grasslands. This in itself is not wide enough to be considered a barrier to black grouse dispersal, and the Newby Moor SSSI which is situated directly in the middle could act as an important stepping stone. This area of bog is considered too small and isolated to support a lekking group of black grouse, but it may act as a potential important stepping stone along the dispersal corridor if habitat conditions were improved here.

Management recommendations

To provide the required conditions in this area, the following are required:

- (a) Continue habitat improvements to encourage recovery and an increase in the extent of heather moorland on the south and eastern slopes of Ingleborough.
- (b) Initiate targeted predator control at the Ingleborough National Nature Reserve and on adjoining ground to increase breeding productivity and maintain survival rates of settling birds to facilitate re-colonisation. Lobby for mechanisms to incorporate funding for predator control in Higher Level Stewardship agri-environment schemes where black grouse are a target species.
- (c) Encourage and maintain extensive management of rough grazing and meadows where these lie adjacent to heather moorland.
- (d) Establish pockets of new native woodland within suitable ghylls.
- (e) Encourage the improvement of the Newby Moor SSSI through pro-active restorative management. Also encourage the implementation of more sensitive farming practices (through HLS) on directly adjacent ground (for instance hay meadow restoration and rough grazing) to enlarge area of favourable habitats around the SSSI.
- (f) Ensure the area is targeted for agri-environment schemes and the needs of black grouse are recognised within agri-environment targeting statements.

3.2 Ribbleshead, Penyghent, Langcliffe Scars to Rathmell Common

Suitable pockets of blanket bog and upland heath habitats are present on the slopes of Penyghent and the fringes of Fountains Fell, but then the habitats south of this through the Langcliffe Scars become severely isolated and fragmented (Figure 7). These remaining patches are too small to support birds, meaning that settlement opportunities are limited. Similarly, there is no infrastructure of predator control operating in this area. The Bowland Fells are separated by 10 km of unsuitable farmed habitats on the valley floor with no obvious large enough stepping stones. Despite this the Bowland Fells are within the dispersal distance of black grouse.

Management recommendations

To provide the required conditions in this area, the following are required:

- (a) Continue habitat improvements to encourage recovery and an increase in the extent of heather moorland in the Penyghent and Fountains Fell area.
- (b) Maintain targeted predator control at Penyghent and Fountains Fell and encourage the adjoining ground to do so to increase breeding productivity and maintain survival rates of settling birds to facilitate re-colonisation.
- (c) Encourage and maintain extensive management of rough grazing and meadows where these lie adjacent to heather moorland.
- (d) Establish pockets of new native woodland within suitable ghylls.
- (e) In the Langbar area ensure agri-environment schemes encourage the maintenance and restoration of dwarf shrub where possible.

4. Management required to re-establish black grouse in the Bowland Fells

Through this process we have identified that sufficient conditions are present to support a network of inter-connected lekking groups throughout the Bowland Fells. But, in isolation this would not be sufficient to support a self-sustaining population, unless connected to the main population in the Yorkshire Dales. To restore black grouse the following actions are required:

- Continue to target conservation resources in the Yorkshire Dales to increase breeding productivity and adult survival of existing lekking groups to provide recruits, whilst simultaneously providing a network of inter-connected habitats to promote range expansion.
- In tandem, continue the translocation programme to re-colonise former suitable habitats in the Yorkshire Dales.
- Restore suitable connected habitat mosaics and initiate targeted predator control through the Ingleborough corridor to link the Yorkshire Dales with the Bowland Fells
- Continue to restore, enhance and improve black grouse habitat mosaics in the Bowland Fells, particularly on the north eastern fringes, where natural re-colonisation is the most likely.

Restoring a network of inter-connecting lekking groups in the Bowland Fells

Black grouse are considered a 'flagship' species of high quality upland habitat mosaics due to their requirements of a mix of heather moorland, rough grazing, hay meadows and scrubby woodlands which are connected at a landscape scale. Therefore management for black grouse has wider benefits for a suite of moorland habitats and their associated species. Within the Bowland Fells, the priority area is the north eastern fringe, inclusive of Botton Head, Fourstones and Burnmoor (Figure 6) as here natural re-colonisation is most likely to occur due to its location relative to remaining populations. Here, the broad suites of moorland fringe habitats required are present with the infrastructure of predator control already in place (Table 3). It is important that resources are targeted to this area to continue to enhance habitats to attract females to settle and breed. This management can then be rolled out progressively towards the south west corner of the Bowland Fells.

Management recommendations

To provide the required conditions in the Bowland Fells the following are required:

- (a) Continue habitat improvements to attract dispersing females to settle and subsequently breed, particularly on the north eastern fringe as natural re-colonisation is considered most likely here due to its proximity to populations in the Yorkshire Dales.
- (b) Ensure that agri-environment schemes are targeted here and include the requirements of black grouse. It is particularly important that these continue to enhance moorland habitats, but also include moor fringe habitats, such as rough grazing and hay meadows which lie directly adjacent to heather moorland.

- (c) The clear felling of conifer plantations often provides opportunities to provide favourable black grouse conditions. These sites often provide opportunities to restore dwarf heath communities and to provide more open scrubby woodlands favoured by black grouse. Thrushgill and High Grains plantations are two priority sites. It is though not considered cost effective to try to recreate past conditions favoured by black grouse within Gisburn Forest, ie returning it back to primarily open heath habitats with some woodland.
- (d) Ensure that predator control is operating to enable any settling females to maximise breeding productivity and survival rates to promote re-colonisation.
- (e) Continue to establish pockets of new native woodland within suitable ghylls to provide winter feeding opportunities.

Restoring black grouse to the Bowland Fells needs to be considered as a longer term objective, as it is currently dependent upon the speed and extent of range expansion to the north and the restoration of connecting habitat links. Direct translocation or re-introduction can be effectively ruled out until these links are restored. As and when conditions in the connecting zone are improved, it is important that records are kept of any incursions by black grouse in the Bowland Fells. If females are being regularly seen in the absence of males, it may then be appropriate to consider a programme of wild male translocation to help re-establish birds here. We are currently refining the techniques of translocation but the over-riding limiting factor is the dependency of the technique on the availability of surplus wild males from the core population. This is largely determined by stochastic factors including weather induced poor breeding seasons, or high winter mortality.

Re-introduction may also be considered in the future, but it is important to note that previous black grouse re-introduction projects in northern Europe have failed due to a combination of factors, which include low survival rates of captive bred birds due to poor quality habitats and high predation rates and insufficient size and scale of habitats at the release sites to allow natural dispersal processes. Therefore before considering this approach all limiting factors identified within this report would need to have been fully addressed.

5. Conclusion

There have been significant landscape scale habitat improvements initiated throughout the Bowland Fells in the past 20 years, with potentially sufficient habitat mosaics to support a network of 21 lekking groups which could theoretically support 105 males. Black grouse in the Bowland Fells up until the early 1990s were part of a contiguous north of England population and restoring the connectivity with the core north of England population is key to any future conservation programme. The Bowland Fells were identified as a potential area for future range expansion through the 'Strategic Approach to Black Grouse' conservation document as suitable habitats were present with an infrastructure of predator control operating. However, this was not considered a priority in the short term due to the relative isolation from the core North Pennines population to deliver the EBAP targets by 2030 of expanding range. Exciting progress is made in expanding the range of black grouse in the Yorkshire Dales and this is being done on a step by step basis. The English BAP group will continue to annually review progress on delivering range expansion objectives, and if range continues to expand southwards, restoring black grouse to Bowland will move up the agenda and this report will provide an important document to guide further range expansion efforts.

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