

GAME & WILDLIFE CONSERVATION TRUST

A Strategic Approach to Delivering Black Grouse Biodiversity Action Plan Targets in Northern England

Prepared on behalf of the English Black Grouse Biodiversity Action Plan Steering Group
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EXECUTIVE SUMMARY

This document was drafted by the Game & Wildlife Conservation Trust on behalf of the English Black Grouse Biodiversity Action Plan (EBAP) group* to facilitate the delivery of the EBAP targets to increase numbers to 2000 males and range to 61 occupied 10 km grid squares by 2030.

Following EBAP Steering Group meetings on the 11th February and the 22nd April 2010 to discuss this document, and with the RSPB on the 6th and 7th April 2011 it was agreed that to deliver the EBAP targets in northern England by 2030 the following priority actions were required:

- 1(a) Increase breeding productivity and over-winter survival of black grouse in the North Pennines, through habitat enhancements on the moor fringe initiated through agri-environment schemes, in combination with further research to quantify desired management prescriptions such as the establishment of willow scrub and cattle grazing to increase the availability of chick food.
- 1(b) Promote range expansion in the Yorkshire Dales, through continuing habitat enhancements through agri-environment schemes on the fringes of heather moorland with full-time gamekeepers operating, in conjunction with the translocation of males to establish leks.
- 2(a) Evaluate feasibility of establishing functional habitat links between black grouse in the North Pennines, North West Northumberland and southern Scotland.
- 2(b) Instigate immediate conservation measures to safeguard remaining black grouse in North West Northumberland.

***English Biodiversity Action Plan partners**

Game & Wildlife Conservation Trust

RSPB

Ministry of Defence

Natural England

Northumberland National Park Authority

Yorkshire Dales National Park Authority

Moorland Association

Moorland Gamekeepers Organisation

North Pennines Area of Outstanding Natural Beauty Partnership

Forestry Commission

CONTENTS

	page
1. INTRODUCTION	1
1.1 Distribution and abundance	2
1.2 Current demographic problems	4
1.3 English Biodiversity Action Plan targets	4
1.3.1 <i>Original targets</i>	4
1.3.2 <i>Progress on targets</i>	4
1.3.3 <i>Revised targets</i>	5
1.4 Definition of Terms	5
2. DELIVERING THE EBAP TARGETS	6
2.1 Increasing breeding productivity	6
2.1.1 <i>Increasing the availability of chick food</i>	7
2.1.2 <i>Reducing clutch predation</i>	7
2.2 Maintain high adult survival rates	8
2.2.1 <i>Providing pockets of native woodland</i>	8
2.2.2 <i>Supplementary feeding trials and wild bird cover crops</i>	9
2.3 Providing suitable conditions to promote range expansion	9
2.3.1 <i>Habitat</i>	9
2.3.2 <i>Population connectivity</i>	11
2.3.3 <i>Infrastructure of predator control</i>	11
2.3.4 <i>Availability of suitable conditions in northern England</i>	12
2.4 Translocation	13
2.5 Research and development priorities	14
3. STRATEGIC APPROACH TO DELIVERING EBAP TARGETS	15
3.1 Key areas for black grouse conservation in northern England	15
3.1.1 <i>North Pennines</i>	18
3.1.2 <i>Yorkshire Dales</i>	19
3.1.3 <i>North-West Northumberland (including the Cheviots and Border Moors and Forest areas)</i>	20
4. NEXT STEPS	21
5. SUMMARY	21
6. REFERENCES	23

1. INTRODUCTION

Black grouse *Tetrao tetrix* in the United Kingdom have declined in numbers and range over the past 200 years, with this decline accelerating over the past 50 years (Baines & Hudson 1995, Hancock *et al.* 1999, Sim *et al.* 2008). At the beginning of the 20th Century, black grouse were widespread throughout southern England (Gladstone 1924), but have since contracted northwards, restricted now to the northern Pennine hills following their extinction from the Peak District in the 1990's (Warren & Baines 2008). The reasons for the decline are well documented (Cramp & Simmons 1980, Baines 1994, Baines 1996) and in northern England are linked with either the direct loss of moorland fringe habitat mosaics, or their degradation and fragmentation (Baines 1994, Beeston *et al.* 2005, Starling-Westerberg 2001) through agricultural intensification (Fuller & Gough 1999).

Black grouse have since been recognized as a 'Red List' species (Gregory *et al.* 2002), a species of principle importance for biodiversity conservation on section 41 of the Natural Environment and Rural Communities Act 2006 and as a UK Government Biodiversity Action Plan (BAP) 'Priority Species' with its own Species Action Plan (www.ukbap.org.uk). Significant progress has been made towards delivering the Species Action Plan objectives, co-ordinated through the work of the North Pennines Black Grouse Recovery Project as reported in Warren & Baines (2004). Numbers have recovered from 773 males in 1998 to 1029 in 2006 (Warren & Baines 2008) and range has simultaneously increased from 38 to 43 occupied 10 km grid squares. Numbers peaked in spring 2007 at an estimated 1200, but since then two consecutive poor breeding years, followed by the harshest winter for thirty years have reduced the population to an estimated 495 males in 2010.

Black grouse in northern England remain severely threatened due to their small population size and contracted range. A recent genetic study showed that in northern England, black grouse have lost genetic variability relative to populations in Scotland and now form a demographically independent unit isolated from other populations in northern Scotland and Wales (Hoglund *et al.* in prep.). We think that the situation could be much worse and that the northern England population may now be fragmented into two discrete sub-populations; North-West Northumberland, and the North Pennines and Yorkshire Dales. Given the huge decreases in population size (Sim *et al.* 2008) and probably also range in southern Scotland it is highly unlikely that cross-border connectivity can readily be restored. Similarly, given the excessive distance to the population in North Wales, the English population is practically and effectively closed and isolated.

Conservation of black grouse in northern England is dependent on maintaining, and even restoring an inter-connected population which is large enough to withstand environmental stochastic events, and to maintain genetic variability and gene flow. The English Biodiversity Action Plan (EBAP) intends increasing numbers to 2000 males and range to a minimum 61 occupied 10 km grid squares by 2030. In this paper we outline a strategic approach that could deliver these objectives.

1.1 Distribution and abundance

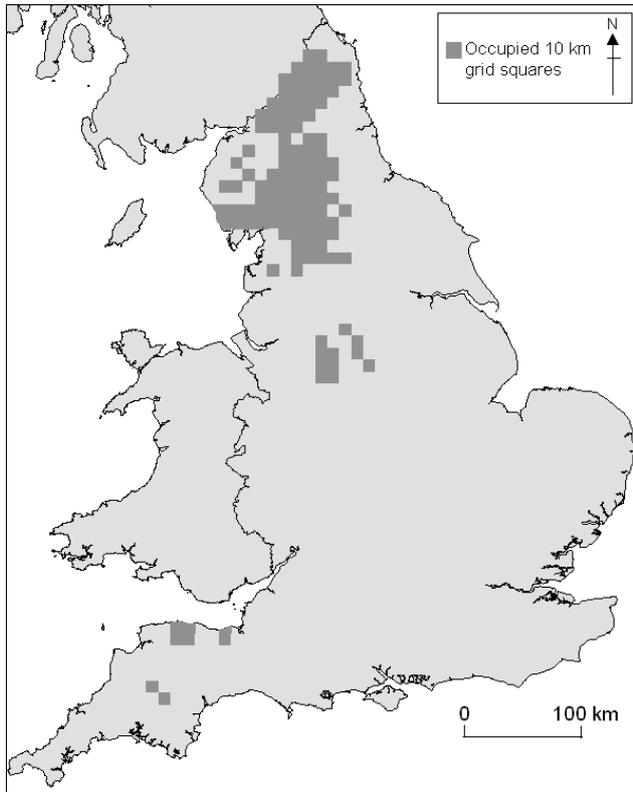
Black grouse distribution (occupied 10 km grid squares) in England were quantified through bird atlas surveys in 1968-72 (Sharrock 1976) and 1988-91 (Gibbons *et al.* 1993); and by the North Pennines Black Grouse Recovery Project in 1998, 2002 and 2006 (Warren & Baines 2008). Range contracted by 68% between 1968-72 and 1998 (Figure 1) from 119 to 38 occupied 10 km grid squares, with the loss of black grouse from Exmoor, Dartmoor, the Peak District, the Bowland Fells, southern Pennines and the Lake District with the remaining distribution concentrated within the northern Pennines. The distribution in 1968-72 clearly demonstrates the connectivity within the population which was present in northern England, connected from the Cheviots to the southern Pennines and west through the southern Lakeland Fells. By 1988-91 fragmentation and isolation of populations was clearly evident and by 1998 had broken down into two distinct groups, the contiguous Yorkshire Dales and North Pennines population and the North-West Northumberland population to the north.

Numbers recovered between 1998 and 2006, increasing from 773 to 1029 males (Table 1), but have declined in numbers to an estimated 495 in spring 2010, with less than 15 remaining in North-West Northumberland (Table 1). Further range contraction has occurred in North-West Northumberland, contracting from seven to five occupied 10 km grid squares between 1998 and 2009. In contrast to the contiguous North Pennines and Yorkshire Dales population where range has consolidated and expanded, increasing from 31 to 37 occupied 10 km grid squares over the same period.

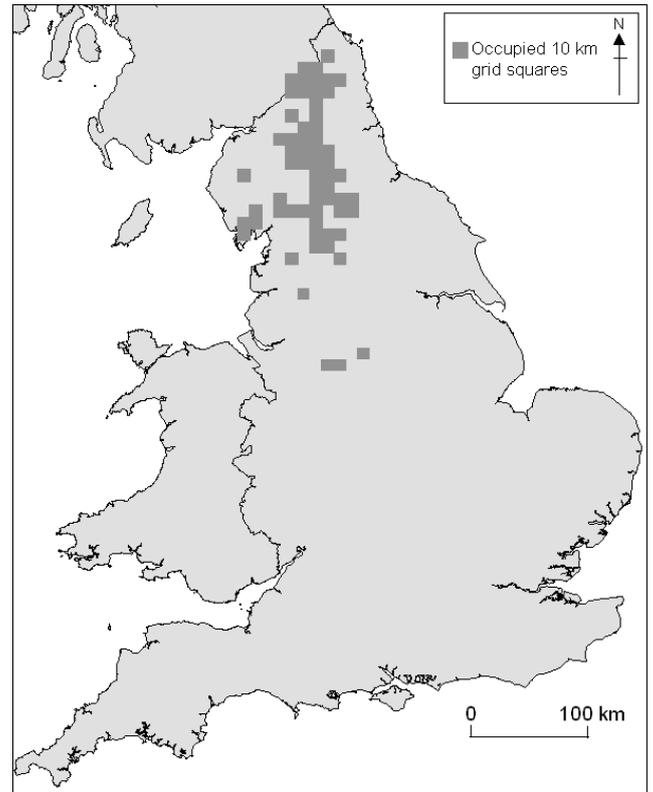
Table 1. Black grouse males attending leks in northern England at sample sites surveyed annually by the North Pennines Black Grouse Recovery Project and in complete national surveys in 1998, 2002 and 2006. Estimated population size (*Values in italics) are from 2007 onwards extrapolated from the 2006 survey.**

Region	Surveys	1998	2002	2006	2007	2008	2009	2010
North- West	Sample	52	68	31	30	15	12	10
Northumberland	Full	61	101	50	<i>48*</i>	<i>24*</i>	<i>19*</i>	<i>16*</i>
North Pennines	Sample	377	408	424	494	407	298	196
	Full	654	690	841	<i>988*</i>	<i>814*</i>	<i>596*</i>	389
Yorkshire Dales	Full	58	103	138	171	164	119	90
Total		773	894	1029	<i>1207*</i>	<i>1002*</i>	<i>734*</i>	<i>495*</i>

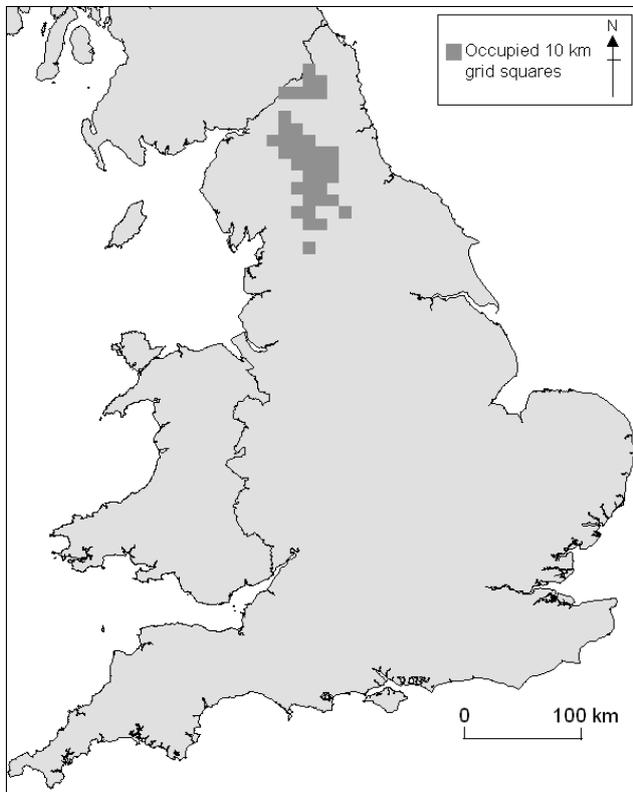
Figure 1. Changes in the distribution of black grouse in northern England from the 1968-72, 1988-91, 1998 and 2009 surveys



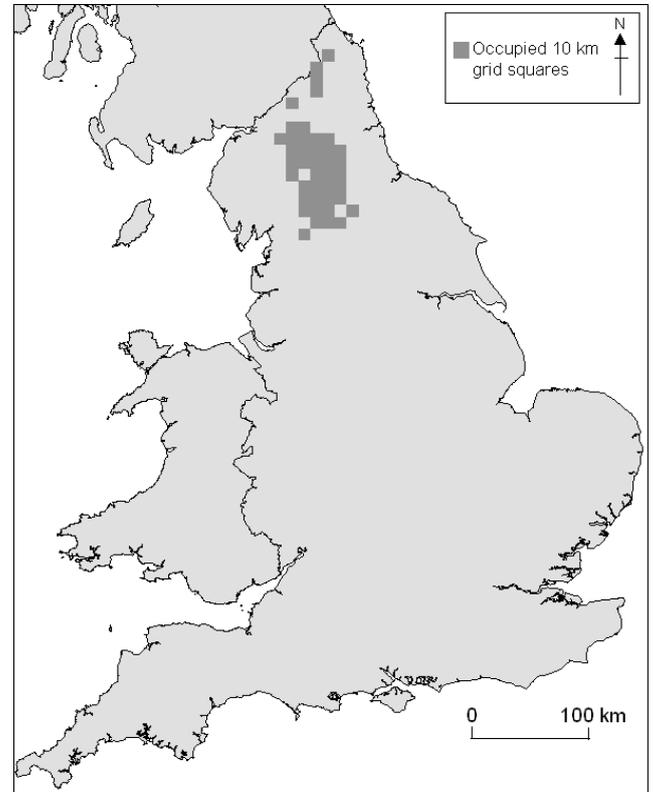
a) 1968-72



b) 1988-91



c) 1998



d) 2009

1.2 Current demographic problems

In northern England, radio telemetry studies have shown that black grouse have high rates of adult survival (70%) (Baines *et al.* 2007), which is the highest recorded by any studies on black grouse in Europe (Warren & Baines 2002). Conversely, they breed less well than in other regions of the UK with only 1.3 chicks per hen, compared to 1.7 in Wales and the Scottish Highlands (Baines *et al.* 2007). Poor breeding is linked to high rainfall when chicks hatch in June, poor quality habitat with relatively few preferred chick insect foods, and predation, probably by stoats and weasels (Baines *et al.* 2007).

1.3 English Biodiversity Action Plan targets

1.3.1 Original targets

The original targets set in 1999 (UK Biodiversity Group 1999) were to:

- T1: Maintain the population of black grouse, at least at its 1996 level, relative to the lower 95% confidence interval estimate of 800 males recorded in 1996 (Hancock et al. 1999),*
- T2: Restore the range of black grouse to its 1988-91 extent (Gibbons et al. 1993) of 61 occupied 10 km grid squares by 2008-11 as measured by BTO surveys,*
- T3: In the long term (20 years), increase the range of black grouse,*
- T4: In the long term (20 years), increase the population of black grouse,*
- T5: Promote re-colonisation of formerly occupied areas between currently isolated populations by 2005.*

1.3.2 Progress on targets

National surveys in spring 2002 revealed that numbers had increased from 773 males in 1998 to 895, achieving the primary target (T1) of maintaining the population, with some progress made to increasing the population (T4). No progress was made towards increasing range (T2) and (T3), or promoting re-colonisation of formerly occupied areas (T5).

Repeat surveys in 2006 demonstrated that the population had continued to increase, with the English population numbering 1029 males exceeding the T1 target of maintaining numbers, while making some progress towards the range expansion targets (T2 & T3), with occupied range increasing from 38 to 43 occupied 10 km grid squares over the same timeframe.

1.3.3 Revised targets (2006)

Following the progress made, the English targets were revised in 2006 to increase numbers to 2000 males and range to 61 occupied 10 km grid squares by 2030 (Table 2).

Table 2. English Biodiversity Action Plan targets following revision in 2006 (2005 data represents the baseline).

Targets	2005	2010	2015	2020	2030
T1: Increase the population of black grouse to 2000 lekking males by 2030	895	1000	1200	1500	2000
T2: Restore the range of black grouse to 61 occupied 10 km grid squares by 2030	43	48	52	56	61

1.4 Definition of Terms

“Translocation”: deliberate and mediated movement of wild individuals or populations from one part of the range to another.

“Supplementation/ Re-inforcement”: addition of individuals to an existing population of conspecifics.

“Re-introduction”: an attempt to establish a species in an area which was once part of its historical range, but from which it has been extirpated or become extinct.

2. DELIVERING THE EBAP TARGETS

To deliver the EBAP targets to increase numbers to 2000 males and range to 61 occupied 10 km grid squares by 2030, there are five limiting steps that need to be considered:

- (1) Low breeding productivity in the core of the range limiting recruits,
- (2) Low dispersive potential by sedentary males to achieve range expansion,
- (3) Habitat suitability at the edge of the current range should (1) and (2) be overcome.
- (4) Remnant populations in North-West Northumberland are now considered to be too small to be viable and local extinctions may/ will occur without intervention.
- (5) Population status is maintained by high rates of adult survival, susceptible to high losses in severe winters with prolonged snow cover.

To therefore deliver the objectives we need to:

- (1) Increase the breeding productivity of the current population to provide recruits for re-colonisation. This is a well documented problem that has never been adequately resolved.
- (2) Maintain high rates of adult survival, through increasing the provision of small pockets of native broad- leaved woodland cover as an emergency food source and assessing whether the provision of wild bird cover crops or supplementary food is beneficial.
- (3) Provide the desired infrastructure of inter-connected habitats to re-connect existing but fragmented populations in northern England and southern Scotland and facilitate colonisation of new or former areas.
- (4) Given the time limited targets and the low potential for re- colonisation based on the sedentary nature of yearling males, we probably need to strongly consider a process of male translocation to habitats pioneered by yearling hens out with the range of males.
- (5) Consider supplementation into areas where populations are now considered too small to be viable without intervention

2.1 Increasing breeding productivity

Black grouse in northern England typically nest and rear their chicks in rough grassland habitats on the margins of grouse moors (Baines 1994, Warren & Baines 2004). Here, despite gamekeepers controlling predators, a third of clutches are predated, mainly by stoats (Baines *et al.* 2007). Low hatching success is further compromised by high chick mortality in wet Junes. This in itself is probably not helped by highly grazed habitats supporting few insect chick foods (Baines *et al.* 1996). Improving breeding habitats by reducing sheep grazing temporarily improved breeding success (Calladine *et al.* 2002), but over the longer term the development of rank grass reduced the initial benefit.

Increasing breeding success alone from the current average of 1.3 chicks per hen to 1.7 chicks per hen (value for Scotland and North Wales) would increase population size by 11% per annum culminating in a predicted 50% increase in four years, meeting the EBAP target of 2000 males within eight years. In comparison to taking thirty years if breeding productivity remains at its current level of 1.3 chicks per hen.

2.1.1 Increasing the availability of chick food

Sawfly larvae form two thirds of chick diet and are twice as abundant in fields grazed by cattle than sheep only (Warren *et al.* in prep.). Here black grouse bred three-fold better. We wish to further test this hypothesis by conducting field trials using cattle in an experimental manner. Similarly, eared willow (*Salix aurita*) scrub in many parts of Scotland supports many moth caterpillars and is extensively used by breeding black grouse (Baines *et al.* 1996). However it is largely absent from moorland fringes in northern England, probably through over grazing by sheep. We also wish to quantify whether restoring areas of willow scrub improves brood foraging conditions, by providing more chick food.

Required mechanisms

- Further research to establish the effects of (i) cattle grazing and (ii) provision of eared willow scrub on insect abundance.

Timescales and approximate costs

- Three year research project to establish the effects of cattle grazing (60k).
- Five year research project to establish effects of willow scrub (50k)
- The adoption of both prescriptions at a meaningful landscape scale, for example establishing at each lek (n=155) 20 ha of rough grazing habitats grazed by cattle and 2 ha of willow scrub on the grass moor would take approximately 10 years and assuming an annual management payment of £80 ha (HLS- rough grazing for birds) would cost £273k per annum.

Contribution to EBAP Targets

- A ten year lag time is predicted, whilst prescriptions are developed and adopted at a meaningful landscape scale. If this increased current average breeding productivity from 1.3 to 1.7 chicks per hen then the population would double within eight years, this achieving the EBAP targets of 2000 males by 2028, two years early.

2.1.2 Reducing clutch predation

Increasing hatching success by better control of clutch predators, such as stoats specifically on the moorland fringe would also improve breeding success and hence contribute to delivery of the EBAP targets. Review current and potential predator control activity on a site by site basis, to a) maximise efficacy and b) optimise resource allocation.

Required mechanisms

- Following predator control review, target additional required predator control effort to black grouse breeding habitats on the moorland fringe where low hatching success can be ascribed to high levels of nest predation.

Timescales and approximate costs

- Example: Employing one additional predator controller between March and September would cost approximately 30k per annum (pro-rata).

Contribution to EBAP Targets

- We predict that if clutch loss rates were reduced by two thirds, this would increase breeding productivity to 1.7 chicks per hen. Population would double within eight years delivering the EBAP targets by 2018, 12 years ahead of schedule.

2.2 Maintain high adult survival rates

Black grouse in northern England have high adult survival rates (Baines *et al.* 2007), which are important to maintain population stability and growth. High mortality is associated with harsh winters when food sources were covered by snow. Black grouse cope with prolonged snow cover throughout their European range, foraging on the buds of trees such as birch, hawthorns and willows. In northern England such deciduous tree cover is limited with only 46% of leks having woodland within a 1.5km radius (see section 2.3.1), comprising on average only 2% of available habitat. In average winter conditions the availability of these food sources do not appear limiting, but in severe winters with prolonged snow cover the lack of deciduous woodland as an emergency food source, cover and shelter is a significant limiting factor.

2.2.1 Providing pockets of native woodland

Required mechanisms

- Provide pockets of native broadleaved woodlands at all leks in northern England.

Timescales and approximate costs

- Establishment of five hectares of broadleaved woodland at each lek (n=155) would take approximately five years and assuming establishment costs of an annual management payment of £200 ha (HLS- Creation of woodland in the LFA) would cost £155 k per annum. Needs to be implemented urgently as new planting will take time to reach a suitable age for black grouse.

Contribution to EBAP Targets

This prescription can be adopted almost immediately at a meaningful landscape scale.

2.2.2 Supplementary feeding trials and wild bird cover crops

Small arable fields were once common in upland Britain, with most farms growing turnips or oats to provide additional winter food for their animals. Historic reports suggest that these crops were frequently used by black grouse during the winter months

Required mechanisms

- Encourage the establishment of pockets of wild bird cover to provide an additional winter food source for black grouse and other species such as twite.
- Develop an emergency winter feeding trial to assess whether the provision of supplementary food can support leks during severe winter conditions

Timescales and approximate costs

- The provision of wild bird cover at a meaningful landscape scale, for example establishing at half of all leks (n=155) 1 ha of wild bird cover assuming an annual management payment of £475 per ha (HLS- Enhanced wild bird seed mix plots) would cost £36.8k per annum.
- Two years to instigate emergency winter feeding trial to be included as a capital payment within HLS agreements and appoint an initiator mechanism.

Contribution to EBAP Targets

Potential benefits need to be proven, before contribution to BAP targets can be assessed.

2.3 Providing suitable conditions to promote range expansion

Whilst undertaking measures to improve breeding success and maintain high adult survival rates within the core of the range, it will also be necessary to provide suitable conditions on the edge of the range in anticipation of range expansion. To identify suitable areas, we have summarised the key needs of black grouse in terms of a suitable habitat mosaic, sufficient connected habitat, existing predator control by moorland gamekeepers and connectivity with existing leks in northern England.

2.3.1 Habitat

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 this area of 300 – 500 ha.

The composition of habitat mosaics within a 1.5 km radius of all known leks (defined here as ≥ 2 males) from the 2006 survey were assessed using MapInfo Professional Version 8.0. Data on the cover of upland heath, blanket bog and hay meadows were downloaded from Natural England's Nature on the Map (www.natureonthemap.org.uk) with grass moor, rough grazing and woodlands identified using aerial photographs (www.multimap.co.uk). Habitat

components were categorised into: upland heath and blanket bog; grass moor (unenclosed); rough grazing allotments; improved or ‘in-bye’ fields (enclosed pastures or meadows); native woodland and mature conifer plantations.

All but one lek in northern England was associated with upland heath and blanket bog (Figure 2), which comprised an average 41% of habitats within a 1.5 km radius (Table 3). Grass moor and rough grazing were also important present at 92% and 83% of leks respectively, comprising 28% and 17% of the habitat. 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.

Figure 2. The distribution of black grouse leks (n=155) in 2006 in relation to the distribution of blanket bog and upland heath vegetation in northern England

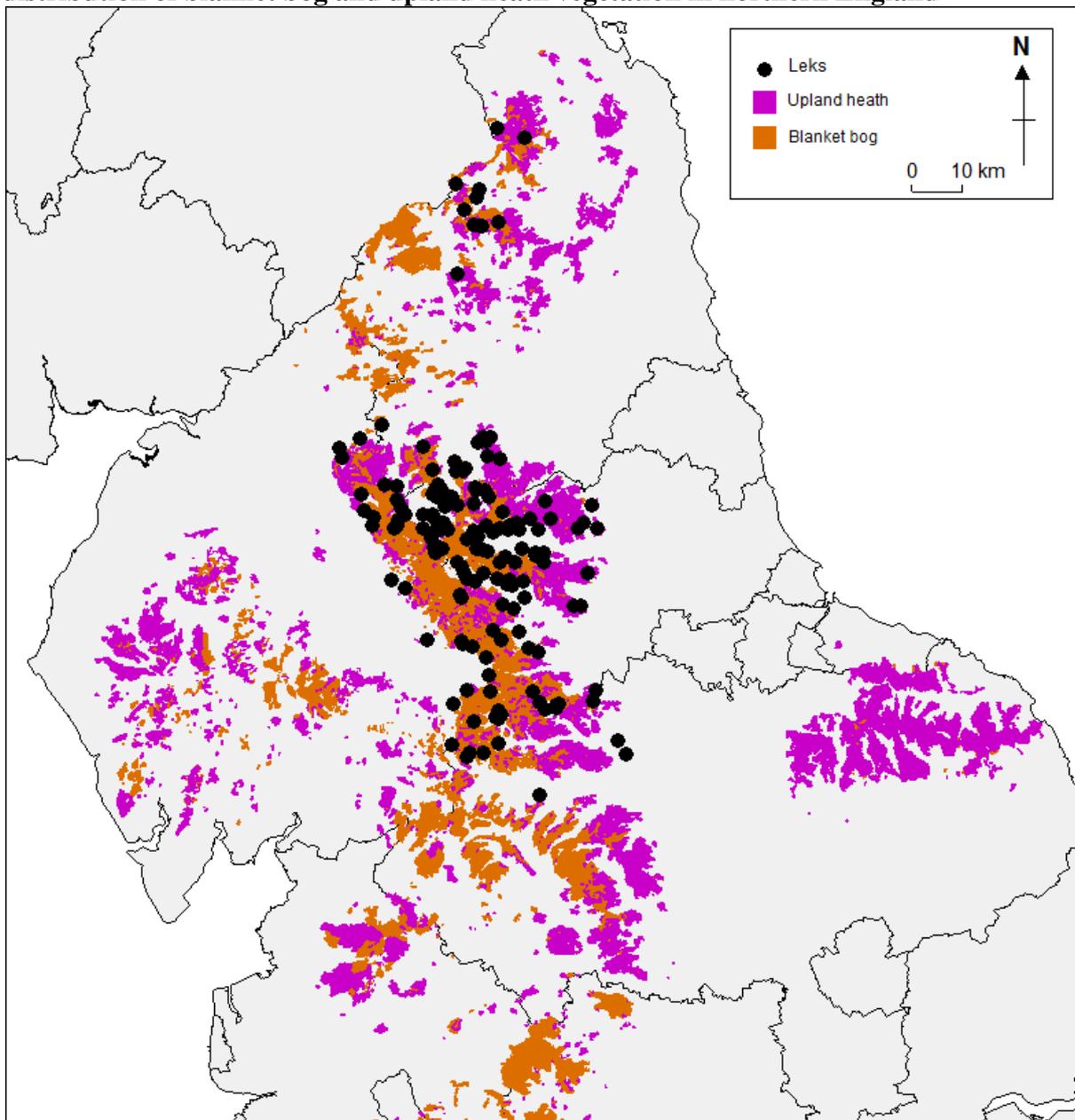


Table 3. Habitat composition within a 1.5 km radius of 155 leks (≥ 2 males) in northern England

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

2.3.2 *Population connectivity*

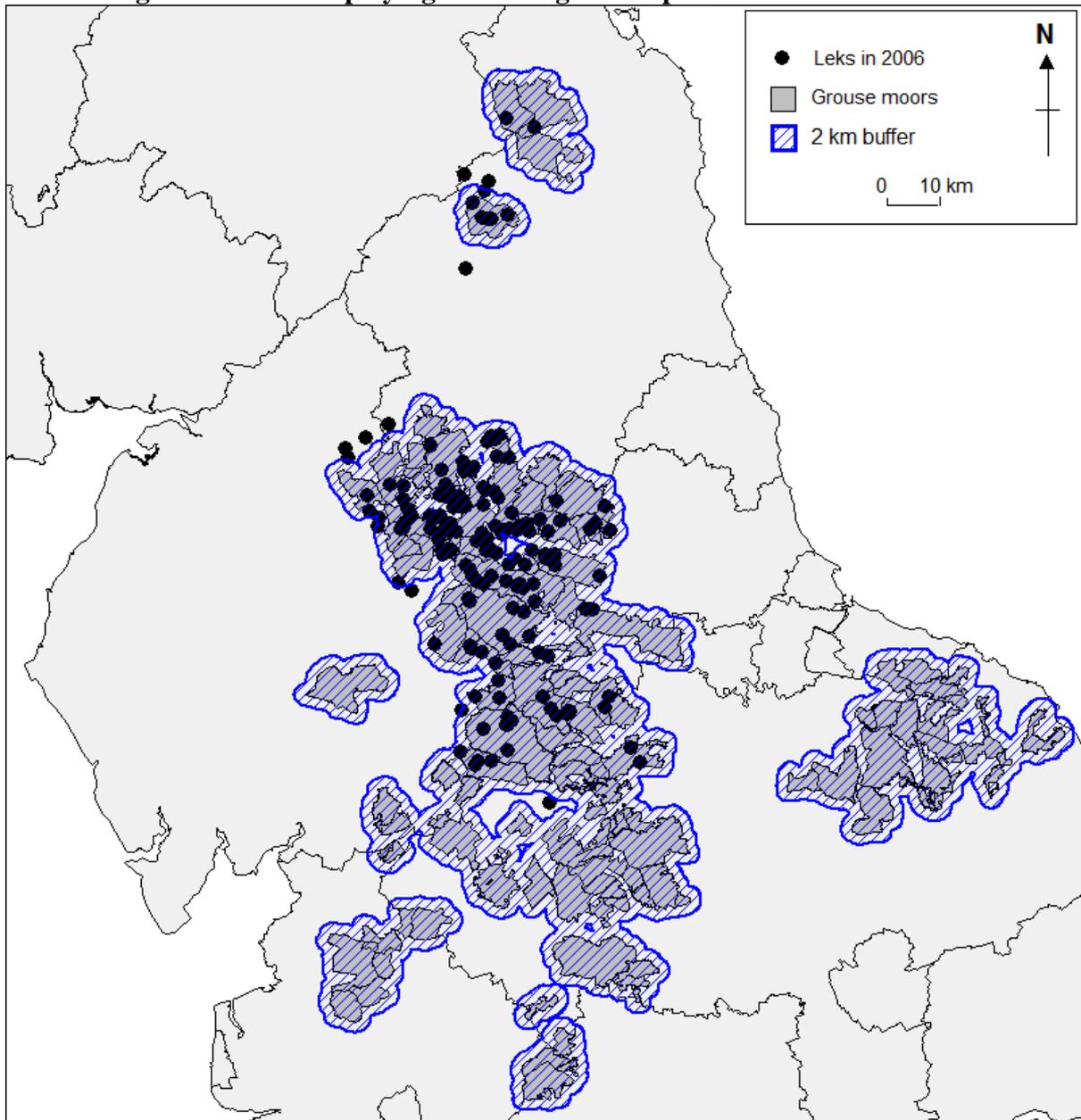
Most young females disperse from their natal areas, with a mean distance of 9.3 km (Warren & Baines 2002), whereas males and adult females hardly move at all. This implies that a group of birds centred on a lek, may only be viable in the long term if they are within the dispersal range of young females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

2.3.3 *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.* in press). Indeed, 95% of leks are found on the fringes of grouse moors (Warren & Baines 2004). Given this strong association between black grouse and grouse moors, we have mapped the extent of grouse moors, both that currently support leks and those which currently have no leks but probably supported leks historically (Figure 3).

Keeped grouse moors in the North Pennines almost all supported black grouse, but those moors in North York Moors, Forest of Bowland, Peak District and the southern part of the Yorkshire Dales currently have none. In this latter group of moors, the loss and fragmentation of grass moor and rough grazing habitats adjoining the heather moorland probably explains their absence. Since the early 1990's many of these habitats have been restored through agri-environment schemes and could feasibly now support black grouse, but remain isolated from potential recruits, particularly males.

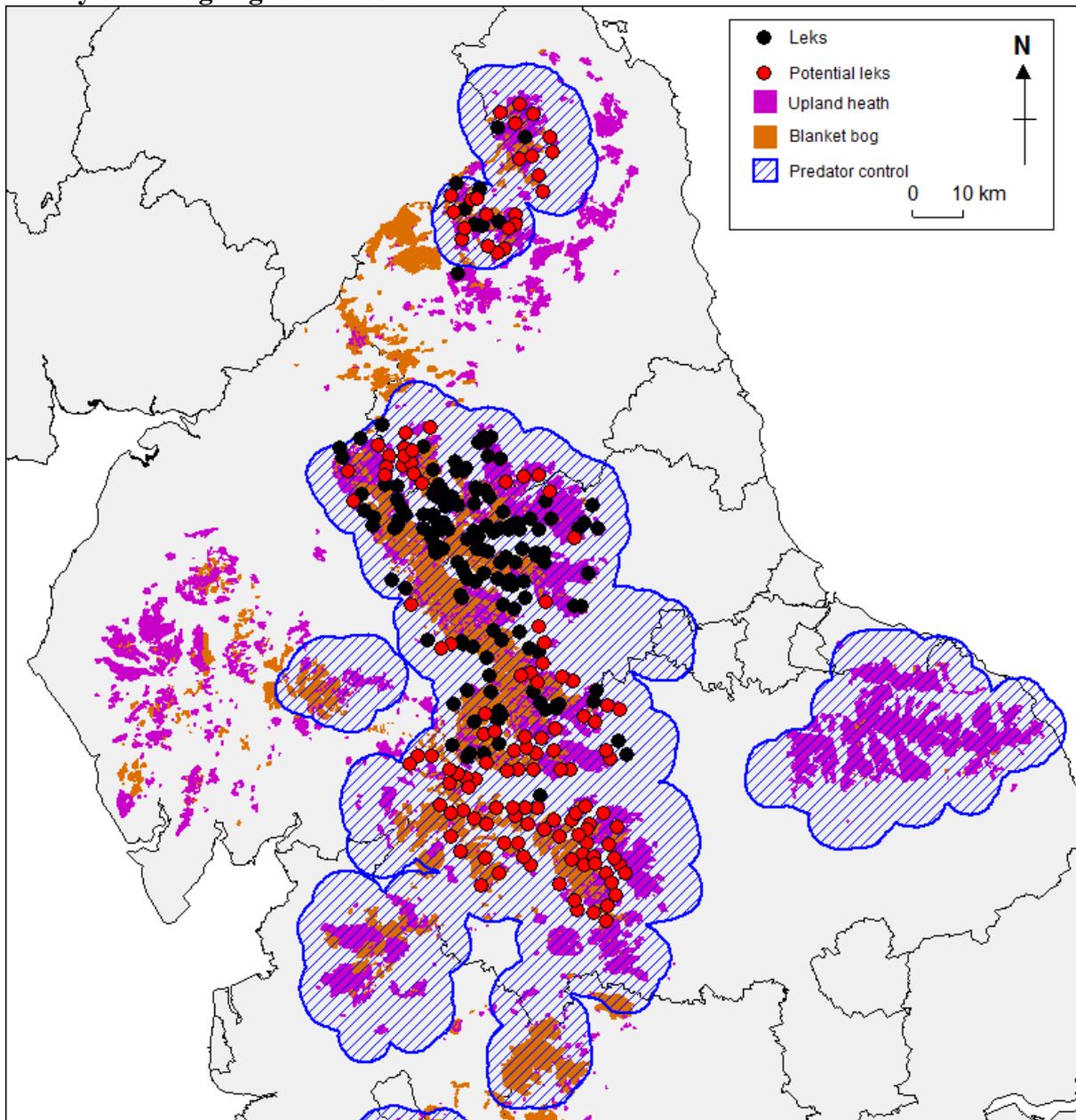
Figure 3. The distribution of black grouse leks (n=155) in northern England in 2006 in relation to grouse moors employing full-time gamekeepers



2.3.4 Availability of suitable conditions in northern England

The potential areas that could now support leks that have suitable habitat, gamekeepers to control predators and could have population connectivity restored were identified and mapped (Figure 4). Note we consider the North York Moors, Peak District, Forest of Bowland and Southern Pennines too isolated from the existing population to stand a reasonable chance of natural re-colonisation.

Figure 4. Map illustrating the extent of heather moorland and blanket bog in northern England in relation to current and future potential black grouse leks on or within the vicinity of managed grouse moors



2.4 Translocation

Female black grouse disperse on average 9.3 km (Warren & Baines 2002), but can move up to 30 km. Male dispersal is however more limited and averages only 0.8 km. This suggests that yearling females may re-colonise areas beyond the fringe of the male range and find no males present. To stimulate range expansion, a trial was instigated in 2006 to establish new leks beyond the fringe of the male population range by moving males to attract dispersing females (McEwen *et al.* 2009). Results have been encouraging with males displaying to females, which have subsequently bred successfully. To establish further leks on the edge of the range we recommend that further birds are translocated into the Yorkshire Dales. Captive bred birds or birds from other UK regions may need to be considered if insufficient surpluses of birds from within the core of the range are available.

2.5 Research and development priorities

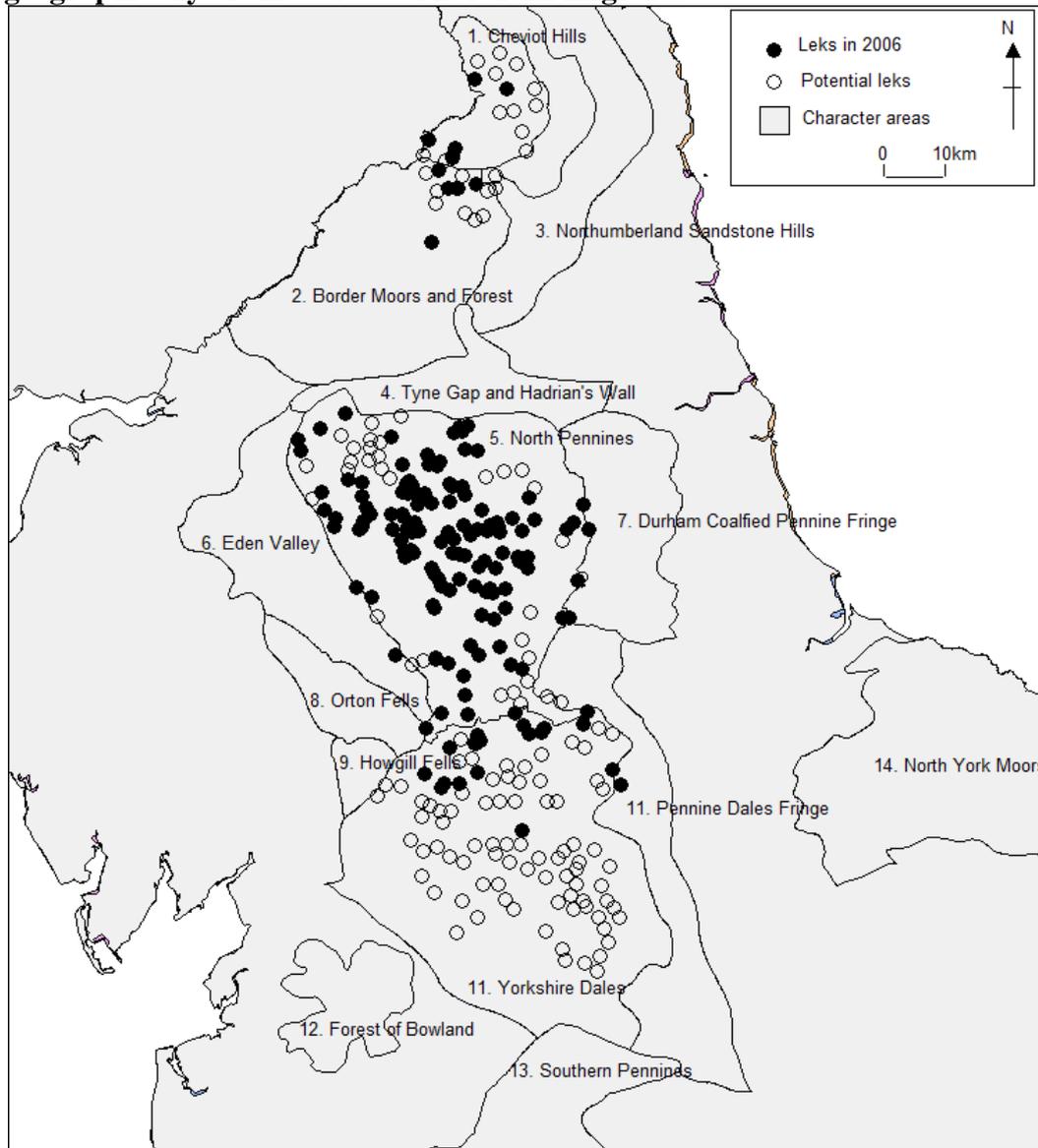
- (1) Can habitat improvements compensate for poor weather at and around hatch time
- (2) What is the optimum breeding habitat and at what spatial scale
- (3) How do we increase key insect foods
- (4) Can improved stoat control as part of sustained management on moorland fringes reduce clutch losses?
- (5) Do parasites influence breeding success through maternal nutrition?
- (6) Can the provision of supplementary food improve survival and breeding productivity
- (7) Assess effectiveness of existing upland planting for black grouse in the North Pennines. Has planting created the desired habitat and is it being used by black grouse?
- (8) Conduct a feasibility study into the establishment of a bona fide captive breeding programme based on wild stock as a future tool to be used to restore and support populations without damaging wild populations.

3. STRATEGIC APPROACH TO DELIVERING EBAP TARGETS

3.1 Key areas for black grouse conservation in northern England

To deliver the EBAP targets of increasing numbers and expanding range, we evaluated the current occupation of suitable habitats, recent trends and the potential for expansion (Table 4) within fourteen geographically distinct areas of northern England (Figure 5).

Figure 5. The distribution of 155 black grouse leks (≥ 2 males) in 2006 and the potential for further leks (habitat suitable, predator control and connectivity) in 14 geographically distinct areas of northern England.



The key areas for black grouse conservation in northern England are the North Pennines and the Yorkshire Dales as here the infrastructure of habitat mosaics and predator control are generally in place, and are connected at the landscape scale (Table 4). Similar suitable conditions also persist in parts of North-West Northumberland (includes the Cheviots and Border Moors and Forest areas), but landscape scale connectivity with the North Pennines

population has clearly broken down (Figure 4), with the distance between the two sub-populations now greater than known dispersal potential.

Parts of the Forest of Bowland, Southern Pennines, North York Moors and the Peak District, all have kept grouse moors and habitat networks, but these are all isolated from the existing population by 15 km, 41 km, 36 km and 72 km respectively. Accordingly, these are therefore not considered as the short term priority for delivering the EBAP targets by 2030 as restoring black grouse in these localities would result only in establishing further isolated populations. This we consider as less preferable to expanding existing continuous range of the UK metapopulation and enhancing its long term population viability.

Similarly, to meet short term EBAP targets we have not considered areas where habitat conditions are not considered suitable, these being the Northumberland Sandstone Hills, Tyne Gap and Hadrian's Wall, Eden Valley, Durham Coalfield Pennine Fringe, Orton Fells, Howgill Fells and the Pennine Dales Fringe.

The mechanisms required to deliver the EBAP targets are discussed in further detail for the following key areas, North Pennines, Yorkshire Dales and North-West Northumberland (Cheviot Hills and Border Moors and Forest combined).

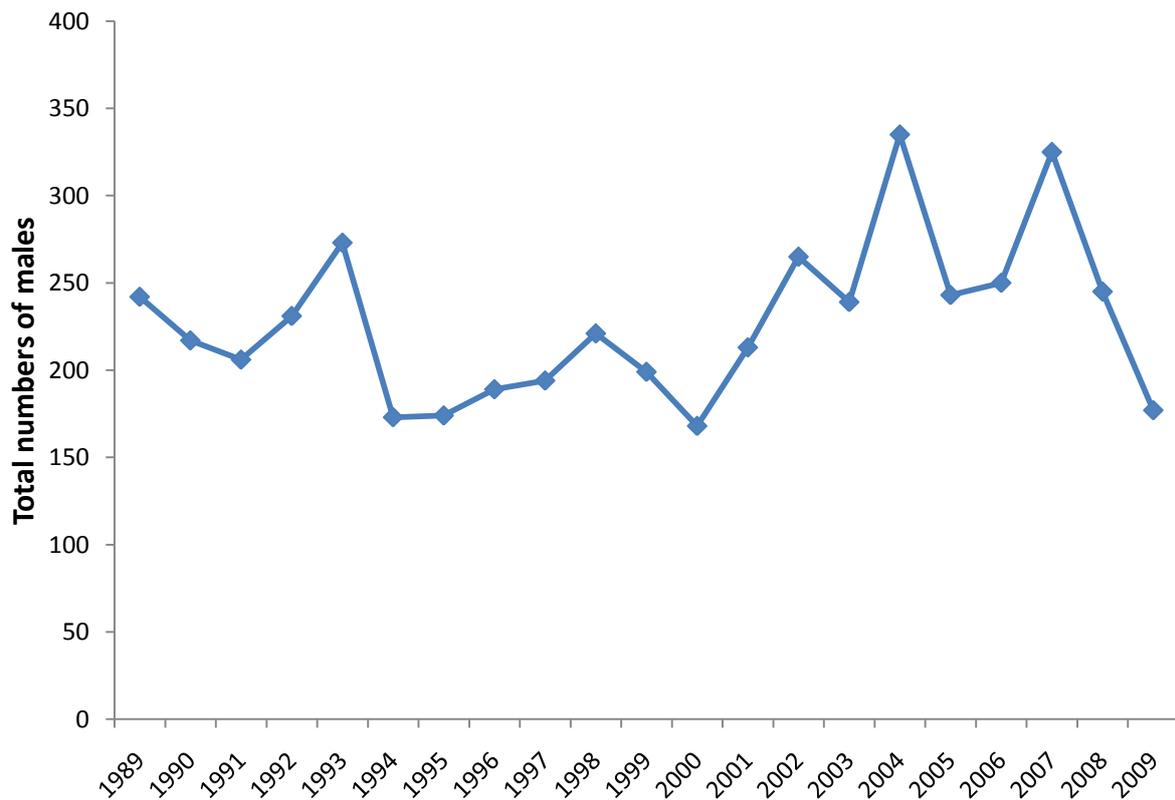
Table 4. Numbers of displaying males, leks and mean lek size in 2006, recent trends in numbers and whether habitats are considered suitable, predator control is operating and whether populations are connected within geographically distinct units in northern England

Areas	Total numbers of males in 2006 (leks \geq 2 males)	Mean lek size	Trend 1998-2009	Current occupation (%) of habitat mosaics available to support leks (potential number of leks)	Habitats suitable	Predator control infrastructure	Connectivity	Action
1. The Cheviots	19 (5)	3.5	Declining	29% (17)	✓	✓	×	Short term-continue to restore existing habitats Long term-consider re-introducing birds when links with neighbouring populations are restored.
2. Border Moors and Forest	31 (6)	3.2	Declining	38% (16)	✓	×	×	Short term- restore predator control and improve restoration of existing habitats.
3. Northumberland sandstone hills	0	0	-	0 (0)	×	×	×	None- insufficient habitat
4. Tyne Gap and Hadrian's Wall	0	0	-	0 (0)	×	×	✓	None- insufficient habitat
5. North Pennines	829 (119)	6.4	Stable	80% (149)	✓	✓	✓	Short term- increase breeding success and overwinter survival.
6. Eden Valley	8 (2)	3.5	Increasing	66% (3)	×	×	✓	None- insufficient habitat
7. Durham Coalfield Pennine Fringe	7 (1)	3	Stable	100% (1)	×	×	✓	None- insufficient habitat
8. Orton Fells	0	0	-	0 (0)	×	×	✓	None- insufficient habitat
9. Howgill Fells	0	0	-	0 (0)	×	×	✓	None- insufficient habitat
10. Yorkshire Dales	133 (21)	5.8	Increasing	21% (102)	✓	✓	✓	Short term- translocate birds in line with IUCN guidelines.
11. Pennine Dales Fringe	2 (1)	2	Stable	50% (2)	×	×	✓	None- insufficient habitat
12. Forest of Bowland	0	0	-	0 (20)	✓	✓	×	Long term- consider re-introducing birds
13. Southern Pennines	0	0	-	0 (15)	✓	✓	×	Long term- consider re-introducing birds
14. North York Moors	0	0	-	0 (0)	×	✓	×	None- insufficient habitat

3.1.1 North Pennines

The North Pennines is the core area for black grouse in northern England, supporting 80% of all birds in 2006. Analysis of data from annual lek counts at 28 leks in the North Pennines since 1989 show that numbers here remain stable (Figure 6). Black grouse already occupy 80% of suitable conditions and there remains only potential for further infill and consolidation, particularly on the northern and southern fringes and along the western slopes of the Pennines abutting the Eden Valley. The key objective within this area is to increase breeding productivity thereby providing recruits for re-colonising neighbouring areas.

Figure 6. Numbers of displaying males from annual counts at 28 leks in the North Pennines between 1989 and 2009.



Required Mechanisms

- Increase breeding productivity and overwinter survival of resident population (see section 2.1, 2.2).
- Ensure that agri-environment schemes are appropriately targeted and the appropriate prescriptions adopted to provide desired conditions for further infill within the range.

Timescales and approximate costs

- In addition to the estimated costs to increase breeding productivity and overwinter survival (see section 2.1, 2.2), funding would be required to provide ten advisory visits per annum @£450 per day to ensure appropriate habitat improvements are instigated. Total cost per annum £4.5k.

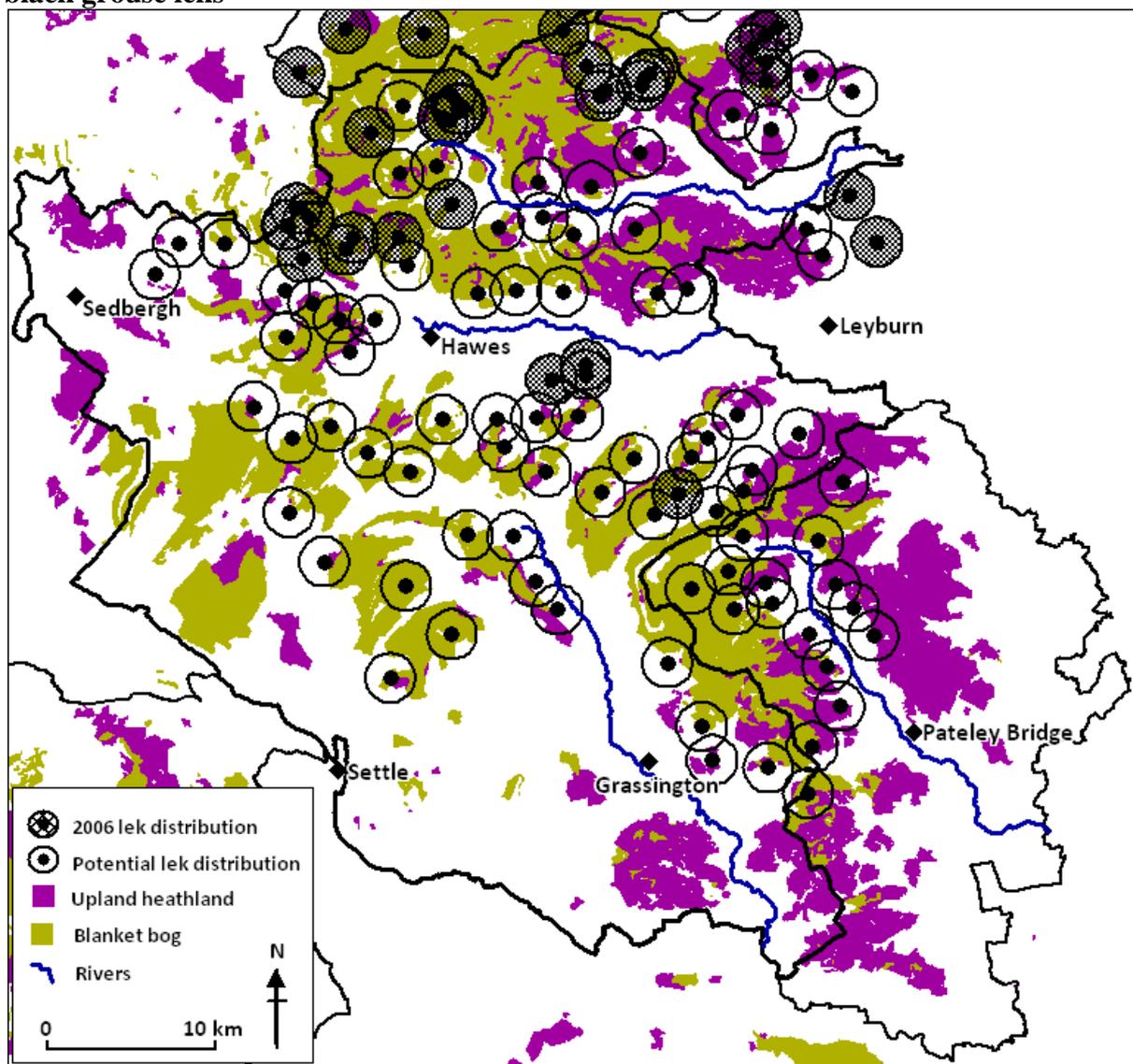
Contribution to 2030 EBAP targets

- Increasing breeding productivity from 1.3 to 1.7 chicks per hen would within eight years double numbers from 800 males to 1600 males. No further contribution to range expansion targets is possible as birds already occupy the 25, 10 km grid squares where suitable habitats are present.

3.1.2 Yorkshire Dales

Surveys conducted since 1998 show that numbers have increased in the Yorkshire Dales from 58 to 119 males between 1998 and 2009, with range expanding southwards through the re-colonisation of four 10 km grid squares since 2006. Further range expansion is achievable as kept grouse moors are present and are highly connected. Habitat enhancement has been on-going since 1990, through agri-environment schemes. Only 21% of suitable conditions are occupied and we estimate that there is the potential for a further 81 leks (Figure 7). Re-colonisation may be slow due to the low dispersal rates of males, and translocation of males to help re-establish an infrastructure of inter-connected lekking groups is recommended.

Figure 7. Areas in the Yorkshire Dales which have suitable conditions to support future black grouse leks



The successful re-establishment of black grouse throughout the Yorkshire Dales may ultimately lead to the natural re-colonisation of the Bowland Fells and southern Pennine areas to the south in the longer term without translocation, or depending on earlier successes, the rate of range expansion may be increased by further translocations of birds.

Required mechanisms

- Ensure that agri-environment schemes are targeted to these areas and the appropriate prescriptions adopted
- Roll out a translocation programme to establish leks in the Upper Nidderdale, Upper Coverdale and Upper Wharfedale valleys to create a connected infrastructure of leks to ultimately provide recruits to recolonise the adjoining areas.

Timescales and approximate costs

- In addition to the estimated costs to increase breeding productivity and overwinter survival (see section 2.1, 2.2). Funding would be required to provide ten advisory visits per annum @£450 per day to ensure appropriate habitat improvements are instigated. Total cost per annum £4.5k per annum.
- A five year translocation programme to initially re-establish birds into Coverdale, through moving 30 males per annum, before rolling out into Upper Nidderdale (40k per annum).

Contribution to 2030 EBAP targets

- There is the potential here to establish a network of a further 81 inter-connected leks which could support 500 males and increase range from nine to 23 occupied 10 km grid squares.

3.1.3 North-West Northumberland (including the Cheviots and Border Moors and Forest areas)

Black grouse have declined in North-West Northumberland and range contracted. Less than 20 males remained in 2009 and local extinction may now be close. Conditions persist on the Otterburn Training Area and neighbouring Cheviot Hills to support up to 30-40 leks, but connectivity with the North Pennines population to the south through Kielder Forest and to the west with birds in Southern Scotland has probably broken down. Not only have upland heath and blanket bog habitats been severely fragmented by commercial forestry, but in addition there are few kept grouse moors providing predator control. Remaining habitat patches are restricted in area and connectivity and are unlikely to support a viable population without significant land use changes and the introduction of targeted predator control.

Required Mechanisms

- Instigate targeted predator control at the remaining key black grouse habitats on the Otterburn Training Area.
- Target habitat improvements to existing populations and restore habitat connections with populations in the North Pennines, and south Scotland. Once, functional habitat links have been restored consider re-introduction, to help restore long term viability of populations on the Otterburn Training Area and in the Cheviot Hills

Timescales and approximate costs

- Short term: Instigate targeted predator control on the Otterburn Training Area (80k per annum), Ensure that agri-environment schemes support remaining populations and evaluate population connectivity potential. Long term: Restore landscape scale habitat links and consider re-introduction.

Contribution to 2030 EBAP targets

- Restoring black grouse in North-West Northumberland has the potential to support 100-200 lekking males and would make an important contribution to range targets, with the potential to occupy nine, 10 km grid squares.

4. Next Steps

Once this strategy has been launched, a delivery plan will be produced to guide and empower its implementation. This will be developed in partnership with all the key stakeholders and will outline the respective roles and responsibilities in implementing the strategies recommendations. It will also appraise potential funding and delivery mechanisms such as landscape scale partnership initiatives and the wider political context within which this strategy sits, such as the new England Biodiversity Strategy and review of England's forestry policy and public forest estate.

5. SUMMARY

To deliver the EBAP targets of increasing numbers to 2000 males and range to 61 occupied 10 km grid squares by 2030 requires a conservation programme to (a) Increase the breeding productivity and overwinter survival of the current population, (b) Promote range expansion in the Yorkshire Dales through a targeted advisory programme and translocation of males to establish leks, (c) re-establish viable links between the North Pennines, North-West Northumberland and Southern Scottish populations and (d) Protect the remaining population in North-West Northumberland through instigating predator control on the Otterburn Training Area and continuing to improve habitat quality until functional habitat links can be re-established with the core populations. .

Ultimately the fundamental objective to restoring black grouse in northern England is increasing breeding productivity from 1.3 chicks per hen to the average 1.7 observed in Scotland and North Wales. Successfully achieving this has the potential to increase numbers by 50% within four years which will also provide the recruits to re-colonise neighbouring areas. A number of mechanisms are available to achieve this through improving the control of clutch and chick predators such as stoats and improving brood rearing habitat.

Recent catastrophic declines in North-West Northumberland have left this population at critically low levels with some isolated populations imminently heading for local extinction. Attention should now be focussed on maintaining remaining populations through continued habitat improvements and targeted predator control. If birds become extinct from this area, natural re-colonisation, even if conditions were improved, is deemed unlikely due to the breakdown of the required habitat and predator control infrastructure through the Kielder

Forest to the North Pennines. The long term aim is to re-establish viable habitat links between the fragmented and core populations at which point reintroduction will be considered.

Delivering range expansion objectives to the south is considered more achievable within the immediate term as suitable conditions are already present, which with infill of the range could support an extra 100 inter-connected leks, which could support a population of 2200 males occupying 49, 10km grid squares. Successfully re-establishing black grouse into this area would then provide sufficient recruits to consider rolling out this programme further to re-colonise the adjoining Bowland Fells and Southern Pennines.

Following the meeting of the EBAP Steering Group on the 11th February and the 22nd April 2010, and with the RSPB on the 6th and 7th April 2011 it was agreed that to deliver the EBAP targets in northern England by 2030 the following priority actions were required,:

- 1(a) Increase breeding productivity and overwinter survival of black grouse in the North Pennines, through habitat enhancements on the moor fringe initiated through agri-environment schemes, in combination with further research to quantify desired management prescriptions such as the establishment of willow scrub and cattle grazing to increase the availability of chick food.
- 1(b) Promote range expansion in the Yorkshire Dales, through continuing habitat enhancements through agri-environment schemes on the fringes of heather moorland with full-time gamekeepers operating, in conjunction with the translocation of males to establish leks.
- 2(a) Evaluate feasibility of re-establishing functional habitat links between black grouse in the North Pennines, North West Northumberland and southern Scotland.
- 2(b) Instigate immediate conservation measures to safeguard remaining black grouse in North West Northumberland.

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