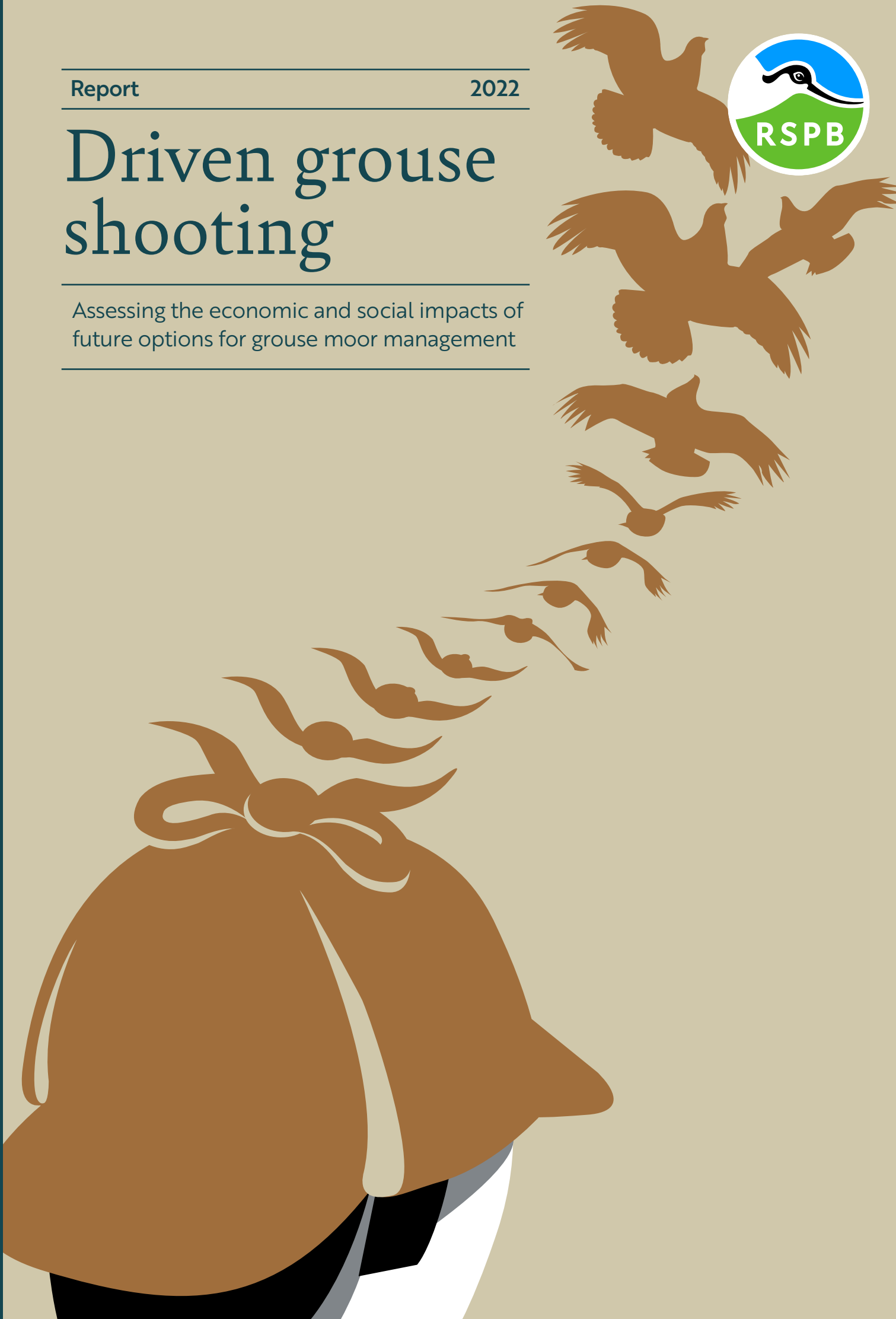

Report

2022

Driven grouse shooting

Assessing the economic and social impacts of future options for grouse moor management



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Any errors or inaccuracies are solely the responsibility of the author, as are the analysis and findings presented in this report.

Disclaimer

This report was commissioned by the RSPB and prepared by Matt Rayment as an independent consultant. It presents the findings of research and analysis by the author. Although welcome comments on a draft were received from the RSPB, it does not represent RSPB policy. It is for the RSPB to determine whether and how to publish any of its contents, and/or use them in developing policy.



Pools in blanket bog, RSPB Forsinard Flows Nature Reserve
Mike Read (rspb-images.com)

Executive Summary

Introduction

In recent years there has been much debate about the environmental, social and economic impacts of grouse moors in Great Britain and about future policy for the sector.

This report presents the findings of a study to assess the economic, environmental and social impacts of policy options for grouse moor management in Great Britain, as far as possible quantifying these and valuing them in monetary terms. The study aimed to provide the RSPB with evidence to inform its policy and advocacy work in this area.

The study involved a detailed evidence review, consultations with key stakeholders, seven case studies and appraisal of policy options for grouse moors and their economic, social and environmental impacts.

Size of the grouse moor sector

The number and extent of grouse moors is not known precisely, and there is a lack of official statistics. Best estimates are that there are around 310 estates engaged in grouse moor management in Great Britain (190 in England, 120 in Scotland), managing between 0.8 and 1.8 million hectares of land for grouse shooting (0.2-0.4 million hectares in England, and 0.5-1.5 million hectares in Scotland). The figures indicate that the average size of grouse moor enterprises per estate is much larger in Scotland than England (4,500 – 12,500 hectares in Scotland; 1,130 – 1,810 hectares in England). Grouse moor management covers a significant proportion of the UK's upland moorland area and in Scotland a sizeable portion of the overall land area (7-19%).

Grouse moors typically form part of large estates with a range of farming, forestry (particularly in Scotland) and sporting land uses and enterprises. Declines in grouse populations and the viability of grouse moor management have led to reductions in the area of grouse moors over the last century. However, there has

been an increase in grouse populations and numbers shot in the 21st century, and this has been attributed to more intensive management.

Moorland management practices

Grouse shooting comes in two forms, driven and walked-up grouse shooting with the former the most common. Driven grouse shooting tends to take place where densities of grouse are higher. Producing the high densities of grouse required to sustain driven grouse shooting involves intensive management of moorland and an increase in infrastructure (e.g. tracks). This drive to increase grouse numbers is underpinned by both legal (e.g. control of foxes and crows) and sometimes illegal management practices (e.g. killing of protected wildlife). The increasing intensity of grouse moor management in recent years appears to reflect increased expectations regarding the population density of red grouse required to sustain a viable driven grouse shooting enterprise.

Financial performance of grouse moors

Grouse moors are expensive to manage, and most are loss-making in purely financial terms. Driven grouse shooting generates much higher revenues than walked-up shooting, but also incurs much higher costs. Both are therefore often loss-making. Loss-making grouse moors are subsidised by their owners, rather than receiving direct public subsidies, though most benefit from agricultural support payments. Despite losses, owners continue to invest in managing moorland intensively for grouse. This can be explained by non-financial motivations such as personal enjoyment and prestige. Most grouse moors provide shooting for estate owners and their friends and families as well as shooting clients. Higher grouse bags raise the capital value of estates, and intensification of management can therefore be reimbursed through increased land values.

Economic impacts

Supporters of grouse shooting note that grouse moors provide employment in rural areas and spend money in local economies, helping to support incomes and opportunities in often remote areas with few alternative economic opportunities. The size of these impacts is uncertain and debated. The figures therefore suggest that the sector may support up to 4,000 FTE jobs in Great Britain if both direct employment and jobs in supplier businesses are included, though this may be an overestimate. This is about 0.09% of rural employment in England and Scotland.

Comparing the economic impact of grouse moors with alternative land uses is not straightforward, but studies show that alternative moorland land uses can generate comparable spending and revenue impacts to driven grouse shooting on a per hectare basis. Data suggest that grouse moor management provides low wages compared to alternative jobs in the uplands. It has been suggested that grouse moors may have negative as well as positive effects on local economies, by discouraging tourism and related economic diversification and reducing ecosystem services.

Social impacts

Grouse moors are generally recognised to play a role in maintaining rural communities in upland areas, by supporting employment and contributing to the local economy. They may also contribute to cultural heritage and community identity. Social benefits vary and are likely to be concentrated in areas with high levels of driven grouse shooting close to rural communities. A range of negative social effects resulting from intensive grouse moor management have also been cited, including displacement of other forms of employment, intimidation of local people, and animal welfare impacts resulting from the control of large numbers of animals by gamekeepers.

Biodiversity impacts

Red grouse is an amber listed species, with populations closely associated with the extent of heather moorland and its management. Grouse moor management, and particularly predator control, can also benefit other species (especially breeding waders), but can also have a range of negative impacts on biodiversity. Heather burning can have a range of positive and negative effects on biodiversity, and its overall impact is debated. Grouse moor management has helped to maintain heather cover, and large areas of grouse moors have conservation designations, though there is also evidence of negative impacts on designated sites from intensive burning and raptor persecution. Burning has been shown to be a principal reason for the poor condition of many upland SSSIs and European protected sites. There is strong evidence that illegal persecution is a major factor in the disappearance of hen harriers and golden eagles from UK grouse moors, limiting their ranges and populations. Illegal persecution results from conflicts between raptors and red grouse, with evidence demonstrating that (at least in some circumstances) raptor populations can affect the economic viability of grouse shooting. Overall, there are differing views regarding the balance of positive and negative impacts on biodiversity, and their implications for management.

Climate impacts

Grouse moor management involves widespread burning of peatlands, including blanket bog, and this has increased in recent years as grouse moors have been managed more intensively. While the evidence is complex and often contested, burning has been shown to release carbon from peatlands, and to be particularly damaging to blanket bog habitats. Peatland restoration, including cessation of burning and rewetting of blanket bog, is widely recognised as having a major role to play in addressing the current climate crisis.

Ecosystem services

Supporters of grouse shooting argue that management of grouse moors contributes to ecosystem services. However, as well as impacting adversely on climate, there is growing evidence that intensive management of grouse moors reduces the delivery of a range of ecosystem services, including by impacting adversely on water quality, increasing erosion and reducing the ability of the uplands to slow water flows and alleviate flooding. However, the impacts are complex, incompletely understood, and often debated. It is widely argued that changes in land use and/or land management on grouse moors could enhance the delivery of ecosystem services. These changes in ecosystem service values are potentially much greater than the direct impacts that grouse shooting has on local economies.

Policy options for grouse moor management

Concerns about recent intensification of grouse moor management, continuing illegal killing of raptors and the limited effectiveness of voluntary codes of practice to address adverse environmental impacts have prompted calls for action to address these impacts.

These have included petitions to ban driven grouse shooting, and proposals from others that the sector is regulated through a licensing scheme. While the Scottish Government has announced its intention to license grouse shooting during the current Parliament, the Westminster Government continues to resist pressure for significant reform in England.

The impact analysis for this study examines three main policy options:

1. Business-as-Usual (BAU) – no new policies to regulate grouse moors or their management
2. Development of a licensing system for grouse moors across Great Britain
3. A Ban on Grouse Shooting in each of the countries of Great Britain.

Impacts of policy options for grouse moor management

The impacts of each option are uncertain and difficult to quantify. Gaps in data and scientific understanding make it difficult to quantify the economic, environmental and social impacts of the grouse moor sector, or the impacts of alternative land uses and land management practices. The policy and economic context influencing the management of the uplands is also highly complex and dynamic, particularly considering emerging developments in financial support for agriculture and land management, as well as increasing interest in natural capital and net zero investments. These make it difficult to predict future impacts even under a BAU scenario. This study has attempted to identify the likely direction of change under each option, and to quantify impacts where possible. The table on the right summarises the principal economic, social and environmental impacts of each of the main options.

Summary of expected impacts of policy options

	Business as usual (BAU)	Grouse moor licensing	Ban on driven grouse shooting
Direct implications and costs	No change.	Little change in practice required for legally compliant moors, but should help to reduce illegal activity. Admin costs could amount to £150k annually for grouse moors and £500k annually for public sector in Britain; cost recovery could impose licence costs averaging £1600 per grouse moor.	Immediate ban on driven grouse shooting, leading to closure of grouse shooting enterprises.
Effects on land use and management	Likely small decline in grouse moor area, in response to wider opportunities for carbon and natural capital investment.	Extra costs and regulatory scrutiny can likely be absorbed by grouse moors but may cause more to change land use/ land management to carbon/ forestry/ natural capital restoration than under BAU. Most grouse moors continue to be managed as at present, but legal compliance increases. Greater focus on how to manage conflicts with raptors.	Cessation of heather management, predator control, medication of red grouse over ca. 1 million hectares of Britain. Some conservation management (e.g., vegetation cutting and predator control) might continue, as well as small scale heather management for walked up shooting. Some grouse moors would be sold, others would change management under existing ownership. Widespread change in land use and land management – peatland restoration, afforestation, rewilding, changes in grazing.
Economic impacts	Small decline in grouse moor employment and income, offset by increases in other activity.	Moderate decline in grouse moor employment and income, offset by increases in other activity.	Up to 4,000 jobs in grouse moors and supply chains lost; at least partially offset by increases in other management activities, tourism and recreation. Overall small effect on rural economies but could be locally significant. Less orderly transition than under other options. Local economy effects could be dwarfed by benefits of enhanced ecosystem services.
Social impacts	Limited effect on rural communities, cultural heritage or animal welfare. Small overall effect on rural communities, cultural heritage, animal welfare.	Small overall effect on rural communities, cultural heritage, animal welfare. Grouse shooting sector could be seen as more sustainable, enhancing public image and reducing divisions of opinion.	Possible effect on some local communities and services in areas dependent on grouse shooting, but generally small impact on rural life. Some impact on cultural heritage and identity on some areas with history and tradition of grouse shooting. Some would see benefit in ending of an activity seen to highlight social inequalities and differences in social attitudes, as well as benefits for animal welfare from large decline in predator control.
Biodiversity impacts	Small declines in heather moorland, red grouse, breeding waders, with small increase in vegetation and species diversity. Continuing illegal persecution of raptors.	Similar but slightly magnified trends to BAU. Illegal persecution of raptors reduced, helping species populations to recover. Improved regulation of heather burning could reduce negative impacts.	Likely decline in area of heather moorland, and populations of species such as red grouse and breeding waders. Enhanced vegetation and species diversity, at least in short term; long term effects would depend on grazing and cutting regimes. Illegal raptor persecution on grouse moors would cease; effects on raptor populations would depend also on habitat change.
Impacts on climate and ecosystem services	Small gains in carbon and ecosystem services, but less than other two options; continuing adverse impacts where moors are intensively managed.	Carbon and ecosystem service benefits greater than under BAU, but some moors continue to be managed intensively with adverse impacts.	Likely benefits for climate, water and flood management. Possible increases in wild fire risk. Changes in landscape could be seen as positive by some and negative by others. Value of ecosystem service changes expected to outweigh local economy impacts.

Conclusions

1. This study has examined evidence of the economic, social and environmental impacts of grouse moors in Great Britain and assessed the likely impacts of broad policy options for the future of the sector.
2. The analysis has been constrained by evidence gaps and uncertainties regarding many aspects of grouse moors and their impacts. These include basic data on the number and area of grouse moors, employment and sector revenues, as well as scientific uncertainties, data gaps and different interpretations of evidence regarding biodiversity, climate and ecosystem service effects.
3. Different stakeholders have widely diverging views on the benefits and costs of grouse moors for society, and the available evidence is often used selectively to support differing policy positions. This study has attempted to provide a balanced, independent analysis of alternative policy options in this context.
4. The context in which decisions are made regarding land use and land management in the uplands is complex and rapidly evolving, with major changes underway in government support, as well as a surge in private sector investment in carbon and ecosystem service markets. These developments, as well as the complex range of motivations affecting grouse moor management decisions, make it difficult to predict responses to alternative policy options.
5. Given these challenges, a robust quantitative assessment of the costs and benefits of alternative policy options is not possible. The analysis has instead attempted to identify the nature, direction and where possible relative value of likely changes in a range of economic, social and environmental effects.
6. Given wider policy and market developments, some further contraction of the grouse shooting sector is likely under the business-as-usual option. This will create new opportunities for biodiversity, climate, ecosystem services, rural economies and communities, as well as having some negative effects. However, this option would not address ongoing impacts of intensive grouse moor management on protected wildlife, climate and ecosystem services.
7. Introduction of a licensing system for grouse moor management would help to support the enforcement of existing legislation for protected species and heather burning, therefore addressing some of the negative environmental impacts of intensive grouse moor management. It would impose administrative costs on the sector but should only require changes in practice for those grouse moors that are not currently legally compliant. While it is expected that the additional costs would be absorbed by most grouse moor businesses, it would be expected to magnify the trends expected under the BAU scenario. By improving sustainability and transparency, licensing could have benefits in enhancing the public image of the sector, while sustaining gamekeeping jobs.
8. A ban on driven grouse shooting would have much larger and more immediate impacts than the other two options, bringing immediate changes in land use and land management. Up to 4,000 jobs could be lost among gamekeepers and in supply chains, though this would represent a small change in the context of rural economies overall and would be at least partially offset by the impacts of new opportunities in natural capital management and ecotourism, and likely outweighed by benefits for

climate and ecosystem services. Some species benefiting from grouse moor management would decline; overall biodiversity would likely increase in the short term, though long-term effects would depend on future strategies for grazing and vegetation management in the uplands. Overall effects would be subject to greater uncertainty and a less gradual or orderly change than might occur under the licensing option.

9. Future analyses would benefit from an improved evidence base in a number of areas, including in relation to the size of the grouse moor sector (number and areas of grouse moors, grouse bags), economic impacts (employment, revenues, wages, purchases, gross value added), social and community effects, interactions with other land management practices (grazing, natural capital

management), effects on the extent and value of a range of ecosystem services (carbon storage and sequestration, water quality, flood management, landscape, tourism and other cultural services), and comparisons of the above effects with other land uses and land management practices.

10. One benefit of a grouse moor licensing system would be that it would provide a means of collecting data that would help to address the evidence gaps identified. Annual reporting by licensees would help to fill evidence gaps on the size of the sector, grouse bags, management practices and potentially socio-economic factors such as numbers of employees. This would strengthen the evidence base for future policy analysis.



A hunting/shooting party in Glen Esk, Angus
Alamy

1. Introduction

1.1 Background

In recent years there has been much debate about the environmental, social and economic impacts of grouse moors in Great Britain, and about future policy for the sector.

Environmental groups have expressed concerns about the impacts of intensive management of grouse moors on biodiversity and ecosystems. Among others, these include the continued widespread illegal persecution of raptors on UK grouse moors, and the effects of vegetation burning on upland habitats, carbon emissions and water quality. The shooting sector argues that grouse moors support employment and contribute to rural communities, and that predator control and heather management benefit ground nesting bird species (particularly waders) as well as red grouse.

Questions about the environmental sustainability of grouse moor management have led to arguments for greater regulation (including introduction of a licensing system for grouse shooting), while some have called for a ban on driven grouse shooting. Such policy changes could have significant implications for land use and land management in the uplands, with a range of possible economic, social and environmental implications.

Three main policy options have been put forward for driven grouse shooting in Britain:

1. **Business-as-usual (BAU)**
2. **Licensing of grouse moors**
3. **An outright ban on driven grouse shooting.**

To evaluate these alternative options, it is helpful to assess their implications for land use and land management in the uplands, and the environmental,

economic and social costs and benefits that may result. This requires evidence of the current impacts of grouse moors, the financial models that influence current patterns of grouse moor management, and the viability and potential implications of alternative models of land use and land management in the uplands.

1.2 Study objective

The RSPB commissioned Matt Rayment to undertake a study to assess the economic, environmental and social impacts of options for grouse moor management in Great Britain, as far as possible quantifying these and valuing them in monetary terms. The study aimed to provide the RSPB with evidence to inform its policy and advocacy work in this area.

1.3 Study methods

The study involved the following main tasks:

1. Evidence review

A review of literature and documentation was undertaken. More than 100 documents were reviewed, including: data and reports on grouse shooting sector, its size, financial performance and socio-economic impacts; evidence of impacts on biodiversity and the environment; and documents on policy options for grouse moor management.

2. Consultations with key stakeholders

Interviews were held with a range of stakeholders including shooting interests, grouse moor managers, environmental groups, government and academics to gather further evidence of grouse moors and their impacts and explore implications of different policy options.

3. Case studies

Seven case studies were developed, to examine existing and former grouse moors and their economic, social and environmental impacts, and to gain the perspectives of landowners and managers. Where possible these included interviews with representatives of each moor, and reviews of published evidence. The seven case studies are outlined on page 12.

4. Options appraisal

The evidence gathered informed an analysis of policy options for grouse moor management in Great Britain. The details of each of the three main

policy options were further defined, taking account of recent policy developments and proposals in each country. The implications of each option for land use and land management were assessed. The analysis identified and described the range of economic, environmental and social impacts expected to result from these changes, assessed their significance and quantified and valued them as far as possible.



Grouse shooting in Yorkshire
Alamy

Case Studies

The seven case studies cover:

1. **Bolton Castle:** A 4,800 hectare estate in Wensleydale, North Yorkshire, the upper half of which is heather moorland, managed intensively for driven grouse shooting.
2. **Geltsdale:** A 5,350 hectare RSPB reserve in the north-west corner of the North Pennines, Cumbria, including 4,500 hectare of unenclosed blanket bog and mosaics of upland heath and acid grassland, previously managed as a driven grouse moor.
3. **Langholm Moor:** 11,500 hectares of heather moorland, blanket bog and acid grassland in the Southern Uplands of Scotland, previously wholly owned by Buccleuch Estates and the focus of the Joint Raptor Study (1992-97) and Langholm Moor Demonstration Project (2008-17). Grouse shooting ceased in 1996, and part of the moor was recently sold to the Langholm Initiative, a community partnership which has created the Tarras Valley nature reserve.
4. **Peak Naze:** A 1,000 hectare moor near Glossop in the High Peak, owned by United Utilities and managed for driven grouse shooting on behalf of a syndicate of local businessmen and professionals.
5. **Rottal Estate:** Glen Clova near Kirriemuir, Angus, a 3,000 hectare estate, including 2,500 hectares of heather moorland, upland grassland and peatland managed for driven and walked-up grouse shooting as part of a mix of estate enterprises.
6. **Driven Grouse Moors in Scotland:** A synthesis of four case study estates examined by McMorran et al (2020), ranging from 2,000 to 20,000 hectares and supporting predominantly driven grouse shooting alongside other estate enterprises.
7. **Walked-up Grouse Moors in Scotland:** A synthesis of four case study estates examined by McMorran et al (2020), ranging from 4,000 to 12,500 hectares and supporting predominantly walked-up grouse shooting alongside other estate enterprises.

Extracts from the case studies provide evidence to support the analysis throughout this report and the case studies themselves are presented in an Annex.

The study covers Great Britain, with greatest focus on England and Scotland (where grouse shooting is most significant in scale), identifying differences in evidence and impact by country, and quantifying impact at country level where possible.

1.4 This Report

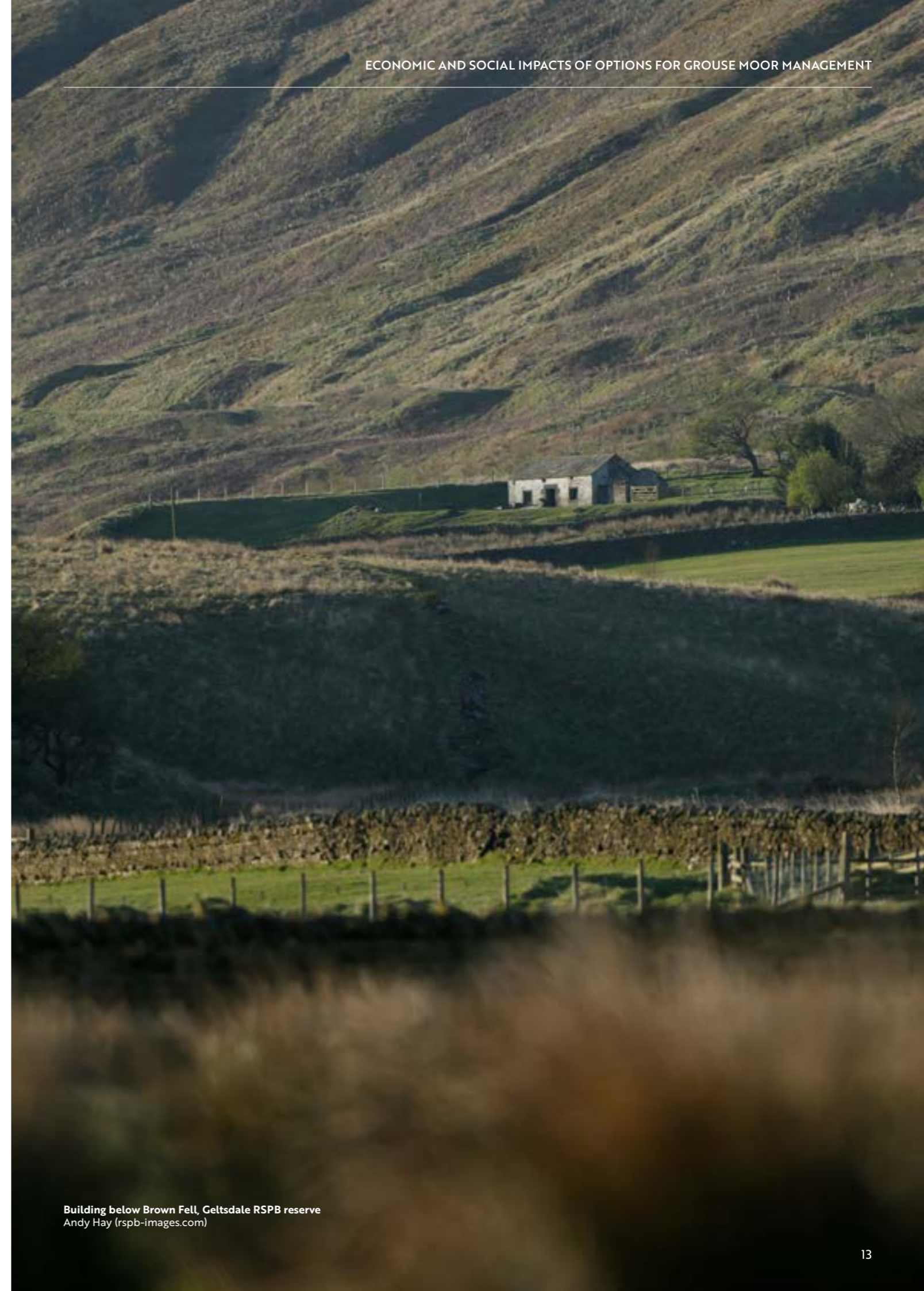
This Final Report presents the findings of the study.

It includes the following sections:

- **Section 2** presents an overview of grouse moor management in Great Britain, examining the size of the sector, management practices and financial performance

- **Section 3** presents an assessment of the economic, social and environmental impacts of grouse moor management
- **Section 4** defines the three main policy options for grouse moor management (business as usual, licensing, ban) and examines the likely details of each
- **Section 5** analyses the implications of each of the main options for land use and management, and assesses their economic, social and environmental impacts
- **Section 6** presents overall conclusions from the study.

The Annex presents the seven case studies, which are also referenced in the main text.



Building below Brown Fell, Geltsdale RSPB reserve
Andy Hay (rspb-images.com)

2. Grouse moor management in Great Britain

2.1 Introduction

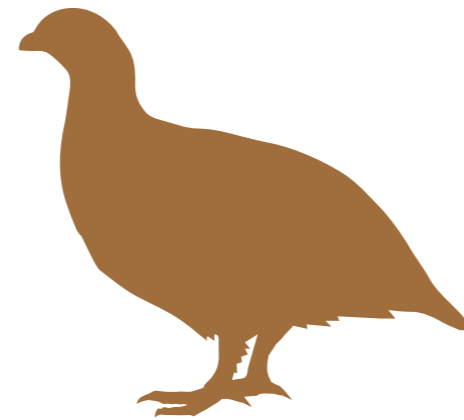
This section summarises evidence about the size of the grouse moor sector in Great Britain, and the management and financial performance of grouse moors.

2.2 Size of the Grouse Moor Sector

The number and extent of grouse moors is not known precisely, and there is a lack of official statistics.

In Scotland, the report of the Grouse Moor Management Review Group (GMMRG, 2019) found that a lack of accessible records of grouse shooting enterprises in Scotland continues to hinder the collection of key statistics on both their environmental footprint and their contribution to local and national economies. There is a similar situation in England, where different reports give varying estimates, based on surveys, studies of land cover and land management, and membership of organisations (such as the Moorland Association) representing grouse moor management interests.

Best estimates are that **there are around 310 estates engaged in grouse moor management in Great Britain** (190 in England, 120 in Scotland), **managing between 0.8 and 1.8 million hectares of land for grouse shooting** (0.2-0.4 million hectares in England, and 0.5-1.5 million hectares in Scotland) (see table on the right).



190

English estates covering between 0.2-0.4 million hectares

120

Scottish estates covering between 0.5-1.5 million hectares



Muirburn patches on moorland, Strathdearn. Steve Austin (rspb-images.com)

Estimated numbers of estates and area of land in grouse moor management

	England	Scotland	Great Britain
Number of estates involved in grouse shooting	190 (Denny et al, 2021, based on Moorland Assn)	120 (GMMRG, 2019)	270 (GWCT Annual Survey; grouse/deer) 310 (Denny et al, 2021) 450 (UKNEA, 2011)
Area of grouse shooting (000 ha)	364 (Crowle et al, 2022, area above moorland line out of total estate area of 573; NE data) 314 (Douglas et al, 2015; burning detected) 215 (Denny et al, 2021, based on MA land under heather) 344 (BASC, 2015, MA managed land) 423 (GWCT, 2020, based on MA land, of which 282 is peatland, above the moorland line)	545 (Scottish Moorland Group, in GMMRG 2019) 525 (Douglas et al, 2015; burning detected) 1,000 (Scottish Land and Estates, 2013) 1,000 – 1,500 (Tingay and Wightman, 2018) 1,170 (RSPB website)	1,175 (GWCT annual survey, grouse/deer) 1,300 (BASC, 2015) 1,676 (UKNEA, 2011) 855 (Douglas et al, 2015; burning detected) 660 - 1,700 (Grant et al. 2012)

Wales once had a substantial grouse shooting sector, but this is now limited to a small number of sites, with the 2,850 hectare Ruabon Moor, near Wrexham, regarded as the most significant. Efforts are being made to restore grouse numbers at other sites, such as the 2,000 hectare Beacon Hill moor near Pilleth in Powys.

The figures indicate that the average size of grouse moor enterprises per estate is much larger in Scotland than England (4,500 – 12,500 hectares in Scotland; 1,130 – 1,810 hectares in England). However, there is evidence that grouse moors are managed more intensively and support more grouse per hectare in England (Thompson et al, 2016). GWCT (2021) estimated spring red grouse densities at 102 per 100 hectares of moor in northern England and 50 per 100 hectares in Scotland.

Grouse moor management covers a significant proportion of the UK’s upland moorland area (43-65% according to BASC, 2015) and in Scotland a sizeable portion of the overall land area (7-19%).

Grouse moors typically form part of large estates with a range of farming, forestry (particularly in Scotland) and sporting land uses and enterprises. Wightman

and Tingay (2015) noted that grouse shooting has been increasingly let commercially in the last 50 years, while since 2000 there has been an increasing trend for Scottish estates to sell grouse moor interests or offer them on long leases to new buyers, often from the financial sector.

After a long-term decline, records show an increase in grouse populations and numbers shot in the 21st century, and this has been attributed to more intensive management.

Grouse shooting has taken place in the UK for more than 160 years (HoC Library, 2021). The area of land devoted to grouse shooting, and the number of grouse shot, has declined since its peak in the late 19th/early 20th century (RSPB website; Thompson et al, 2016).



Hen harrier
Steve Knell (rspb-images.com)

GWCT (2015) found a 90% increase in post breeding densities on a sample of moors in England from 171 per km² (1990-1994) to 325 per km² (2010-2014) in England and a 74% increase from 81 to 141 per km² over the same period in Scotland, attributing this to increased medication. ONS (2019) noted a 75% increase in the numbers of grouse shot between 2004/05 and 2012/13, suggesting that this could be due to the cyclical nature of red grouse populations, as well as more intensive management of habitat and predators. Since the 1990s grouse moor management has undergone a resurgence with the management intensity increasing markedly in some places (e.g. Central and East Highlands of Scotland and the Pennines; RSPB website). Thompson and Wilson (2020) linked a 62% increase in grouse bags between 2004 and 2016 with increasingly intensive management. Wightman and Tingay (2015) argue that an influx of “new money” into grouse shooting has driven an increase in the intensity of management.

2.3 Moorland Management Practices

Grouse shooting comes in two forms, driven and walked-up grouse shooting with the former the most common. Driven grouse shooting tends to take place where densities of grouse are higher.

Both forms of shooting may occur on the same moor, at different times of the season and depending on grouse numbers in a particular year. The case studies for this report covered moors supporting a combination of driven and walked-up shooting (See box on the right).

Sotherton et al (2009) described driven grouse shooting as typically involving hiring 20–50 local people as beaters, driving grouse over a line of 8-10 guns usually standing behind stone, wooden or turf-built butts. Additional people can be employed as gun loaders and a further team with gundogs are employed as ‘pickers-up’ to retrieve shot grouse. Catering is usually provided. Depending on grouse numbers there can be up to 50 driven days per season. Walked-up shooting either involves two or three guns shooting over pointing dogs or a more extended line of four to seven guns with retrieving dogs, and typically involves only 10% as much labour on shooting days. While the shooting season lasts from 12 August to 10 December, gamekeepers are normally employed year-round. It is estimated that at least one gamekeeper per 1,500 hectare of heather moor is required to regularly exceed the 60 or more grouse per 100 hectare in August needed to make driven grouse shooting worthwhile.

Driven and walked-up grouse shooting – examples from the case studies

The case study estates involve a combination of driven and walked-up grouse shooting

At **Bolton Castle**, driven grouse shooting is preferred, on account of the much larger financial revenues it generates, and thus its contribution to investment in the intensive management of the grouse moor. By comparison walked up shooting is not seen as capable of raising sufficient income to fund the management needed to generate a shootable surplus of birds.

Geltsdale previously supported driven grouse shooting, but this ceased in 2001 when RSPB acquired the shooting rights. A few hundred hectares continue to be leased for walked-up shooting, while two neighbouring estates are managed intensively for driven grouse shooting.

Langholm Moor previously sustained a driven grouse shoot. The Langholm Moor Demonstration Project invested heavily in grouse moor management, but despite increasing heather cover and grouse populations, failed to achieve the increased level of breeding success deemed by the project board as necessary to sustain a financially viable driven shoot (a conclusion which some have disputed). It concluded that continuing management would be unlikely to achieve target grouse numbers, which would probably require further reductions in predation pressure.

At **Peak Naze** shooting is entirely driven and yields an average of 200 brace of grouse annually. In bad grouse years, of which there have been two in the last 12 years, no shooting may take place. The manager of the shoot believes that driven shooting kills a larger proportion of older birds and is therefore optimal in maintaining a healthy population of red grouse.

Rottal Estate practices a mix of driven and walked up grouse shooting. Depending on grouse numbers, early season walked up shooting tends to be followed by five to six driven shoots in September and October.

Sotherton et al (2009) reported sample data from the National Gamebag Census that 56% of all UK shooting days are driven days but found this varied by region. In Wales, only two properties shot grouse and both walked them up. In England, 94% of shooting days were driven, whereas in East Scotland only 40% were driven, and in West and North Scotland, where less grouse shooting is now undertaken, only 27% of shooting days were driven. It is likely that the proportion of driven days has increased since then, as grouse numbers and the intensity of management have increased.

Producing the high densities of grouse required to sustain driven grouse shooting involves intensive management of moorland and an increase in infrastructure (e.g. tracks). This drive to increase grouse numbers is underpinned by both legal (e.g. control of foxes and crows) and sometimes illegal management practices (e.g. killing of protected wildlife).

Management typically involves rotational burning of heather to promote new growth, cutting, drainage, legal (and illegal) predator control, livestock grazing (mainly sheep), grouse medication, the construction of butts and hill tracks, and in Scotland the culling of mountain hares and deer in the belief that this will help to control disease. Vegetation burning is subject to legal requirements, promoted via voluntary codes of practice, but it is often argued that these are weakly monitored and enforced (RSPB website; Thompson et al, 2016; Tingay and Wightman, 2018).

Heather management practices at the case study estates are summarised on page 18.

Heather management on the case study estates

Heather burning and/or cutting have played an important role in moorland management at each of the case study estates

At **Bolton Castle**, heather burning previously covered larger areas, but has transitioned to smaller mosaics, with an agri-environment agreement in 1997 stipulating burning rotations. Burning management has been improved through investment in improved equipment, including bowsers on Argocat all-terrain vehicles. Fires are now smaller and more controlled, in accordance with the Heather and Grassland Code of 2007, with cooler burns limited to the canopy and enabling quicker recovery of blanket bog vegetation. As a result, an increasing proportion of quadrats have vegetation in favourable status.

At **Geltsdale**, management aims to achieve a varied and naturally sustainable vegetation structure. As well as grazing this currently involves cutting of 15–30 hectares of heather per year, as well as allowing taller vegetation and scrub to develop in other areas, to enhance vegetation diversity. Heather burning was reduced from 2000 and ceased in 2009. The RSPB aims to stop cutting when a diverse and sustainable vegetation structure has been achieved.

At **Langholm Moor**, heather dominated vegetation declined by 73% between 1948 and 2009, though large areas remained, especially at higher altitude. The Langholm Moor Demonstration Project made large scale reductions in sheep grazing, as well as reintroducing gamekeepers to restore heather through muirburn, cutting, and in some areas spraying and re-seeding. In response, heather-dominated vegetation cover increased by 30% over six years to 2,032 hectare. The subsequent Langholm Initiative's Tarras Valley Nature reserve will encourage habitats to regenerate naturally, to provide a mosaic of habitats and enhance biodiversity.

At **Peak Naze**, heather is managed by cutting to create short mosaics spanning 20x30 metres, with around 10% of the area of the moor cut annually. This is a time consuming and labour-intensive exercise, occupying the gamekeeper for two to three months per year. Cutting also requires more equipment than burning. However, it is preferred to burning because it can be undertaken by a single keeper in all weathers and is more precise in delivering patches of the required size. Limiting heather height (preferably to less than 12 inches) is important to reduce wildfire risk, make vegetation palatable to grouse and sheep, prevent emergence of trees/scrub and create nesting areas for waders and grouse which enable visibility of predators. Peak Naze has not experienced a wildfire in the last 12 years, unlike neighbouring moors. Grazing is managed by a tenant farmer; the regime involves appropriate stocking levels of native sheep breeds to avoid overgrazing.

Rottal Estate has invested in deer management and reduced sheep numbers to restore heather moorland for the benefit of grouse and other species. Cool burning of heather takes place in small patches, to create a mosaic of habitat and varied vegetation height. Cutting of heather is impractical because the hill is steep and rocky and use of machinery would damage the habitat. Burning of peat – which is at higher altitudes – is unnecessary and avoided. As well as red grouse, this management has benefited other species including breeding waders, black grouse, ring ouzel and golden eagle.

GMMRG (2019) noted that intensive management of grouse moors can include illegal practices such as the killing, injuring and disturbance of raptors, undertaking muirburn outside the designated season or without giving due notice to neighbouring estates, and using medicated grit contrary to the Veterinary Medicines Regulations 2013. At present few convictions arise from these actions prohibited by law on account of difficulties in obtaining a sufficiency of admissible evidence to support a prosecution. This is especially true for the illegal killing of raptors.

Although the number of convictions has declined since the turn of the century, there are strong grounds for inferring higher levels of persecution than is apparent from the current number of convictions. The number of detected poisoning incidents has declined, but there is increasing evidence that offenders are resorting to shooting, especially at night (aided by improved and readily available night-vision equipment) and being more thorough in the disposal of carcasses and other evidence (GMMRG, 2019).

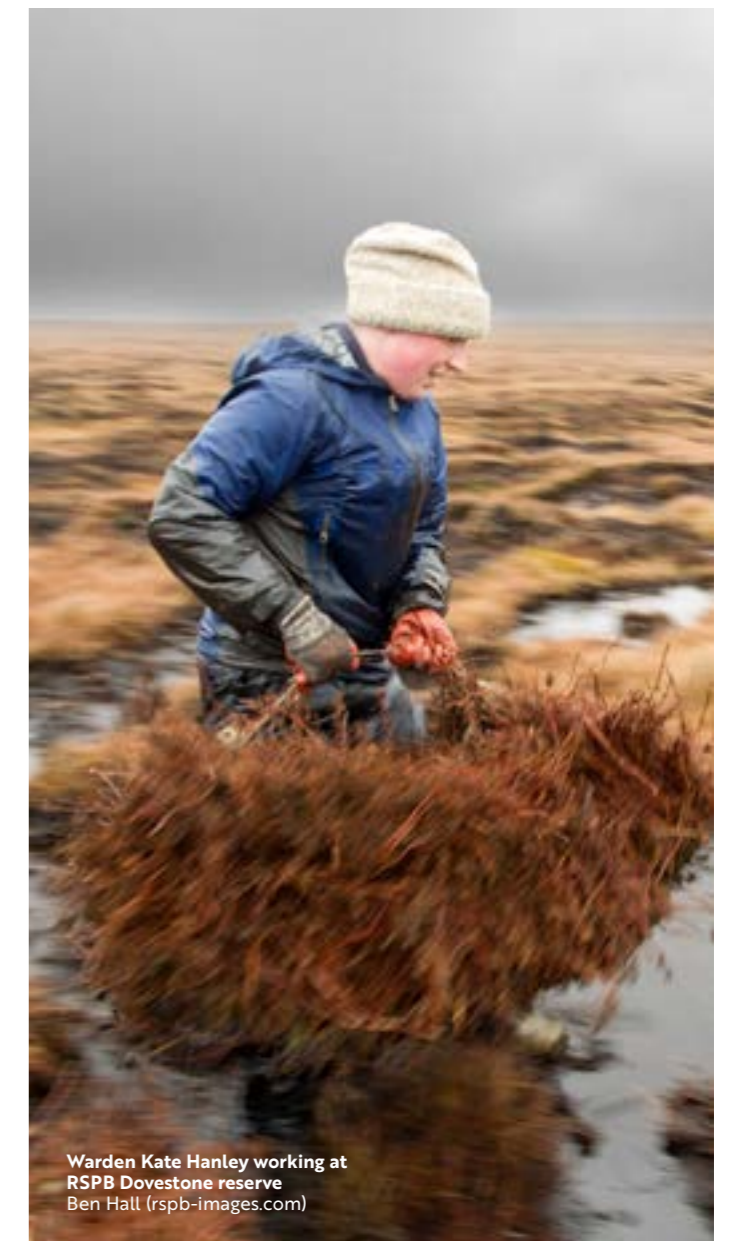
Grouse moor management has maintained areas of open moorland and prevented regrowth of forests. However, declines in grouse populations and the viability of grouse moor management have led to reductions in area over the last century.

The popularity of grouse shooting and associated bags has varied markedly since the 1850s reflecting changing demand and the profitability of alternative land uses, notably sheep-grazing or plantation forestry. Bag sizes per unit area peaked in the late 19th and early 20th centuries, declining during the First and Second World Wars when gamekeepers were away on war service. Recovery to 1974 was followed by a decline from which some moors have more recently returned to bag sizes at late 19th century levels. Overall, since the late 19th century, the area of moorland managed for shooting grouse has declined. Where this has occurred, heather has tended to give way to grass under more intensive sheep-grazing and to new tree plantations. An example of the significant decline in the number of grouse moors is in south west Scotland where the more than 100 properties that shot grouse before 1914 were reduced to a handful by 2019. Similar pressures resulted in the complete disappearance of driven grouse shooting in Wales. By contrast, the Northern Pennines grouse moors have long reported much larger bags than in Scotland. The range contraction of 11% for red grouse in Scotland reported by the British Trust for Ornithology (BTO) between 1970 and 1990 is attributed to increased grazing pressure, tree-planting, reduction in the numbers of gamekeepers and an increase in the numbers of predators (GMMRG, 2019).

Where there is still open land, heather restoration is possible if grazing is restricted, but as the Langholm Moor experiment has demonstrated, this can be an expensive and lengthy operation, especially if the aim is to re-establish a functioning driven grouse moor (GMMRG, 2019).

Large areas of upland heathland and blanket bog managed for grouse have been designated as SSSI, SPA and SAC (RSPB website). For example, Crowle et al. (2022) calculated that 67% of English 'moorland' managed for grouse shooting is designated as SSSI, 61% as SPA and 59% as SAC.

Compared to walked up shooting, driven grouse moors normally require more infrastructure (tracks and butts) as well as intensive management (Sotherton et al, 2009).



Warden Kate Hanley working at RSPB Dovestone reserve
Ben Hall (rspb-images.com)

The intensity of burning of heather moorland has increased in recent years, causing damage to blanket bog habitats.

Thompson and Wilson (2020) argued that a 62% increase in grouse bags between 2004 and 2016 was the result of more intensive management, especially burning, predator control and the treatment of grouse disease. They also concluded that prescribed burning does not contribute to the conservation or restoration of peatland vegetation.

Matthews et al (2020) examined changes in burning on grouse moors in Scotland between 2005/11 and 2018. Examining burning intensity on 1km cells, they noted an increase in intensity on 2,534 cells (66% of the total), a decrease on 568 cells (15%), and no change on 725 cells (19%). The most frequent increases occurred in those areas with previously low burning intensities.

Wightman and Tingay (2015) pointed to an intensification of grouse moor management in recent years, including burning, tracks and roads, medication, ticks and fencing, lead ammunition, disturbance and raptor persecution, and argued that grouse moor management is now “out of control”. They reported that the intensification of grouse moor management is causing increasing concern to public authorities with responsibilities for aspects of countryside management. They cited a report on moorland management prepared for the Cairngorms National Park Authority, which expressed concerns about the single species focus of intensive moorland management for red grouse and negative impacts on other species and habitats in the National Park.

UK Government (2021) concluded that burning is damaging to blanket bog and expressed concern that the frequency of burning of moorland has increased in recent years, which has been found to have led to the

conversion of 87,000 hectare of blanket bog in England to dwarf shrub dominated vegetation (Glaves et al, 2013). New government legislation will protect about 40% of blanket bog in England (deep peat on European protected sites) from further burning (UK Government, 2021).

The increasing intensity of grouse moor management in recent years appears to reflect increased expectations regarding the population density of red grouse required to sustain a viable driven grouse shooting enterprise.

Thompson and Wilson (2020) reported that, since 2010, the post-breeding density of red grouse has ranged in England from 239 grouse/km² to 370 grouse/km² (July counts on 25 moors) and 84 to 191 grouse/km² on a sample of 24 Scottish moors (figures derived from GWCT Annual Reviews, data for 2009-2018). Especially in England, these post-breeding densities now contrast markedly with the density of 60-130 grouse per km² (varying with gamekeeper density) required to ensure that driven shooting broke even in the late 1980s and early 1990s (Hudson 1992).

Between 2004 and 2016 the number of grouse shot in the UK rose from 400,000 to 650,000 birds (Aebischer 2019). Robertson et al.'s (2017) analysis of long-term and regional variation in grouse bags notes a positive association between bag sizes and gamekeeper densities in the British uplands, but grouse bags in England have remained consistently high (post breeding density >200 grouse/km²) since the use of an improved form of medicated grit to treat the nematode worm *Trichostrongylus tenuis* was widely deployed in 2007.

The case studies illustrate the management of grouse populations and shooting bags at different moors (see box on right).

Managing grouse populations and shooting bags – examples from the case studies

Shooting practices are determined by cyclical changes in grouse populations at the case study estates

At **Bolton Castle**, grouse numbers are surveyed in spring and autumn in a sample of eight 100 acre blocks, to calculate the shootable surplus. Recent years have seen between 0 and 4,500 brace of red grouse shot annually, with an average of around 1,750, allowing approximately 17 driven shooting days with an average of 100 brace per day. The best ground in the Yorkshire Dales produces a maximum of a brace per acre per year.

The **Langholm Moor** Demonstration Project (2008-17) set a target of shooting 1000 brace in at least one of the 10 project years, which was considered the minimum level needed to sustain driven grouse shooting. Each year the project board and gamekeepers, with input from the science team, used the July grouse counts to assess whether shooting should take place. Each year it was felt that adult and chick grouse mortality was too great for there to be ‘spare’ grouse to be shot in a sustainable harvest.

At **Peak Naze**, the grouse population is carefully managed, with the aim of sustaining a viable population to deliver a shootable surplus of birds, while also limiting numbers to control outbreaks of pests and disease. An ideal stocking rate is considered to be one breeding pair of grouse per five acres (400 pairs for a 2,000 acre moor). Each year, the breeding stock are counted in April and the post-breeding stock in late July. It is necessary to leave 600 pairs of birds after shooting ceases, to maintain the target breeding population of 400 pairs, allowing for winter mortality. This determines the shootable surplus. The shoot manager aims to shoot older birds as much as possible, to leave a healthier, less aggressive and more fertile breeding population, and believes that driven shooting helps to achieve this.

On driven days at **Rottal Estate**, eight to nine guns will typically shoot a total of 50-75 brace of grouse. Walked up shooting typically involves five to six guns. Overall numbers of grouse shot may range from 200 brace in a poor year to 500 in a good year. Rather than seeking to maximise bag numbers through intensive management, the estate prides itself on the overall quality of the shooting experience, with shooters appreciating the wider wildlife and landscape quality that the estate offers.



Grouse beaters with flags on a grouse shoot on moors in Scotland
Alamy

There is evidence that red grouse are sensitive to climate change, which may cause them to be lost from much of their current UK range later this century.

A Climatic Atlas of European Breeding Birds found that the current range of the willow grouse (of which the red grouse is the endemic British sub-species) is described very well by climate. A simulation of its potential late 21st century distribution in response to climate change showed a north-westward shift in its range, with most current breeding localities in the southern half of the present range simulated as no longer suitable. The simulation suggested that red grouse will be lost from England and remain only in northern Scotland by the end of the 21st century (RSPB, 2007).

Continuing illegal persecution of raptors highlights conflicts between grouse moor management and raptor conservation.

The Langholm Moor Demonstration Project sought to resolve the long-standing conflict between grouse moors and raptors by trying to determine if grouse moor management could (at that site at least) be made viable without reductions in raptor predation (LMDPB, 2019).

These conflicts help to explain why illegal killing of raptors takes place. Burnside and Pamment (2020) reported the findings of a survey of retired gamekeepers, in which five out of nine interviewees stated that gamekeepers can experience employment-related pressure to control raptor species illegally.

There are conflicting views regarding whether burning of heather increases or reduces the risk of wildfires.

Prescribed burning of heather, including on grouse moors, has been shown to lead to wildfires, including through escaped burns (Thompson and Wilson,

2020). However, it is also argued that prescribed burning can reduce wildfire risk by removing dry, woody and dead vegetation (Marrs et al, 2018). Shooting interests and grouse moor managers interviewed for this study expressed the strong belief that prescribed burning reduces the incidence and severity of wildfires, giving examples to support this view. However, environmental groups argued that evidence to support these claims is lacking. A recent NatureScot review (Holland et al, 2022) found evidence that muirburn causes a proportion of wild fires, and that, although it is plausible that muirburn reduces the incidence or severity of wild fires, evidence is inconclusive.

2.4 Financial performance of grouse moors

Grouse moors are expensive to manage, and most are loss-making in purely financial terms.

Most interviewees noted that most grouse moors do not generate a profit but are managed for non-financial reasons, including use by owners and their friends and family, motivations related to social status, history and tradition, and/or to enhance the capital value of estates. Profitability also varies between years, with many moors being profitable or breaking even in a good year but incurring significant losses in others (particularly in years where low grouse numbers do not permit commercial shooting at all).

McMorran et al. (2020) examined the financial performance of four estates practising largely 'walked-up' grouse shooting and four estates practising largely driven grouse shooting in Scotland. They found that in all cases revenue was insufficient to cover costs, by a margin of £11,000 - £104,000 on the walked-up estates and by £6,000 - £169,000 on the driven estates. Losses result from the high level of recurrent and staffing costs associated with grouse production.

They noted that this finding was consistent with other studies over time, including Waddington (1958), Hudson (1992), Sotherton et al. (2009) and the Fraser of Allander Institute (2010). The authors cautioned that sporting enterprises are integrated financially with wider estate businesses, so can be difficult to account for separately. More profitable estate enterprises may subsidise less profitable activities, and activities which require private investment may be subsidised by enterprises benefiting from public subsidy.

Thompson and Wilson (2020) found that whilst driven moors typically generate much higher income from shooting than walked-up moors, the high management costs mean that many driven moors operate at a loss so that walked-up and driven shoots are reliant on private investment to cover running costs.

Wightman and Tingay (2015), however, argued that grouse moor management can be a profitable business, despite being popularly portrayed as an endeavour that costs considerable sums of money and which inevitably runs at a loss. It is unsurprising that a recreational activity such as this costs money in the same way as other expensive pursuits such as sailing, horse-racing or motorsport. However, they noted that grouse moor management adds to the profitability of estates. They also pointed to the Fraser of Allander Institute (2010) study which showed that the percentage of landholdings in Scotland whose grouse moors made a profit rose from 2.1% in 1994 to 17.6% in 2001 and 42.6% in 2010; given that many grouse moors are not managed as businesses but as personal recreational assets, this suggests that they can indeed be profitable.



Steve Downing, James Bray and Mick Demain from the RSPB ringing and tagging Hen harrier chicks in the Forest of Bowland
Anastasia Taylor-Lind (rspb-images.com)

Driven grouse shooting generates much higher revenues than walked-up shooting, but also incurs much higher costs. Both are therefore often loss-making.

Mustin et al (2017) found that potential gross income from driven grouse shooting far exceeds that from alternative hunting styles, noting that fees per brace for driven grouse shooting are almost twice as high as those for walked-up grouse and almost four times those for shooting over pointer dogs.

Sotherton et al (2009) gave estimates of the costs and revenues of providing different forms of grouse shooting. In 2008, typical values were £130–£150 per brace of driven grouse and £70–£80 per brace of walked-up grouse. They estimated that driven shooting generates roughly 10 times the revenue of walked-up shooting, and moors in England were generating more than double the revenue of Scottish ones. English moors produced higher densities of grouse over a five-year average than Scottish moors and this may be as a result of the intensity of keeping modified by the prevalence of grouse diseases and some inherent climatic and nutritional factors. Scottish estates tend to be more diversified, with grouse supplemented by other enterprises such as deer stalking and fishing.

McMorran et al (2020) examined financial models for different grouse shooting enterprises. They found that walked-up shooting involves comparatively low ‘intensity’, with an average of 25 hectares per brace. The total combined capital, running and staff costs for walked-up grouse were relatively low compared to other moorland land uses at £13 per hectare; low revenues resulted in a net cost across the case studies of £6 per hectare (or £35,000 at estate level), requiring subsidy from other estate enterprises. Walked-up shooting also had a comparatively low employment

impact (1 FTE per 4,700 hectares). The case studies demonstrated that expenditure levels and impact from grouse shooting varies widely, linked to the size of the moorland and sporting operation and relative commercial emphasis as determined by owner motivations.

McMorran et al found that driven shooting required more intensive and expensive management, involving a sustained level of capital spending (equivalent to £8 per hectare on average) and total combined direct capital, running and staff costs averaging £38 per hectare. Driven grouse shooting required seven hectares per brace shot on average, with the most intensive case only requiring two hectares per brace. Driven grouse shooting operations generated substantial annual revenues (over £250,000 for larger operations) in good years, although revenues were generally lower than spending levels, averaging £20 per hectare. Income was highly cyclical, depending on the availability of shootable surpluses of grouse which was related to several factors (weather, parasites and predators). These findings confirmed those of previous studies that driven grouse shooting enterprises were rarely profitable as stand-alone land uses, as costs generally outweighed revenue, or at best resulted in a break-even position during good years. Ongoing net costs meant that driven grouse shooting was subsidised by other, on or off estate, income streams. The employment impacts of driven grouse enterprises across the case studies broadly reflected previous findings and indicated that, on average, 1 FTE was generated per 1,450 hectares.

Sotherton et al (2017) argued that moving from driven to walked-up grouse shooting would not be a viable option, as revenues would fall more rapidly than costs. They argued that maintaining driven-grouse shooting is necessary to maintain moorland management and its wider benefits for wildlife.



The Langholm Moor Demonstration Project was unable to achieve the levels of grouse populations deemed by the project board to be sufficient to support driven grouse shooting, such that moorland management and associated benefits for habitats, raptors and wading birds could only be achieved with public subsidy (LMDPB, 2019). It should be noted that critics have argued that the target population levels set for the project were very high, and exceeded levels at which grouse shooting had taken place in the past (e.g. Tingay, 2016; Housden 2014).

Loss-making grouse moors are subsidised by their owners, rather than receiving direct public subsidies, though most benefit from agricultural support payments.

Grouse moor representatives emphasise that grouse moor management does not itself receive public subsidies, unlike farming and forestry. However, most grouse moors are also grazed and therefore benefit from agricultural support payments and agri-environment payments (such as for grazing and vegetation management, and peatland restoration).

Clients pay substantial fees for grouse shooting, especially for driven shooting.

Denny et al (2021) found that the cost of a walked-up day, with the possibility of a bag of 20 birds, is roughly the same as a day shooting pheasants or partridge where the bag could be 100 – 200 birds. The cost of driven grouse shooting can be five times that of a pheasant day for a similar number of birds shot. A moor in Yorkshire advertised driven grouse shooting in 2021 at rates ranging from £1,740 to £2,906 per gun for eight Guns, falling through the season from August to November with reductions in birds shot.

An article in Guns on Pegs (2019) suggested that fees amount to £180 per brace, with a 100-brace day costing £18,000 plus travel, accommodation and tips. An overall cost of £20,000 for a team of eight shooters would amount to £2,500 each.



Hen harrier
Steve Knell (rspb-images.com)

Despite losses, owners continue to invest in managing moorland intensively for grouse. This can be explained by non-financial motivations such as personal enjoyment and prestige. Most grouse moors provide shooting for estate owners and their friends and families as well as shooting clients.

PACEC (2014) suggested that the large numbers of loss-making shooting enterprises could be explained on the basis that acquiring and managing estates is a lifestyle choice centred on non-financial benefits such as the act of the shoot itself, shared activities with family and friends, continuity of family heritage, rest and relaxation and concerns about nature conservation and providing local employment.

A survey by Hindle et al (2014) of Scottish estates found that estates' own use accounted for around 20% of all shooting and stalking activity.

Higher grouse bags raise the capital value of estates, and intensification of management can therefore be reimbursed through increased land values.

McMorran et al (2020) noted that each brace of grouse has an impact on the capital value of the estate selling grouse shooting. A study by Knight Frank (2014) found that in this context a brace of grouse

may be valued at between £3,750 and £5,500, so that sporting estates can achieve a significant financial return on investment by increasing the average grouse bag (over a 10 year period) prior to selling, with driven grouse moors increasing in value by 49% over a decade. Increases in capital values result from an influx of new money into grouse moors since the beginning of the century.

Wightman and Tingay (2015) noted that the Knight Frank (2014) study showed that over the 10 years 2004 - 2014, grouse moors outperformed all other sporting properties (deer forests, salmon rivers etc.), and that returns from a;

“well-managed and heavily invested moor may be significantly higher because greater numbers of birds are being shot each year.”

Their report included a case study of Glenogil estate, where numerous reported incidences of wildlife crime have been accompanied by a rise in capital value.

Thompson and Wilson (2020) noted that, despite operating losses, the capital (sporting) value attributed to a brace of grouse means that the value of a moor can be substantially increased (over time) by increasing the average bag size, with running costs recouped at the point of sale of the moor.

The case studies illustrate that financial performance varies between moors and between years and is inter-related with that of other estate enterprises. Many grouse moors struggle to cover their costs but

are sustained by owners because for cultural/traditional reasons and/or because they provide unpaid shooting and contribute to estate capital values (see box below).

Financial aspects of grouse moor management – examples from the case studies

The annual income of the **Bolton Castle** grouse moor varies according to the numbers of birds, with the shoot generating a profit in most years but occasional significant losses. The financial surplus generated by the shoot is important in funding other estate conservation activities, while the two gamekeepers are closely involved in conservation work, including peatland restoration. The shoot attracts a diversity of paying customers, with a mix of old money and new money.

Langholm Moor was historically wholly owned by Buccleuch Estates and managed as a driven grouse shoot, until this became unviable in the late 1990s. Attempts to restore driven grouse shooting through enhanced moorland management under the Langholm Moor Demonstration Project (LMDP) between 2008 and 2017 did not succeed in achieving sufficient grouse numbers to restore a viable driven grouse shoot.

At **Peak Naze**, shooting is undertaken by a syndicate of local businessmen and professionals from the Manchester and Sheffield areas, who share the annual costs of management. Similar arrangements occur on other moors locally. Managing the grouse shoot costs an average of £65,000 annually, comprising the wages of the gamekeeper, vehicle and equipment costs, and payments for beaters (typically £50 per day for 25 beaters on five days per year). This requires careful control of costs. These costs are shared by members of the syndicate through an equal annual fee. This model works well for smaller moors; many larger moors work on a similar principle where owners involve others to share the cost of their shooting, but typically with more commercial arrangements where management is funded by a larger number of paying clients.

The revenue from grouse shooting at **Rottal Estate** probably does not repay the levels of investment required; however, this is seen as investment in the overall natural capital value of the estate, as well as complementing other estate enterprises. While this approach to natural capital offers some benefit to the current enterprises, it also has potential to enhance the value of the estate and the returns from future management, particularly if the Scottish Government increases public payments for public goods through its land management schemes.

Four **Scottish Driven Grouse Shooting** enterprises examined by McMorran et al (2020) were all loss making or just managing to break-even in better years, and therefore subsidised by other estate activities or owner contributions. Interviewees recognised the contribution that grouse numbers can make to the capital value of their estates, though none cited this as a primary motivation because they did not envisage selling their landholding. There was a mix of national and international shooting clients on all four estates, with international clients making up 40-50% of overall custom. Revenues from grouse activity averaged £20 per hectare, compared to annual running costs of £30 per hectare. Annual losses for the grouse enterprise therefore averaged £10 per hectare (before capital expenditure), ranging from £1 to £40 per hectare across the four estates.

Four **Scottish Walked-up Grouse Shooting** enterprises examined by McMorran et al (2020) were all loss making or just managing to break-even in better years, and therefore were required to be subsidised by other estate activities or owner contributions. Other estate activities such as tourism and hydroelectricity were considered more profitable. Gamekeepers were funded from multiple sporting activities and carried out various estate functions. Interviewees expected to maintain similar levels of investment in grouse moor management, to contribute to the maintenance of sporting activities and the viability of the estates overall; while it was recognised that the quality of the sporting experience could contribute to the capital value of the estate, this was not a major motivating factor as none had plans to sell their land. Revenues from grouse activity averaged £4.68 per hectare, compared to annual running costs of £11 per hectare. Annual losses for the grouse enterprise therefore averaged £6 per hectare, ranging from £1 to £53 per hectare across the four estates.

Populations of hen harriers and other raptors have been cited as a direct determinant of the financial viability of grouse moors.

GWCT (2014) stated that;

“if there are too many harriers on a moor the shoot becomes uneconomic, the gamekeepers lose their jobs, and numbers of ground-nesting birds decline, including ones of conservation concern such as waders.”

The Langholm Moor Demonstration Project suggested that raptor predation was a major factor preventing the re-establishment of a viable driven grouse enterprise, concluding that:

“For this moor further reductions in predation pressure would probably be required to achieve and maintain the project’s target for grouse numbers” (LMDPB, 2019).

In contrast, the RSPB (2019) argued that these conflicts stemmed from unrealistic expectations regarding grouse densities and shooting practices. It argued that the LMDP was a remarkable success in that it;

“reversed decades of heather loss and restored grouse densities to those that would have been considered a sufficient basis for driven shooting as recently as the 1990s. The LMDP also shows that shooting more modest bags of grouse almost certainly would be compatible with the delivery of wider public benefits from the management of grouse moors, but this will depend on more sustainable, legal approaches which rid moors of the illegal killing of raptors and other damaging environmental practices.”



Volunteers repairing dry-stone wall, Geltsdale RSPB reserve
Andy Hay (rspb-images.com)



RSPB Dovestone
Ben Hall (rspb-images.com)

3. Economic, social and environmental impacts on grouse moor management

3.1 Economic impacts

Supporters of grouse shooting note that grouse moors provide employment in rural areas and spend money in local economies, helping to support incomes and opportunities in often remote areas with few alternative economic opportunities. The size of these impacts is uncertain and debated.

Critics note that most evidence has been collected by the industry itself and may be subject to biases.

Impacts vary between estates and fluctuate over time. Data on grouse moors can also be difficult to disentangle from those for other estate enterprises.

BASC (2015) estimated that grouse shooting supports 2,500 – 4,000 FTE jobs in Britain, based on estimates of 1,520 FTE jobs in England and Wales (Moorland Association, 2011 and undated) and between 1,072 and 2,640 FTE jobs in Scotland (Fraser of Allander Institute, 2010; Scottish Land and Estates, 2013).

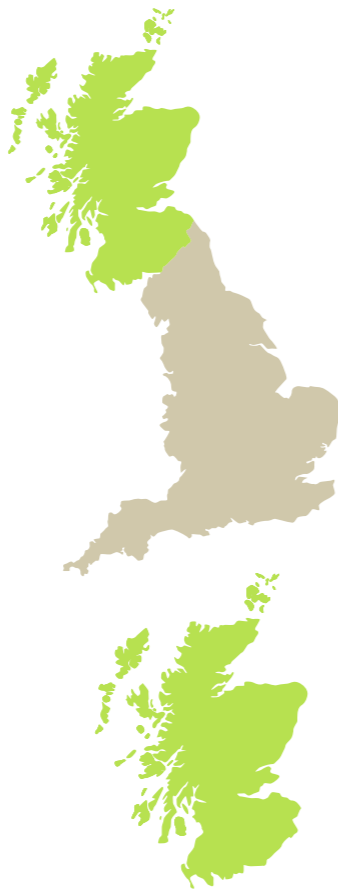
However, these estimates seem to mix up a range of different types of jobs. The FAI estimate is for direct employment, whereas the Moorland Association estimate includes both direct (700) and supply chain (820) jobs. Estimates typically scale up from survey data, raising questions about the representativeness of the data provided by respondents.

Thomson et al (2018) and GMMRG (2019) pointed to a number of data problems and challenges making it difficult to assess the economic contribution of the sector in Scotland. However, they concluded that grouse shooting and related activities can be important to some remote and fragile local economies. Their review of evidence suggested that around 2,500 FTE jobs (both direct and indirect) were reliant on the grouse moor sector in 2009 with £14.5 million spent

on wages related to grouse moor management and support activities, with a total Gross Value Added contribution of £23 million to the Scottish economy. The figures suggest that the sector accounts for approximately 0.017% of Scotland's annual GVA, and around 0.06% of GVA in rural areas.

The figures therefore suggest that the sector may support up to 4,000 FTE jobs in Great Britain if both direct employment and jobs in supplier businesses are included, though this may be an overestimate.

This includes approximately 1,500 FTE in England and 2,500 FTE in Scotland, and approximately 1,800 direct FTE jobs and 2,200 FTE jobs in supplier businesses.



4.56 million
Total rural employment in England and Scotland

£23
contribution to the Scottish economy

Total rural employment is estimated at 4.12 million in England (Defra, 2021) and 440,000 in Scotland (Scottish Government), suggesting that grouse moors support approximately 0.09% of rural jobs in the two countries combined.

The case studies indicate that rates of employment vary between moors, with grouse moors typically supporting between 0.5 and 2 direct FTE jobs per 1,000 hectares (see box below).

Direct employment – examples from the case studies

The **Bolton Castle** grouse shoot employs two full-time keepers. Another keeper is employed part-time on the low ground. The shoot provides £100,000 in wages for beaters in a good year – there are typically between 22 and 26 on a driven day. Shooting clients also employ loaders – typically local farmers – and up to eight per shoot. Total direct grouse related employment therefore amounts to approximately 4 FTE, or 1.7 FTE per thousand hectares of grouse moor.

At **Geltsdale**, employment has increased on site since the RSPB acquired the reserve, and now totals approximately 5.75 FTE – one full-time site manager, three wardens, an estate worker and an average of 1.5 seasonal research staff annually (2.5 in 2022). This amounts to approximately 1.1 direct FTE job per 1,000 hectares across the reserve.

Langholm Moor, when managed as a grouse moor, employed one keeper per grouse beat, with the core beats averaging 1,070 hectare in size. The LMDP invested approximately £215,000 annually between 2008 and 2015, employing and equipping five gamekeepers as well as a project manager. Direct grouse-related employment therefore amounted to 0.5 FTE per 1,000 hectares of moorland overall, or 1.0 FTE per 1,000 hectares across the core beats. In the new Tarras Valley Nature Reserve, the Langholm Initiative aims to create new economic opportunities through restoration of peatlands and woodlands, woodland creation, conservation grazing, eco-tourism, renewable energy, research and environmental education, thus helping to diversify the local economy and provide new forms of employment locally. The original Langholm Moor Business Plan identified the need to create 3.5 FTE jobs in estate management at the point of purchase (equivalent to 0.8 FTE per 1000 hectares covered by the Plan) and identified opportunities for considerable new job creation over time, including up to 25.6 FTE through business space provision, 20 FTE in tourism, and 12 FTE in forestry/ woodland management.

Peak Naze employs one gamekeeper, as well as providing work for beaters (typically 25 beaters on five days per year, each paid £50). Direct grouse related employment therefore amounts to 1.5 FTE over 1,000 hectares.

Rottal Estate has eight full-time employees as well as the owner – three gamekeepers (including one trainee), two housekeepers, a shepherd, a general estate worker and a personal assistant. The estate provides up to 150 days of employment for beaters on driven days (typically 25 beaters on six days per year). The employment supported by grouse moor management is difficult to separate from that of other estate enterprises.

Four estates with **Driven grouse moors in Scotland** examined by McMorran et al (2020) employed an average of 6.0 FTE sporting staff (keepers, shepherd, ghillie, admin, handyman), with an average of 3.5 FTEs attributed to grouse management. Total grouse related employment, including casual employment of beaters, averaged 5.1 FTE per estate. Grouse-related staff costs averaged £13.93 per hectare (ranging from £8.11 to £31.84/ha per estate). On average grouse activities on the case study estates supported 0.7 FTE per 1,000 hectares (ranging from 0.4 to 2.2 FTE per 1000 hectare).

Four estates with **walked-up grouse moors in Scotland** examined by McMorran et al (2020) employed an average of 2.8 FTE sporting staff (keepers, stalkers, estate staff), with an average of 1.2 FTEs attributed to grouse management. Overall, they employed 0.5 FTE sporting workers, and 0.2 grouse specific FTE workers per 1,000 hectares of grouse moor. Grouse-related staff costs averaged £5.97 per hectare, 45% of overall sporting staffing costs, and ranged from £1.17 to £33.34/ha.

Grouse moor management helps to support a range of supplier businesses through expenditures on vehicles and fuel, equipment, contracting, materials, catering and support services (see box below).

Benefits to supplier businesses – examples from the case studies

The **Bolton Castle** grouse moor provides revenue for local businesses, including garages, fuel stations, restaurants, pubs and dry cleaners, who benefit from expenditures by the estate and its visitors.

Over eight years, **Langholm Moor** Demonstration Project invested around £1.5 million of capital funds from both public (Scottish Rural Development Programme and SNH) and private sources on fencing, new and upgraded tracks, grazing control and heather reseeded.

At **Peak Naze**, the £65,000 annual cost of managing the grouse moor pays for expenditures on vehicle and equipment costs, as well as wages for the gamekeeper and payments for beaters.

At **Rottal Estate**, expenditures in maintaining estate vehicles benefit the local garage and petrol station.

Four **Driven grouse moors in Scotland** examined by McMorran et al (2020) made capital expenditure on grouse moor management averaging £8.07 per hectare (ranging from £1.03 to £68.05/ha per estate). Overall, 59% of this capital spend was on property development or refurbishment, 29% on vehicles, 6% on sporting equipment and 8% on fencing and drainage. 76% of this spending was made locally (within 20 miles of the estates) and a further 20% regionally (20–50 miles). Annual recurrent spend on grouse moor management averaged £14.30/ha across the four estates (ranging from £7.44 to £37.63/ha). Overall, 20% of this spending was on vehicle maintenance and running costs, 13% on building repairs, 10% on land management inputs, 9% on hospitality, and the remainder on a variety of other goods and services. 71% of this spending was made within 50 miles of the estates.

Four **Walked-up grouse moors in Scotland** examined by McMorran et al (2020) made annual capital expenditure averaging £1.90 per hectare (ranging from £0.28 to £8.18/ha per estate). Overall, 43% of this capital spend was on vehicles, 29% on buildings and refurbishments, 22% on new sporting infrastructure, 8% on sporting equipment, 7% on roads and tracks and 6% on fencing. Over 80% of this spending was made within 50 miles of the estates. Annual recurrent spend on grouse moor management averaged £5.16/ha across the four estates (ranging from £1.03 to £19.18/ha). Overall, 32% of this spend was on agents/contractors, 23% on vehicle maintenance and running costs, 15% on building repairs, 15% on land management inputs and 8% on tax/business rates. 53% of this spending was made within 50 miles of the estates, indicating larger levels of leakage for spending on agents, insurance, taxation and some sporting related costs.

Benefits to food, drink and tourism businesses – examples from the case studies

Bolton Castle estate provides lunches on shooting days, but not accommodation. Local businesses – including a pub and a bed and breakfast provider – cater for grouse shooting clients. One business estimated that it lost revenue of £110,000 in a recent year when no grouse shooting took place on the estate. The local tourism industry benefits from walkers in the summer months, with grouse shooting providing an important share of business in September and October.

Geltsdale reserve has a small visitor centre and attracts annual visits of about 6,000, bringing some visitor spending into the local economy.

At **Peak Naze**, the local pub benefits on shooting days, when members of the syndicate meet there for breakfast and dinner.

Rottal Estate sources as much food as possible locally, benefiting local butchers and bakers. Visitors often eat lunch and sometimes stay in local pubs and hotels, while the estate also hires additional chefs and front of house staff to cater for events.

At four **Driven grouse moors in Scotland** examined by McMorran et al (2020), catering and accommodation provision was a more established feature compared to walked-up estates, with all four estates either utilising on-estate accommodation or making use of local hotels as accommodation providers.

Expenditure by shooting clients also helps to support employment and revenues for businesses providing accommodation, food and drink (shown above).

Scotland's Regional Moorland Groups (2021) reported survey findings that downstream spending in remote communities by Scotland's grouse moors increased to over £15m in 2021, and that employment was retained, even though the season was badly affected by snow.

Comparing the economic impact of grouse moors with alternative land uses is not straightforward, as different land uses have different profiles of employment, expenditure and revenue over time, as well as varying by site and facing uncertainties regarding future prospects. **However, studies show that alternative moorland land uses can generate comparable spending and revenue impacts to driven grouse shooting on a per hectare basis.**

McMorran et al (2020) compared the economic impacts of grouse moor management to those of other land uses. They concluded that alternative moorland land uses can generate comparable spending and revenue impacts (and in some cases more consistent revenue) to driven grouse shooting on a per hectare basis (see details on page 34).

In particular:

- Forestry has uneven economic impacts over time, with higher up front capital expenditures but lower ongoing running costs than driven grouse moors, but potentially superior net revenues (through sales of carbon credits).
- Conservation management can involve higher per hectare management expenditures but generates lower revenues and may depend on public subsidies.
- Deer management involves relatively low costs and revenues but can complement other land uses.
- Sheep farming can incur higher costs and generate higher revenues than most other land uses including driven grouse moor management but is highly dependent on public subsidies.
- Renewable energy involves high costs (especially capital costs) and revenues and can support comparable levels of employment to other uses on a per hectare basis.
- It should be noted that different enterprises may complement one another on an estate and cannot be fully separated in accounting terms. For example, grouse moors are typically also grazed by sheep, which receive public subsidies.



Isles of Glencoe Hotel in Scotland
Shutterstock

Comparative socio-economic indicators for the moorland land uses derived from case studies <i>Source: McMorran et al (2020)</i>									
Impact	Walk-up grouse	Driven grouse	Forestry	Woodland creation ¹	Conservation	Deer stalking	Sheep	Renewables - Hydro ²	Renewables - Wind
Case study enterprises	4	4	1	3	2	3	4	3	3
Average annual capital costs	£10,465 (£2/ha)	£59,096 (£8/ha)	£173,000 (£41/ha)	£32,924 (£151/ha)	£153,815 (£10/ha)	£45,624 (£2/ha)	£16,341 (£7/ha)	£1.4m (build cost); (£93,444 over 15yrs (£4,024/kW)	£89m (developer) costs (n/a)
Average running costs (incl. staff costs)	£61,247 (£11/ha)	£219,292 (£30/ha)	£102,056 (£30/ha)	£26,548 (£122/ha)	£480,284 (£29/ha)	£182,813 (£10/ha)	£87,019 (£36/ha)	£37,172 (n/a)	Est. £4.8-5m for larger examples (n/a)
Average revenue	£26,281 (£5/ha)	£147,916 (£20/ha)	£220,000 (£53/ha)	£63,039 (£290/ha)	£313,816 (£19/ha)	£87,826 (£5/ha)	£146,971 (£61/ha)	£192,280 (£552/kW)	£334,000 (£245/ha wind farm or £55/ha estate)
Hectares per FTE / average FTEs	4,865 (1.2)	1,446 (5)	4,000 (1)	n/a	2,100 (8)	4,005 (4.8)	1,793 (1.4)	n/a (0.2)	n/a (5)
Net balance (before capital)	-£34,966 (-£6/ha)	-£71,375 (-£10/ha)	£117,944 (£28/ha)	£36,491 (£168/ha)	-£166,468 (-£10/ha)	-£94,987 (-£5/ha)	£59,952 (£25/ha)	£148,878 (£428/kW)	n/a
Net balance (capital included)	-£45,431 (-£8/ha)	-£130,472 (-£18/ha)	-£55,056 (-£13/ha)	£3,567 (16/ha)	-£320,283 (-£20/ha)	-£140,611 (-£7/ha)	£43,611 (£18/ha)	£92,606 (£266/kW)	n/a
Average revenue (%) from public funding ³	0%	0%	47%	86%	79%	0%	66%	69%	n/a
Level of local-regional spending	Moderate/High	High	Low/Moderate	Low/Moderate	Moderate/High	High	High	Moderate/High	Moderate
Revenue per £1 spent	£0.43	£0.67	£2.15	£2.37	£0.65	£0.48	£1.69	£1.93 (£4.43 after payback)	n/a

¹ Data relates to annual costs and revenues averaged over 15 years. Average annual costs and per/ha costs are considerably lower over a full rotation.

² Average annual running costs and revenues exclude the initial capital costs – but the net balance including repayment of capital investment is shown over 15 years.

³ The public funding contributions only relate to the specified land use and a low or zero percent figure does not imply that the estate within which the land use/enterprise sits did not receiving any public funding in relation to other activities (e.g. farming, conservation). Furthermore, some estate land uses which may receive public funding (e.g. sheep grazing) overlap with, complement, and form part of the management of the moorland area over which grouse shooting and other activities may take place. Landowners may also receive public funding for deer fencing but this is generally recorded as relating to forestry management as opposed to deer revenues.

Other analyses (undertaken for organisations on different sides of the grouse moor debate) give different assessments of the economic impact of alternative land uses. Common Weal (2018) estimated that grouse shooting generates less GVA per hectare and requires more hectares per job than alternative land uses (agriculture, forestry, energy and housing), arguing that multiple uses of land will be more economically and socially beneficial and giving example maps of upland land uses. On the other hand, Denny et al (2021) considered alternative land uses and concluded that none of them are likely to have the socio-economic benefits of driven grouse shooting, and that rural economies and communities would suffer in its absence.

Similarly, stakeholders interviewed for this study gave mixed views about whether, if grouse shooting were to decline, alternative land uses could replace its contribution local economies. Some grouse shooting interests expressed the view that this was unlikely, particularly in more remote areas; others expressed the view that land use change, focused on rewilding and the development of nature-based economies, could deliver greater benefits than grouse moor management does at present.

Public funding, regulatory and biophysical constraints may limit the growth in alternative uses of grouse moors.

Denny et al (2021) argued that alternatives are dependent on public subsidy or owner benevolence (e.g. sheep farming, conservation, forestry, renewables) or subject to regulatory (e.g. windfarms, forestry) and biophysical (e.g. farming, forestry, renewables, housing) constraints, limiting their potential to replace grouse moor management. GMMRG (2019) made similar comments about such constraints and urged caution in extrapolating the value of alternative land uses across Scotland’s moorland.



A farmer on a quad bike, Horton-in-Ribblesdale, Yorkshire Dales National Park
Alamy

GMMRG (2019) noted that, at present, as a result of grants or subsidies, the afforestation of moorland, where feasible, is more profitable for the owner than retaining the moorland for red grouse. The majority of grouse moor enterprises are not profitable but still contribute significantly to the local economy even in a season when there is no shooting. Grouse shooting is seasonally inconsistent and generally loss making and as a result is vulnerable to any negative changes in the natural or regulatory environment. They considered that re-wilding could make a useful contribution but in terms of geographic coverage or national economic contribution is not currently considered to be a realistic alternative, at least in the short-term, though this could change with developments in government policy and the impacts of climate change, which could have negative impacts on grouse moors (including effects on food and breeding success, disease, wildfires, land use change). More recent experience, however, suggests that increasing numbers of investors are seeing value in investments in land management in pursuit of natural capital and carbon objectives (see Section 5).

Crowle et al (2022) challenged a suggestion by Newton (2020) that reductions in grouse moor management would lead to significant land use change, including through intensive grazing and afforestation. They argued that nature conservation designations (67% of upland grouse moor in England is SSSI), landscape designations (84% is National Park or AONB), EIA regulations, agri-environment incentives, biophysical constraints and the lack of profitability of increased stocking densities would limit land use and land management change; instead they presented a vision for less intensive management of the English uplands, following a natural capital approach and enhancing carbon storage and sequestration and the delivery of other ecosystem services.

Data suggest that grouse moor management provides low wages compared to alternative jobs in the uplands.

Common Weal (2021) estimated (from industry estimates of employment and wages) that grouse moor management provides an average income of £11,401 per direct and indirect job, noted that this is less than the minimum wage for a full-time job, and found that alternative jobs (land manager, wildlife manager, commercial forestry, wood processing, deer stalking/venison, horticulture, energy engineer, housebuilding and ecotourism) would pay higher incomes.

This finding is consistent with data from other studies. Since gamekeeper wages are much higher than this, it is likely to be partly explained by the amount of casual labour employed on grouse moors. It should also be noted that many gamekeepers are provided with housing and a vehicle as part of their employment package, suggesting that wages do not fully account for incomes overall. However, **it is also possible that employment has been overstated** (e.g. by upscaling from unrepresentative samples and/or counting jobs partly involving other estate activities).

It has been suggested that grouse moors may have negative as well as positive effects on local economies, by discouraging tourism and related economic diversification, and reducing ecosystem services.

However, while negative environmental effects are well documented, there is little firm evidence of effects on local economies.

Thomson et al (2018) noted that there may be negative economic impacts through externalities, and adverse effects on tourism through raptor persecution. If there are smaller raptor populations in and around grouse moors, it may have a knock-on effect to the wider, non-game related recreation and tourism earning potential of local economies. They cited



evidence of the positive impacts of bird watching and wildlife tourism in Scotland. For example, Bryden et al. (2010) estimated that nature-based tourism accounted for nearly 40% of tourism expenditure in Scotland, generating £1.4 billion revenue and 39,000 FTE jobs. Visit Scotland (2017) estimated that in 2015 there were 494,000 domestic visits and 2.7 million accommodation nights generating £187 million spend on visits that included “*watching wildlife/bird watching.*” Progressive (2015) showed that wildlife/bird watching was an important motivation for visits to the Cairngorms. Crowle et al (2022) contrasted ONS (2021) estimates that nature contributed £12 billion to tourism and leisure spending in the UK in 2019, with estimates that grouse shooting contributes £12 million per year for rural communities (Moorland Association, 2021).

Data relating to wildlife recreation and tourism on moorland areas of different management regimes do not appear to exist, meaning it is hard to determine the extent of any negative impact that driven grouse moors may have.

The figures above suggest that wildlife tourism is worth much more to the British economy than grouse shooting. It is uncertain whether ecotourism growth would offset any decline in the grouse shooting sector, but it clearly has potential to do so.



3.2 Social impacts

Grouse moors are generally recognised to play a role in maintaining rural communities in upland areas, by supporting employment and contributing to the local economy. They may also contribute to cultural heritage and community identity.

Most stakeholders interviewed recognised that grouse moors contribute to rural communities by employing gamekeepers, providing jobs in tourism and other businesses, and therefore helping to sustain schools and other rural services. However, conflicting views were expressed about whether, if grouse shooting were to decline, alternative land use and land management practices could deliver similar or greater benefits, both directly and through their contribution to tourism. Some interviewees also stressed the contribution that grouse shooting makes to the culture of upland communities; others argued that being part of our cultural heritage does not necessarily make something sustainable or acceptable now or in the future.

Thomson et al (2018) found that there is evidence that the grouse shooting industry leads to some localised population retention, maintenance of cultural aspects and community identity (although little is reported on the social and cultural aspects of alternative land uses).

Surveys of communities in three grouse shooting areas in Scotland, commissioned by shooting interests, found that local people are on balance supportive of the sector, but also revealed some concern about negative environmental impacts.

McMorran et al (2015) reported results of a community survey in Monadhliath and the Angus Glens, in a study funded by local estates. 49% of respondents in Monadhliath and 26% in the Angus Glens reported personal positive effects, while 70% in

Angus and 53% in the Monadhliath perceived community-level benefits, with employment and spend the most important benefits at personal and community levels. In Angus, 8% did not recognise any community-level benefits, while 15% did not recognise community-level benefits in the Monadhliath. In Angus 35% reported either direct or indirect dependence on the grouse shooting industry for their livelihoods, compared to 21% in the Monadhliath. Business interviewees confirmed that the industry provided income for businesses directly and through shooting parties spending locally.

A majority of community survey respondents in both areas felt they had good or some awareness of estate management. More respondents in Angus were satisfied (48%) with the level of communication between estates and communities than unsatisfied (20%), with opinion more divided in the Monadhliath (31% satisfied, 35% unsatisfied). A degree of perceived 'disconnect', between estates and communities was evident in both areas, with significant numbers (40%) in both areas expressing interest in learning more about grouse shooting. Community survey and estate survey respondents recognised environmental benefits and negative environmental impacts linked with the grouse shooting industry. The majority of community survey respondents generally agree with grouse moor management practices, with a majority in both areas also viewing grouse moors as attractive or extremely attractive. A concern common to both areas was illegal raptor persecution and how this could be effectively policed and stopped in the future. A majority of community survey respondents were supportive of the continuation or expansion of grouse shooting in both areas, though this was greater in Angus (74%) than Monadhliath (52%).

Social and community impacts – examples from the case studies

The **Bolton Castle** grouse shoot is in a remote rural area and plays an important role in bringing people together on driven shoot days, including beaters and loaders – often from the farming community – as well as shooting clients and caterers. Driven grouse shooting is said to bring together people from diverse backgrounds and provide camaraderie and healthy exercise.

The area around **Langholm Moor** has suffered from industrial decline, with a paucity of alternative employment opportunities, limited diversification and little new investment in new housing or business. There is a declining and aging population, with young people leaving to find employment and further education. The Langholm Initiative sees community ownership as a catalytic step in community development and empowerment, enabling local people to make decisions about how assets within their communities are used. Volunteering and environmental education form an important part of plans for the Tarras Valley Nature Reserve. There are plans to develop a derelict property at Lodgegill as a field centre and bunk house for environmental education, research, volunteering and walking. Community ownership will allow the improvement of picnic areas, footpaths, hides and parking facilities for the enjoyment of all visitors.

The **Peak Naze** grouse moor helps to enhance social interaction in a rural upland area, through engagement with the local farming community, members of the syndicate and beaters. Syndicate members benefit socially, meeting at the local pub for breakfast and dinner on shoot days. The shoot provides income for the pub as well as beaters.

Rottal Estate provides local employment and helps to maintain demand for local services. The estate works in partnership with organisations such as the RSPB, Cairngorm National Park Authority, NatureScot and the local fishery board.

Four **Driven grouse moors in Scotland** examined by McMorran et al (2020) all accommodated gamekeeping staff in tied housing and provided additional expenses including dog allowances and vehicles. In all four cases sporting employees had young families with children attending local schools. The four estates were engaged with the local community to varying extents, with one particularly involved with its local primary schools and facilitating estate school visits to demonstrate estate-based land uses to local children.

An earlier case study by McMorran (2009) of Tomintoul and Strathdon, funded by the Scottish Countryside Alliance, highlighted the importance of the grouse shooting industry, in terms of socio-economic benefits, and indicated that the local community was generally supportive of the sector. The case study found that the presence of gamekeepers and their families in the community was the most significant community-level social and economic benefit of the grouse shooting industry. Some stakeholders interviewed mentioned that there is discontent in some local communities, particularly in areas under intensive management, citing incidents

of anti-social behaviour and intimidation, though evidence is mostly anecdotal.

Social benefits vary and are likely to be concentrated in areas with high levels of driven grouse shooting close to rural communities.

McMorran et al (2015) found that impacts are likely to be concentrated in specific high activity areas close to communities. In other areas, community-level benefits of grouse shooting may be absent or more dispersed, dependent largely on the land cover and presence of estates with sporting objectives.

Examples of social and community impacts from the case studies are shown above.

The types of jobs supported by grouse moors vary widely in their quality and social benefits.

Gamekeepers tend to be well-trained, have full-time jobs, play an important role in communities, and report high levels of job satisfaction. On the other hand, driven grouse shooting also employs significant amounts of casual labour (e.g. beaters), which is highly seasonal, with low skills and wages, and is often imported from outside the local area.

Thomson et al (2020) reported a survey of gamekeepers. 95% of respondents were male. 60% of the respondents had more than 20 years working experience in the profession. Only 11% of the respondents had no formal training pertaining to their job whilst nearly 50% had a further education qualification and 25% a higher education qualification relating to gamekeeping. Gamekeeping apprenticeships had been completed by 14% of the respondents and 63% of respondents receive on-the-job training. Respondents reported that they worked an average of 63 hours per week during peak working periods and 41 hours per week during off-peak periods. Most were involved in a variety of estate management, deer management and game management activities as well as grouse management. Head keepers, beat keepers and under keepers were mostly employed full-time. Of those in full-time employment as a gamekeeper, stalker or ghillie, 58% earned £15,000 to £25,000 whilst 31% earned £25,000 to £35,000. 60% of the respondents lived in tied housing, sometimes provided rent-free, whilst 25% resided in their own house and 6% stayed in privately rented accommodation. 86% of those involved in driven grouse work expressed very high levels of job satisfaction, but there was widespread concern and pessimism about the future of the profession, and public perceptions of it. The authors gave the caveat that there were 152 responses to the survey, amounting to 10%-13% of the population of gamekeepers, stalkers and ghillies in Scotland, and that there was therefore a risk of response biases.

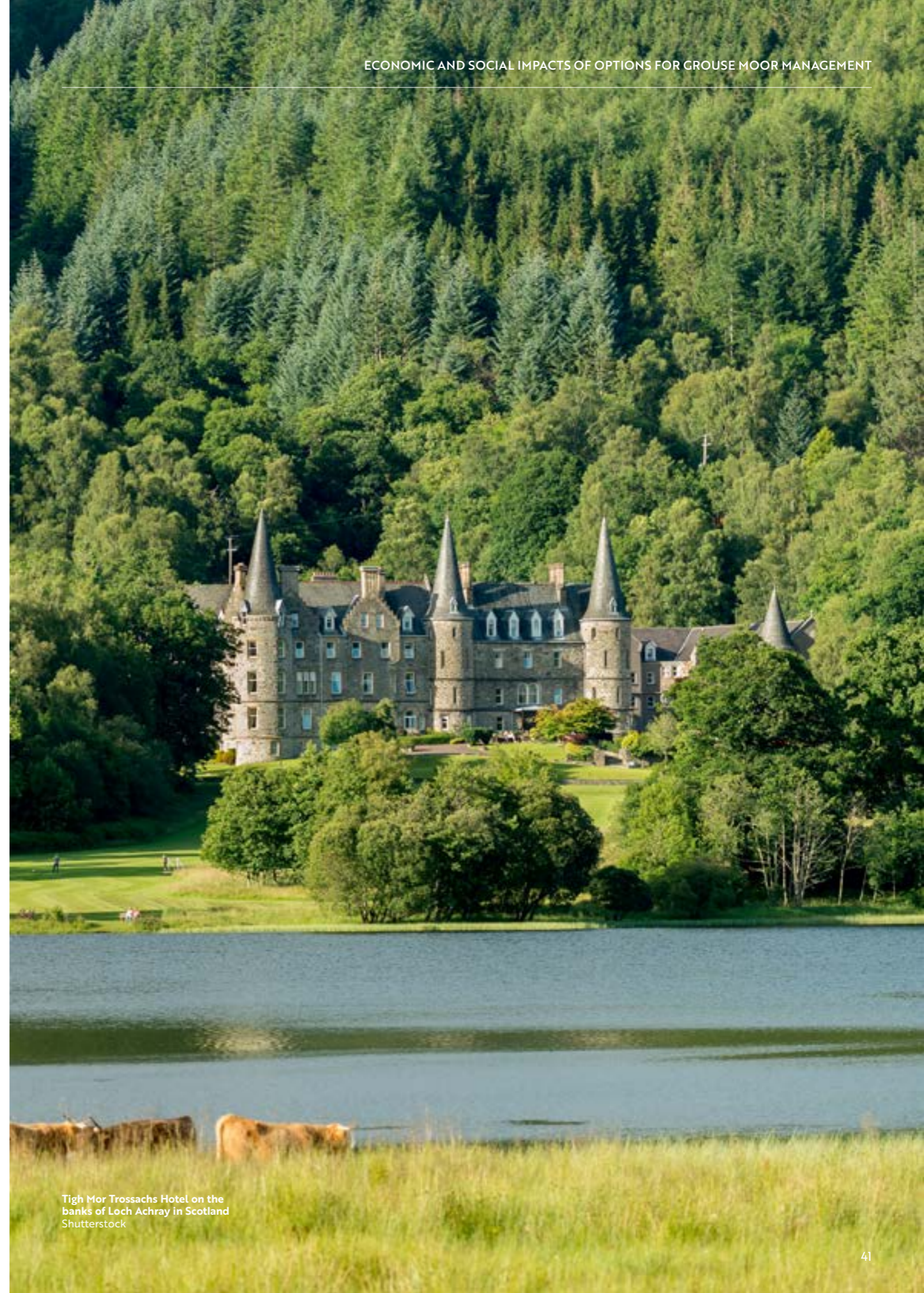
One report suggests that intensification of grouse moor management can have negative social impacts, by displacing other forms of employment.

Wightman and Tingay (2015) stated that in many parts of Scotland, agricultural tenancies are being terminated and the estate owner is taking over agricultural operations, with claims that on at least one estate, financial inducements and intimidatory pressure were deployed to persuade tenants to give up their tenancies.

From a wider societal perspective, concerns have been expressed about the impacts of driven grouse shooting on animal welfare.

For example, a report by Revive (2020) highlighted the animal welfare impacts of intensive grouse moor management. It noted that thousands of animals are trapped, snared and killed in Scotland annually to protect grouse shooting for sport, often using inhumane methods. These include weasels and stoats caught in spring traps, crows caught in cage traps, foxes caught in snares, mountain hares shot in mass culls, and raptors killed illegally. It argued that accidental victims are numerous and include protected species such as red squirrels, and domestic animals such as pet cats and dogs. It argued that these methods of 'wildlife control' are archaic and do not meet widely accepted standards of animal welfare or ethical wildlife management. Similar concerns have been documented by a range of animal welfare and conservation organisations.

Several stakeholders interviewed noted the importance of public opinion and that there is a growing recognition in the sector that it needs to improve its public image if it is to have a sustainable future.



Tigh Mor Trossachs Hotel on the banks of Loch Achray in Scotland
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3.3 Environmental Impacts

3.3.1 Biodiversity

Red grouse is an amber listed species, with populations closely associated with the extent of heather moorland and its management.

The population has increased in recent years and was estimated at 265,000 pairs in 2016 (HoC Library, 2021). Rotational burning has been shown to raise grouse breeding success and post breeding populations (Robertson et al, 2017).

Grouse moor management, and particularly predator control, can also benefit other species, but can also have a range of negative impacts on biodiversity.

Fletcher et al (2010) found that lapwing, golden plover, curlew, red grouse and meadow pipit bred on average three times more successfully when predator control was performed, with positive effects on populations.

Sotherton et al (2009) pointed to correlations between moorland managed for grouse and conservation designations, which they attributed to high populations of ground nesting birds which benefit from predator control. They also noted that loss of heather cover has been greater in areas not managed for grouse. They pointed to studies showing higher populations and breeding success on grouse moors for curlew, golden plover and lapwing among others.

GWCT research also found that driven grouse moors have higher densities of mountain hare in Scotland, likely the result of predator control (Hesford et al, 2019). Thompson and Wilson (2020) found that, while habitat management remains highly favourable for this species, culling of mountain hares for louping-ill control may have driven recent, severe declines in their populations. They also found that medication used to control grouse disease poses risks to aquatic ecosystems.

Heather burning can have a range of positive and negative effects on biodiversity, and its overall impact is debated.

Overall effects of muirburn on biodiversity are mixed (Booker et al, 2018). Thompson and Wilson (2020) found no evidence that burning helped species other than red grouse. Thomson et al (2020) reported positive correlations with some bird species but were not able to separate the impact of heather burning itself from wider moorland management practices. A recent NatureScot review (Holland et al, 2022) found that the impact and influence of muirburn on moorland habitats and species is complex. Moorland management (including managed burning) affects the abundance and diversity of bird species, with some species benefiting while others do not.



European golden plover
Oliver Smart (rspb-images.com)



Pools in blanket bog, RSPB Forsinard Flows Nature Reserve
Mike Read (rspb-images.com)

GMMRG (2019) concluded that well-managed muirburn normally achieves its desired aims of providing good habitat for grouse and other species, but that wider impacts are highly contested, with variable and sometimes contradictory findings from different experiments and monitoring work. The benefits of muirburn in providing young, more nutritious shoots for grouse (and livestock, deer and mountain hares) are well-established. There is also evidence that regular muirburn managed in accordance with the Muirburn Code can increase above-ground biodiversity (evidence includes plants, birds, invertebrates) compared with unburnt moorland, particularly in dry heaths, through the creation of mosaics of different ages of heather giving a mix of habitat structures. Muirburn restricts colonisation by woodland that would represent the natural habitat type in many of these 'cultural' moorland areas. There is also strong evidence of detrimental effects in some situations – on biodiversity, hydrology, soil stability and other components of the system. Where fires have been sufficiently intense to burn into the moss/litter layer/

soil/peat (in that order), they greatly increase the likelihood of detrimental impacts. The report concluded that the strongest, but still inconclusive evidence of long-term detrimental impacts relates to blanket bog/wet heath areas, with regular muirburn widely assumed to be detrimental to peat-forming plant species. However, this is not conclusive as several studies have found the opposite, including a long-term (60 years) experimental study in the Pennines. Grant et al (2012) found similarly mixed evidence of the impacts of muirburn.

Crowle et al (2022) pointed out that spring burning can contribute to the failure of first nesting attempts. The bird species most affected are those with 10% or more of first eggs laid before 15 April, the end of the burning season in the English uplands. This includes several waders, short-eared owl and stonechat. Another possible effect relates to the relative scarcity of the old, mature stands of heather on intensively burnt moors that are favoured for nesting by some species such as merlin and hen harrier, though effects on populations are unknown.

Grouse moor management has helped to maintain heather cover, and large areas of grouse moors have conservation designations, though there is also evidence of negative impacts on designated sites from intensive burning and raptor persecution.

GWCT (2022) stated that, since the second world war, 20% of UK heather moorland has been lost to commercial coniferous plantations and even greater areas to overgrazing due to CAP incentives. They argued that the enduring commitment to grouse management prevented an even greater area from disappearing. More positively, they claimed that adaptive grouse management has been shown to provide the ideal approach to actively conserving the internationally important habitats and species for which many of our uplands are designated. They suggested that grouse moor management should be celebrated as an integrated solution to land use that preserves heather moorland and offers a way of restoring what has been lost.

Crowle et al (2022) presented data that 67% of the grouse moor area above the Moorland Line in England is designated SSSI. However, they noted that intensive management of land for driven grouse

shooting has a range of negative as well as positive effects on biodiversity, and that there is considerable debate about its environmental sustainability.

BASC (undated) reported negative effects on a range of bird species (lapwing, golden plover, curlew, hen harrier and ring ouzel) at the Berwyn SAC following cessation of grouse shooting, as well as declines in hen harriers, red grouse and breeding waders at Langholm Moor following cessation of moorland management and predator control, resulting in unfavourable SSSI and SPA status.

On the other hand, Tingay and Wightman (2018) quoted evidence from Scottish Natural Heritage (2010) that inappropriate burning is one of the main reasons for poor condition of upland sites designated for their conservation value, contributing to the reasons for unfavourable condition on 87% of unfavourable upland bog features in Scotland.

The case studies illustrate varying approaches to management of designated sites, with changes in management designed to deliver a more diverse vegetation structure at Geltsdale contrasting with a more traditional approach to grouse moor management at Bolton Castle (below).

Management of designated sites – examples from the case studies

At **Bolton Castle**, the SSSI was designated in 1995 as an outstanding example of North Pennines moorland, having an extensive and complete west to east transition from blanket bog to dry heathland and supporting an important assemblage of moorland breeding birds. SSSI condition assessments focus on vegetation indicator species. The proportion of quadrats including the threshold of seven indicator species has increased from 30% to 70% and is therefore showing a positive transition towards the 90% required to reach favourable condition.

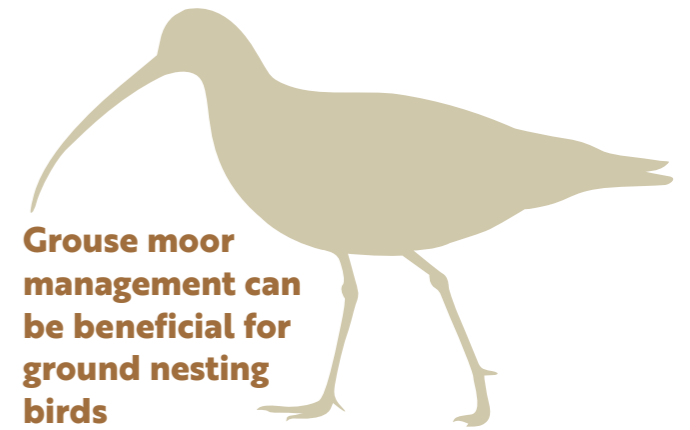
The **Geltsdale** reserve is within the North Pennines Moors SPA and SAC, and the Geltsdale and Glendue Fells SSSI and forms part of the North Pennines AONB. The European designations recognise the particular importance of the area's blanket bog and dwarf shrub heath, alkaline fen, ash and oak woodlands, and its upland-bird assemblage. The combination of drainage, burning and sheep grazing left significant areas of bare and eroding peat. By the late 1990s, over 90% of the blanket bog within the Geltsdale and Glendue Fells SSSI had been assessed by English Nature as being in unfavourable condition. Changes to vegetation management have been agreed with Natural England; although changes in vegetation structure have adverse effects on populations of some breeding waders (notably golden plover), the local NE advisor has argued for further increases in scrub than are currently present, to deliver wider benefits for biodiversity.

There is strong evidence that illegal persecution is a major factor in the disappearance of hen harriers and golden eagles from UK grouse moors, limiting their ranges and populations.

Murgatroyd et al (2019) concluded from satellite data that hen harriers in Britain suffer elevated levels of mortality on grouse moors, which is most likely the result of illegal killing. Thompson and Wilson (2020) cited evidence that satellite tracking technology has revealed that excess, premature deaths of golden eagles and hen harriers are strongly spatially associated with driven grouse moors. The illegal killing of both species continues to limit their breeding populations and ranges, with recent national surveys finding declines and low levels of territory occupancy associated with grouse moor areas. In contrast, as found in the Langholm Moor Demonstration Project, in the absence of illegal killing, grouse moor management can be beneficial for ground-nesting birds, including hen harrier, curlew, golden plover and snipe. Newton (2020) found evidence that in recent decades the populations of some species have declined on and around grouse moors, including hen harrier, peregrine falcon and golden eagle, and more locally northern goshawk and red kite, in all of which illegal killing has been sufficient to affect numbers over wider areas.

Illegal persecution results from conflicts between raptors (especially hen harriers) and red grouse, with evidence demonstrating that (at least in some circumstances) raptor populations can affect the economic viability of grouse shooting.

GMMRG (2019) concluded that the Langholm project showed that if other predators are controlled, raptors are the main remaining predators and in some circumstances, hen harrier predation can reduce grouse to such low levels as to make driven shooting impracticable. Diversionary feeding has been shown to reduce rates of grouse predation by hen harriers.



Grouse moor management can be beneficial for ground nesting birds

Despite the proven benefits of deploying diversionary feeding, most estates have not tried it largely because it is not considered to be cost effective.

All stakeholders interviewed for this study said that they were opposed to the illegal killing of raptors. Most expressed the view that grouse shooting is compatible with raptor conservation. Some felt that this would require a change in attitudes and a less intensive model, where grouse shooting (either walked up or driven) would have lower bags and enjoyment of wildlife (including raptors) would form part of the experience. The case studies highlight that there are conflicts between raptors and grouse moor managers on some grouse moors, but that some estate managers see raptors as an important part of the natural experience that grouse shooting offers (see page 46).

There are differing views regarding the balance of positive and negative impacts on biodiversity, and their implications for management.

GMMRG (2019) found a shortage of robust evidence on many of the environmental impacts of grouse moor management practices. Complexity, as well as differing values, have contributed to a very heated debate, with what is deemed environmentally unacceptable to some viewed as beneficial to others. Many species in addition to grouse (notably waders) benefit from prevailing management practices, while predators do not; but many smaller impacts are less well understood.

Raptors and grouse moors – examples from the case studies

Bolton Castle estate supports the hen harrier brood management scheme, which is seen as a good way of increasing the species population and range. The estate has served as a receptor site for the scheme and believes hen harriers can co-exist with driven grouse shooting, but that more than one pair can adversely impact on grouse numbers.

At **Geltsdale**, hen harriers attempt to nest annually but breeding success has been affected by a series of unexplained disappearances of breeding birds, believed to be linked to illegal persecution on neighbouring moors.

At **Langholm Moor**, between 1992 and 1997, the Joint Raptor Study measured the scale of raptor predation on grouse and worked out the likely effect this would have on shooting and subsequent breeding stocks of grouse. It showed that predation by raptors could prevent the recovery of a red grouse population and brought about an increase in the hen harrier population, which peaked at 20 pairs in 1997, leading to the moor being designated as a SPA for the species. Raptor predation at Langholm reduced autumn grouse abundance by 50%, leading to the re-deployment of gamekeepers and cessation of driven grouse shooting. These findings questioned the viability of driven grouse shooting at the site, in the absence of wildlife crime.

At **Peak Naze**, the grouse moor manager welcomes raptors, as part of the natural experience, and does not see them as a problem for the shoot, providing the habitat is well managed and other predators are controlled.

At **Rottal Estate**, raptors are seen as forming an important part of the natural capital and enhancing the overall natural experience that the estate offers its shooting clients.

Negative effects include raptor persecution and detrimental impacts of muirburn, in some situations, on biodiversity, hydrology, soil stability and other components of the system, while further evidence is needed of the conservation status of mountain hares.

Sotherton et al (2009, 2017) acknowledged that gamekeepers are responsible for the absence of hen harriers from most English and Scottish grouse moors but argued that this conflict should not be resolved through lower intensity management, on the grounds that this would reduce wider conservation benefits, including benefits for red grouse, other ground nesting birds and mountain hares. Sotherton et al (2017) called for alternative solutions to conflicts between grouse moors and harriers (e.g. diversionary feeding, closer working with the Raptor Persecution Priority Delivery Group, nest and winter roost protection, a southern re-introduction and a trial brood management scheme).

In contrast, Thompson et al (2016) argued that, while grouse moor management benefits red grouse and some ground nesting birds, there is also growing evidence of negative environmental impacts and societal costs associated with increasingly intensive management practices. Overall, there is increasing evidence that driven grouse shooting contravenes principles of wise use, the requirement not to jeopardise conservation efforts, and sustainable ecosystem management. They argued that alternative shooting styles and cultures (e.g. walked-up shooting or driven shooting of smaller bags) would integrate more readily with wider environmental and societal objectives for sustainable moorland management.

The case studies demonstrate that grouse moors can support healthy populations of ground nesting birds (especially breeding waders); cessation of grouse moor management at Geltsdale has reduced breeding wader numbers while benefiting a wider range of species (see box to the right).

Biodiversity impacts – examples from the case studies

At **Bolton Castle**, the moorland supports a range of important bird species including curlew, golden plover, lapwing, snipe, redshank, ring ouzel, merlin and hen harrier. Breeding Bird Survey records show strong increases in populations of a range of wader species, especially golden plover, lapwing and curlew, between 2007 and 2016. A BTO survey of upland waders found that the tetrad had amongst the highest populations of curlew and lapwings nationally in 2016. Wader populations have benefited from keeping and predator control. They benefit from the scale of available habitat – small patches of habitat in the lower areas of the estate can attract breeding waders but make them vulnerable to predation. There is concern that increased predation from gulls, which the estate is unable to control, threatens to reduce curlew nest productivity below levels required to sustain the population (0.55 fledged young per pair).

At **Geltsdale**, changes in vegetation management have increased biodiversity; 90 species of breeding birds have been recorded, many more than on typical grouse moors, and including species such as grasshopper warbler and whinchat which were previously mostly absent. However, there have been criticisms from shooting interests that this has been at the expense of breeding waders. Populations of golden plover have declined. There has also been a decrease in curlew, but a healthy population of around 50 breeding pairs remains, helped by vegetation cutting and bog restoration. Black grouse have benefited from the more varied vegetation structure and increased to 40-50 breeding males in the decade to 2013, with numbers continuing to remain well above 1990s levels. Populations of red grouse are healthy, and, while fluctuating, have followed an overall upward trend in numbers of both adults and young. Productivity exceeded that on neighbouring grouse moors in 2019. It is thought that the varied vegetation structure, especially the woodland cover, benefits this species in harsh winters.

Hen harrier numbers at **Langholm Moor** experienced a rapid increase during the Joint Raptor Study (benefiting from protection and habitat management), but then declined following the cessation of heather management. Curlew, golden plover and lapwing all bred in good numbers on the moor through the 1990s but declined after the gamekeeping stopped in 1998. Mountain hares were also lost from Langholm at this point. The LMDP brought a recovery in heather cover and helped to increase the populations of a range of moorland bird species including hen harrier, merlin, curlew, golden plover, black grouse and meadow pipit. The Langholm Initiative's long term management plan aims to enhance the special characteristics of the SSSI and SPA, including by increasing the population of breeding hen harriers, and to put in place the facilities and infrastructure for visitors to experience them sustainably.

Peak Naze has a good population of curlew (14 pairs) and is one of the most productive moors for them in the Peak District. Lapwing are also present, and peregrines bred successfully in 2020.

Rottal Estate has seen increased populations of red grouse and curlew in recent years. There are healthy populations of a range of breeding birds including golden plover, dunlin, lapwing, snipe, black grouse, ring ouzel, cuckoo, golden eagle, merlin, peregrine and short-eared owl. Rottal has gained Wildlife Estates accreditation.



Recovery in heather cover helped to increase the populations of a range of moorland bird species



Aerial view of peatland pools in blanket bog,
RSPB Forsinard Nature Reserve
David Tipling (rspb-images.com)

A reduction or cessation of grouse moor management would have negative impacts on some species and positive impacts on others.

Newton (2020) expressed concern that a ban on driven grouse shooting, while it might remove the main current constraint on hen harrier and other raptor numbers in some regions, might not translate into larger national populations in the longer term if heather moorland was converted to other uses such as sheep pasture or forest plantation. This would diminish their value for harriers and other large raptors by destroying habitat or reducing prey populations, while also lessening their value for many other ground-nesting birds besides grouse, including several wader species.

However, Crowle et al (2022) challenged these findings. They argued that biophysical, financial and policy constraints (including nature and landscape designations and agri-environment incentives) would prevent wholesale changes in land use and presented a vision for less intensive management of the uplands, using a natural capital approach that managed land for carbon, biodiversity and a range of ecosystem

services. While some species would suffer from reduced predator control, restoration of blanket bog would benefit some waders such as dunlin and golden plover, while less intensive moorland management would enhance structural diversity, benefiting species reliant on taller vegetation, scrub and trees such as whinchat, stonechat, red kite, tree pipit and yellowhammer.

Stakeholders interviewed for this study recognised that grouse moor management can benefit some species while having adverse impacts on others. Grouse moor/shooting interests argued that large areas of designated sites have benefited from and are dependent on management as grouse moors; that this management has benefited other ground nesting birds, particularly waders; and that without it heather moorland would be lost. Proponents of change argued that reducing the area and intensity of grouse moor management will have overall benefits for biodiversity, by creating a more varied mosaic of habitats, which would still include some heather moorland. This would benefit species such as black grouse.

3.3.2 Climate Impacts

Grouse moor management involves widespread burning of peatlands, including blanket bog, and this has increased in recent years as grouse moors have been managed more intensively.

Douglas et al (2015) mapped burning for gamebird management across c45,000 km² of the UK. Burning occurred across 8,551 1km squares, a third of the burned squares in Scotland and England were on peat ≥0.5m in depth, and the proportion of moorland burned within squares peaked at peat depths of 1–2m. The annual numbers of burns increased from 2001 to 2011 irrespective of peat depth. More recently, Matthews et al (2020) found a burnt area amounting to 163,000 hectares of rough grazing across 491 holdings with grouse butts in Scotland. They found an increase in burning intensity between 2005/11 and 2018 on 2,534 (66%) of the 1km cells they examined.

While the evidence is complex and often contested, burning has been shown to release carbon from peatlands, and to be particularly damaging to blanket bog habitats.

Gregg et al (2021) noted that peatlands (blanket bogs, raised bogs and fens) represent England's largest terrestrial carbon stores. Healthy, functioning peatlands have a net cooling effect on the climate, locking up carbon and playing an important role in climate regulation. However, England's peatlands have been severely degraded by management interventions such as drainage, burning and agricultural use, and now represent a net source of carbon and a warming effect. Their restoration is now recognised as a priority for reducing greenhouse gas emissions from land use in the UK. 30% of blanket bog in England has been subjected to burn management, and despite its extensive and long-term use research into its effect on carbon cycling in peatlands is not definitive, with

variable responses reported (Heinemeyer et al 2020; Glaves et al; 2013; Natural England 2010). Though burning management on peat remains a contentious issue, there is increasing consensus in the scientific evidence that burning on blanket bog is damaging. Raising water levels and restoring peat-forming vegetation is a more effective way of managing these sites to reduce fire risk (Granath et al 2016; Glaves et al. 2020), as well as delivering significant benefits for climate change mitigation, biodiversity and water quality.

The UK Committee on Climate Change (2015) noted that the majority of upland areas with carbon-rich peat soils are in poor condition, and that the damaging practice of burning peat to increase grouse yields continues, including on internationally protected sites. The Committee's 2020 report on land use for net zero called for a ban on rotational burning in the UK, including for grouse shooting. This practice was traditionally undertaken on mineral soils but over-time it has encroached onto peat soils. Burning heather is highly damaging to the peat, and to the range of environmental benefits that well-functioning peat can deliver (e.g. water quality, biodiversity and carbon sequestration). A voluntary cessation of this activity by landowners has not produced the desired outcome so the practice should be banned across the UK with immediate effect. The adoption of more sustainable practices to manage the vegetation (e.g. heather cutting) would still allow grouse shooting to continue on peat soils, while the burning of heather could continue on mineral soils. The ban could be implemented through an amendment to the Environment Bill (Committee on Climate Change, 2020).

The stakeholders interviewed expressed mixed views about whether burning of grouse moors can be sustainable. Generally, supporters of grouse moor management argued that moorland can be burned sustainably in accordance with codes of good practice, that sustainable burning can contribute to carbon sequestration and storage in the long term, and that grouse moor management reduces wildfire risk by limiting fuel load. However, environmental campaigners disagree, and reviews by Natural England have concluded that burning on peat (which covers the majority of grouse moors) is generally bad for the environment. The contribution of heather burning to limiting wildfire risk continues to be debated, with some stakeholders pointing out that many wildfires have started as managed burns, and that peatland rewetting could be the most effective means of reducing wildfire risk (although there would still be risks in hot summers when the water table is low, and therefore a need for investment in other prevention, detection and response measures).

Burning has been shown to be a principal reason for the poor condition of many upland SSSIs and European protected sites.

Douglas et al (2015) detected burning within 55% of Special Areas of Conservation and 63% of Special Protection Areas that were assessed, and the proportion of moorland burned was significantly higher inside sites than on comparable squares outside protected areas. They cited evidence that impacts of burning include a lowered water table, breakdown of the active peat-forming structure, resulting long-term loss of the carbon store, changes in vegetation composition and structure and, where fire temperatures are high and rotation lengths are short, damage to peat-forming species such as Sphagnum spp. mosses. These problems are cited as a primary reason for poor condition of upland sites designated

for their conservation value, contributing to the reasons for “unfavourable” condition in 53% of the total area in England (Natural England, 2008) and on 87% of “unfavourable” upland bog features in Scotland (SNH, 2010). They argued that the spatial overlap of burning with peat and protected areas and the increasing number of burns required urgent attention.

The UK’s report under Article 17 of the EU Habitats Directive (JNCC, 2019) revealed that only 9% of the blanket bog habitat whose condition was known was in good condition (358 km² in good condition; 3,422 km² in not good condition, 18,042 km² with condition not known). Burning was identified as one of the most severe pressures on the habitat (alongside intensive grazing, air pollution and drainage), and “management of fishing stocks and game” one of the main threats.

Peatland restoration, including cessation of burning and rewetting of blanket bog, is widely recognised as having a major role to play in addressing the current climate crisis.

55%
Burning was detected in 55% of Special Areas of Conservation

63%
Burning was detected in 63% of Special Protection Areas



Northern lapwing
Ray Kennedy (rspb-images.com)

Thompson and Wilson (2020) argued that restoration of the UK’s upland peatlands has a key role to play in tackling the climate and nature emergencies. Rather than continuing to burn our peatlands, the authors argued that we need to re-wet them and reintroduce peat-forming Sphagnum mosses to increase resilience to wildfire and secure a wider range of peatland ecosystem services.

A cost benefit analysis of options for restoration of blanket bog in England by eftec (2015) estimated that cessation of rotational burning over 143,865 hectares would deliver benefits with a net present value of £470 million over 40 years, an average of £3,266 per hectare.

These changes in ecosystem service values are potentially much greater than the direct impacts that grouse shooting has on local economies.

For example, the eftec (2015) estimate that cessation of burning on blanket bog in England would deliver carbon benefits with a net present value of £3,266 per hectare over 40 years is equivalent to an annual net value of £153/ha. This compares with average annual revenues of £20/ha found by McMorran et al (2020) for four driven grouse moors in Scotland (though average revenues per hectare are higher than this for most English moors).

3.3.3 Ecosystem services

Supporters of grouse shooting argue that management of grouse moors contributes to ecosystem services.

However, as well as impacting adversely on climate, there is growing evidence that intensive management of grouse moors reduces the delivery of a range of ecosystem services, including by impacting adversely on water quality, increasing erosion and reducing the ability of the uplands to slow water flows and alleviate flooding. However, the impacts are complex, incompletely understood, and often debated.

BASC (2015) argued that grouse moors contribute a range of ecosystem services. It stated that grouse are healthy, lean and nutritious food, with an estimated 700,000 shot in 2012/13 in the UK, with a value of

£490,000 annually. BASC argued that grouse moor managers contribute to peatland restoration, that sustainable burning enhances ecosystem services and reduces carbon emissions and wildfire risk, and that grouse moor management can reduce flood risk, as well as contributing cultural services and benefiting rural economies.

Appleton and Smith (2022), in a report by the GWCT, presented an audit of grouse moor management's contribution to a range of ecosystem services and Defra 25 Year Environment Plan goals. They concluded that management of moorland and peatland for red grouse contributes to a range of these goals, that their audit contradicted suggestions that it has negative impacts on ecosystem services, and that there is little evidence that alternative upland management and land use would better integrate, replace or sustain goods and services. Their analysis



recognised a range of downsides and trade-offs – for example effects on carbon emissions and air quality depend on whether the effects of controlled burning in reducing wildfire risk are sufficient to outweigh direct emissions from burning. Many of the identified benefits require best practice management, including restoration and rewetting of degraded peatlands. The report pointed to evidence gaps in relation to many of the services assessed.

Many studies, however, point to negative impacts on a range of ecosystem services, although some (e.g. Thomson et al, 2018; Grant et al, 2012; UKNEA, 2011) have found that the evidence is complex and often contested.

Douglas et al (2015) found that there is growing evidence links burning over peat to a range of impacts on water quality including discolouration (White et al., 2007), lower pH and higher DOC content (Brown et al., 2014; Clay et al., 2012). Furthermore, riverine invertebrate diversity may be lower within burned catchments (Brown et al., 2013). Clutterbuck and Yallop (2010) found strong evidence that burning of blanket peat contributed to elevated DOC concentrations in water catchments in the Pennines.

Grayson et al (2012) noted that water discolouration is one of the key water quality problems faced by UK water companies taking raw water from peatland catchments. They developed a water colour model using a combined Geographical Information System and Multicriteria Evaluation approach, finding that rotational heather burning and vegetation type (particularly heather) were the two most statistically significant variables influencing water colour generation in the study catchments.

Thompson and Wilson (2020) cited evidence of a range of negative impacts on ecosystem services. Glaves et al. (2013) found evidence of negative impacts of burning on peatland flora and fauna (eight of 12 studies) and carbon and water (10 of 11 studies). Brown & Holden (2020) confirm that prescribed burning is associated with increased exposure of the peat surface, elevated erosion risk, lowered water tables and increased overland flow.

Burning of moorlands has been implicated in contributing to flooding in places like the Calder Valley (The Guardian, 2021). Carver (2016) suggested that burning of grouse moors can contribute to flooding but noted a lack of evidence to prove this conclusively. He cited the example of the flooding of Hebden Bridge on Boxing Day 2015, which is downstream of Walshaw Moor estate, the focus of a case relating to unauthorised drainage and excessive burning of blanket bog. Carver suggested that natural flood management and rewilding may prove more cost effective than hard engineered approaches to flood management.

The EMBER (Effects of Moorland Burning on the Ecohydrology of River basins) study by the University of Leeds was conducted over five years to examine the impact of heather-burning on 10 river catchments in northern England, half of which were regularly burnt for grouse shooting and half which were not. Key findings were that burning had impacts on peat hydrology, peat chemistry and physical properties, river water chemistry and river ecology (Brown et al. 2014).

GMMRG (2019) noted that there is evidence that medicated grit is toxic to aquatic organisms. There is evidence of excessive use and some evidence of use that potentially presents environmental risks, but a lack of conclusive evidence of environmental impact. A follow up study by SEPA (2020) found that the evidence generally suggests that there is a low environmental risk from the use of flubendazole in medicated grit on grouse moors. However, uncertainties in both the estimated environmental concentrations and ecotoxicological effects data were high enough for the report to recommend further investigations into the matter.



Curlew
Andy Hay (rspb-images.com)

Stakeholders interviewed for this study expressed differing views about impacts on ecosystem services (carbon, water, flooding). Grouse moor/shooting interests generally argued that sustainably managed grouse moors contribute positively to ecosystem service delivery, and that managers are contributing to ecosystem services through peatland restoration as well as sustainable heather management. Most environmental groups pointed to increasing evidence that grouse moors have generally negative impacts on carbon, water quality and flooding.

Mixed views were expressed about the impacts of grouse moor management on landscape; supporters of grouse shooting argued that it maintains open, heather covered landscapes popular to visitors in areas like the North Yorkshire Moors and Yorkshire Dales. Others expressed the view that these landscapes are bleak and inhospitable, and that rewilding would deliver a more varied landscape more attractive to visitors. Some interviewees pointed to the negative aesthetic impacts on the landscape of grouse moor infrastructure (butts and tracks) as well as burning of moorland.

It is widely argued that changes in land use and/or land management on grouse moors could enhance the delivery of ecosystem services.

Various studies find that peatland restoration (including cessation of burning, and rewetting of

blanket bog) could enhance the delivery of ecosystem services, including carbon storage and sequestration, water quality regulation and flood management (e.g. Natural England, 2012; Clarke et al, 2015; RSPB, undated) and that this would deliver favourable benefit: cost ratios (Clarke et al, 2015; Glenk and Martin-Ortega, 2018; Cambridge Econometrics, 2020). The Clarke et al (2015) study estimated that investments to improve the delivery of ecosystem services in the Keighley and Watersheddles catchment, South Pennines, through habitat restoration and less intensive land management, including reduced burning, would deliver a benefit: cost ratio of 2.96. Only the benefits of enhanced carbon storage/sequestration and water colour were valued.

Armstrong (2019) argued that grouse moors, both burned and unburned, are lower in structural and species diversity, are less biologically productive and provide fewer ecosystem services than the woodlands, scrub and peat-forming bogs that could replace them. Continued management as grouse moors will maintain a large area of Scotland's land in an impoverished state, while a widespread move away from grouse moor management towards an increase in woodland and scrub cover and reinstatement of functioning bogs could result in an upland landscape composed of a mosaic of different woodland, scrub and open habitats. This diversity of habitats would, in turn, support a greater abundance and diversity of wildlife, supply improved ecosystem services, be more resilient to environmental change, pests and diseases, and provide diverse resources and sources of income for local people. This would provide benefits at the local, regional, national and global level. Current ecological knowledge is sufficient to make the transition however, there are many societal barriers. All of these could be addressed through education, advice, legislation, grants and subsidies. There might be adverse impacts on some moorland bird species, but an increase in biodiversity and ecosystem services overall.

Conversely, Appleton and Smith (2022) argued that best practice management of grouse moors is superior to a range of alternative land uses (managed wilding, rewilding, commercial timber, energy and agricultural intensification) in its delivery of a variety of provisioning, regulating and cultural services.

Similarly, mixed views were expressed by the stakeholders interviewed regarding whether land use change and a reduction in the area of grouse moors and intensity of management would be desirable from an ecosystem services perspective. Several interviewees pointed to recent land use changes, and increased interest among investors in rewilding, afforestation

and peatland restoration to enhance carbon stocks. Others noted that changes in land use are potentially complex and need to be viewed at the whole estate level, taking account of the mosaic of enterprises and land uses. Most interviewees saw a likelihood that alternative forms of land management (peatland restoration, rewilding, afforestation) will take place gradually alongside continuing grouse moor management and other sporting activities, as part of a balanced estate portfolio.

A similar range of views and approaches to management of moorland for ecosystem services are evident from the case studies (see below).

Ecosystem services – examples from the case studies

At **Bolton Castle**, controlled burning of heather moorland is not seen to have adverse effects on carbon emissions or water quality. While peatland restoration can enhance sphagnum and inhibit heather growth, burning or cutting remain necessary on drier heather moorland, to reduce fuel load, and cutting is not possible on all land. The recent ban on burning on deep peat on European designated sites, which covers 30-70% of the grouse moor, necessitates an increase in cutting, but this is not possible on at least 10% of the area. The estate is restoring blanket bog, in accordance with a Natural England survey and restoration plan, with restoration of the hydrology central to achieving ecosystem function.

At **Geltsdale**, peatland restoration and woodland expansion, as well as the cessation of heather burning have benefited carbon sequestration and water quality, as evidenced by studies by the University of Leeds. The reserve is part of the water collection area for Carlisle, with United Utilities reporting that water from the reserve is of better quality than other parts of the catchment.

At **Langholm Moor**, the Langholm Initiative's management of Tarras Valley will restore peatlands, blocking drains to enhance carbon sequestration and biodiversity. Natural regeneration of woodland along the Tarras Water is creating a wilder landscape and reducing river bank erosion, downstream flooding and providing spawning grounds for fish. Creation of new native woodlands will capture carbon, create employment opportunities, increase biodiversity and resistance to climate change, and support amenity for the local community.

Peak Naze is owned by the water company United Utilities. The grouse moor manager believes that the landowner benefits from the management of the moor, which contributes to maintaining water quality. There is no active programme of bog restoration – while rewetting the moor could benefit grouse by enhancing insect numbers – the opportunities for this are limited because of the steepness of the ground.

Rottal Estate has restored 30 hectares of peatland and would like to restore a further 100 hectares. Blocking of ditches has reduced water flows and enhanced river water quality, which has also benefited from riparian tree planting. Rewetting of the peatland has enhanced insect life, which has benefited red grouse.

4. Policy options for grouse moor management

4.1 Current policy for grouse moor management

Policy for grouse shooting and grouse management is devolved, with different policy frameworks operating in England and Scotland. Until recently, there has been limited regulatory oversight of the grouse shooting sector, although recent policy developments will increase regulation of the sector in both countries.

Thompson et al (2016) observed that the high-input, high-output management is practised in a regulatory environment in which landowners set their own bag limits and establish the management to deliver these, with the state only regulating quarry species, hunting season and permitted hunting methods. There is no statutory requirement for hunters to report their bags, although records are collected by a non-profit organisation, the Game & Wildlife Conservation Trust (GWCT). This combination of intensive shooting practice with weak regulation is almost unique, with most other countries in Europe and North America taking a stricter approach to regulation of game shooting (Mustin et al, 2010; Pillai and Turner, 2017). There is growing public debate about these impacts, with four recent public petitions to license or ban driven grouse shooting, one for the introduction of vicarious liability (whereby the rights-holder is held responsible for the actions of an employee) and one for stronger legal protection of Scottish mountain hares.

4.1.1 England

In response to a 2019 petition to ban driven grouse shooting, the UK Government stressed that grouse shooting is a legitimate activity providing benefits for wildlife and habitat conservation and investment in remote areas. Defra is working on the sustainable

management of English uplands, to ensure that protection of wildlife, compliance with the law and a sustainable, mutually beneficial relationship between shooting and conservation (Defra, 2019).

The Peat Action Plan for England (2021) set out plans for peatland restoration, as well as announcing a ban on burning of blanket bog on European protected sites, protecting approximately 142,000 hectares of England's upland deep peat from further damage by managed burning, which represents approximately 40% of all blanket bog in England. The government will keep under review the environmental and economic case for extending the approach to additional areas of blanket bog after assessing how the new regime works in practice.

Burning of moorland in England is covered by the Heather and Grass Burning Code 2007 (Defra, 2007), the Heather and Grass Burning Regulations 2007 (Defra, 2007) and the Heather & Grass Burning Regulations 2021 (Defra, 2021).

The Heather and Grass Burning Code is a voluntary code. It outlines good practice on planning where to burn, and how to burn safely and responsibly. The 2007 Regulations specify the months in which burning is permitted and the maximum size of a single burn (10 hectare). They require reasonable precautions to be taken to ensure safety, limit on burning in specific places (e.g. slopes and along watercourses) and prohibit leaving bare soil areas of more than 0.5 hectare or leaving soil smouldering for more than 48 hours. The 2021 Regulations ban the burning, without a licence, of specified vegetation on peat over 40 centimetres in depth in a SSSI that is also a SAC/SPA, with the purpose of preventing further damage to protected blanket bog habitat.



Shooting Butts in a line across a driven grouse moor
Ray Kennedy (rspb-images.com)

4.1.2 Scotland

In 2020, the Scottish Government, in its response to the report of the Grouse Moor Management Review Group (2019) led by Professor Alan Werritty, announced that a licensing scheme would be introduced for grouse shooting businesses. The SG also announced that muirburn will also only be permitted under licence, to protect wildlife and habitats, regardless of the time of year it is undertaken and whether or not it is for grouse moor management or improving grazing. There will also be a statutory ban on burning on peatland, except under licence for strictly limited purposes, such as approved habitat restoration projects. It also announced that it will work with all stakeholders to produce guidance on best management practices for the use of medicated grit and convene an expert group to study how best to monitor compliance with a new code of practice.

The Werritty review was announced in 2017, triggered by evidence of the disappearance of satellite tagged golden eagles on Scottish grouse moors, with a remit to examine how grouse moors could be managed sustainably and within the law. The review found that there was a strong case for greater regulation of grouse moors, in response to raptor persecution and concern about the impacts of muirburn, control of mountain hares and environmental risks from over-use of medicated grit. It concluded that fragmented regulation bedevils the better management of grouse moors, and that many of the management practices of concern are subject to voluntary codes with limited monitoring of compliance. A petition, calling for licensing of gamebird hunting in Scotland, was lodged at the Scottish Parliament, by the Scottish Raptor Study Group in July 2016.



RSPB Flows viewing tower on the Dubh Lochan trail
David Tipling (rspb-images.com)

The Scottish Government and Scottish Green Party Shared Policy Programme reiterated the government's commitment to grouse moor licensing, as well as committing to a review of the wider species licensing system, with a view to ensuring that the law is being applied correctly and that lethal control is only licensed where the conditions required for such a licence are demonstrably being met. The review will also assess the potential to apply the principle of full cost recovery to species licensing and the introduction of a public register of licences to improve transparency, bearing in mind data protection and safety of licence holders. The coalition will support the transition to more economically and environmentally productive uses of land where appropriate and deliver the recommendations of the Grouse Moor Management Review Group as a matter of urgency, including the licensing of grouse moors. Licensing or further regulation will cover the key areas identified in the review, including muirburn, wildlife control, the use of medicated grit and wildlife crime. Licensing will be supported by clear penalties to encourage compliance, as well as additional effort to detect wildlife crime (Scottish Government, 2021).

At the time of writing, the Scottish Government is still working on the details of how a grouse moor licensing scheme could work, with proposals expected later in 2022, accompanied by an impact assessment. However, it is understood that licensing will primarily address the problem of wildlife crime (especially the illegal persecution of raptors, but potentially other offences such as breaches of trapping/snaring regulations), with other issues (muirburn and medication) dealt with through separate policy instruments. The licensing scheme is expected to be administered by NatureScot, which is responsible for other licences. The possibility of cost recovery through licence fees (which are not currently applied

to other species licences) is being examined. Details of what exactly is licensed (e.g. grouse shooting/ the grouse shooting business/grouse moor management) are being examined.

Management of moorland is subject to the Muirburn Code (NatureScot, 2021), which sets out good practice guidance for burning and cutting of vegetation, as well as statutory restrictions. Among other things statutory regulations specify the muirburn season, the requirement to seek consent from NatureScot to burn on SSSIs, and the requirement to inform the landowner and neighbouring properties. Leaving a fire unattended, or undertaking certain practices that damage or present risk to human health, property and/or wildlife are prohibited. The Code states that burning should not take place on: peatland, except as part of a habitat restoration plan, approved by NatureScot; on thin soils over rock; on summits, ridges and areas exposed to wind; on the edge of waterbodies; or on heavily grazed areas. Good practice guidelines for muirburn practice are provided.

Details of proposals for year-round licensing of muirburn, and a ban on burning peatland, as indicated in the Scottish Government's response to the Werritty review, have yet to be published.

**Petition for
the protection
of Scottish
mountain
hares**



4.1.3 Wales

The Welsh Government has indicated that it does not support the shooting of grouse or other live quarry as a leisure activity¹, though has yet to develop policy proposals on the issue.

As in England and Scotland, management of moorland vegetation is addressed by a combination of statutory regulation and a voluntary code, through the Heather and Grass Burning Code for Wales 2008 (Welsh Assembly Government, 2008) and Heather and Grass etc. Burning (Wales) Regulations 2008 (Welsh Assembly Government, 2008).

4.2 Defining Policy options for Grouse Shooting in Great Britain

Concerns about recent intensification of grouse moor management, continuing illegal killing of raptors and the limited effectiveness of voluntary codes of practice to address adverse environmental impacts have prompted calls for action to address these impacts. These have included petitions to ban driven grouse shooting, and proposals from others that the sector is regulated through a licensing scheme.

While the Scottish Government has announced its intention to license grouse shooting during the current Parliament, the Westminster Government continues to resist pressure for significant reform in England.

The impact analysis for this study examines three main policy options:

1. **Business-as-Usual (BAU)**
2. **Licensing of Grouse Shooting**
3. **A Ban on Grouse Shooting**

These are further defined as follows.

4.2.1 Business-as-Usual

The BAU option involves no new policies to regulate grouse moors or their management.

Grouse moors would continue to be subject to existing legislation, including in relation to species protection, designated sites, and the management of moorland vegetation. This option assumes that the proposals being developed for licensing of grouse moors and muirburn do not come into fruition.

4.2.2 Licensing of Grouse Shooting

This option involves the development of a licensing system for grouse moors in Great Britain.

The owners or managers of grouse moors would be required to obtain a licence to be able to provide grouse shooting on their land. It is assumed here that grouse moor owners or managers would be required to apply for a licence and provide information to the authorities to obtain and retain it, rather than merely being awarded a licence to continue their existing activities.

Under a licensing scheme there can be a graduated scale of consequences when inappropriate conduct is detected (e.g. additional reporting requirements, tighter conditions and ultimately revocation of the licence). These can be imposed on the basis of the civil burden of proof and a cumulative record of misbehaviour (as with the current rules for revoking a general licence in Scotland under the Wildlife and Countryside Act 1981) (GMMRG, 2019). According to the Werritty report, this would avoid “the almost overwhelming difficulty of proving specific wrongdoing beyond reasonable doubt” which applies to the enforcement of criminal law under the current system (see box on the right).

Examples of raptor persecution not leading to successful criminal prosecution

The case for grouse moor licensing to address illegal raptor persecution is founded on the argument that, even where illegal killing is known to have taken place or been attempted, it is extremely difficult to obtain sufficient proof to secure a conviction under criminal law.

Two examples in recent years are:

- Hope Woodlands and Park Hall, Derbyshire. In this case, in 2016, a video was published of an armed man, sitting next to a decoy hen harrier, on a grouse moor in the Peak District National Park owned by the National Trust and leased to a shooting tenant. The National Trust launched an investigation into the incident after a police investigation had failed to make progress. This led to the early revocation of the shooting lease (Raptor Persecution UK, 2016).
- Raeshaw Estate vs Scottish Natural Heritage. In this case, evidence that illegal raptor persecution had taken place was sufficient for a court to reject an appeal against SNH’s withdrawal of general licences, even though it had not been possible to secure a criminal conviction (Knox, 2017).

In such cases it is likely that action could be taken under a grouse moor licensing system even where police investigations had failed to secure a conviction.

A number of details regarding the design and implementation of the licensing system would need to be decided.

For the purposes of this analysis, it is assumed that:

- The requirements of the licensing system would be wide ranging, and include compliance with all relevant legislation, including that regarding protected wildlife, predator control, heather burning and use of veterinary medicines. In practice, in Scotland, current proposals are that separate licensing requirements will cover protected wildlife and muirburn.
- The licensing system would be administered by an appropriate government agency (most likely NatureScot, Natural England and Natural Resources Wales).
- There could be exemptions for moors in which only small numbers of grouse are shot, by setting a threshold based on bag size or exemptions relating to management practices (e.g. exempting moors that do not undertake predator control or intensive heather management) or shooting practices (e.g. walked-up shooting).
- Licensees would be required to provide annual reports specifying certain information, including on grouse bags, predator control and vegetation burning/ cutting.

Key details that would need to be specified include whether the licence covered grouse shooting or grouse moor management, the definition of the licensee, and arrangements for administration, compliance checking and enforcement.

¹ <https://www.nationalgamekeepers.org.uk/articles/shooting-in-wales>



Grouse beaters with flags on a grouse shoot on moors in Scotland
Alamy

An important consideration affecting the impact of this option is how a licensing system would be financed, and particularly whether its administration would be publicly funded or whether costs would be recovered through licence fees.

These aspects of the design of a grouse moor licence scheme are discussed in the GMMRG (2019) report, and in more detail in a report for the RSPB by Austin (2021). Recommendations for the licensing of muirburn in Scotland were made by RSPB Scotland (2021).

4.2.3 Ban on Grouse Shooting

This option would simply ban grouse shooting in each of the countries of Great Britain.

A ban could apply to grouse shooting in all forms, or to driven grouse shooting only. If the ban were to apply to driven grouse shooting only, it would be necessary to make an appropriate legal definition of what constitutes driven grouse shooting.

A petition by Wild Justice (2019) to UK Government and Parliament focused on a ban on driven grouse shooting on the grounds that it is bad for people, the environment and wildlife. The petition argued that grouse shooting is economically insignificant when contrasted with other real and potential uses of the UK's uplands, that muirburn impacts negatively upon climate change and drainage leads to flooding and erosion, that culling of predators and Mountain Hares impacts negatively on the ecology of these areas, and that the industry is underpinned by a criminal tradition of raptor persecution which shows no signs of abating.

The next section examines the consequences of a change of policy to licensing or banning driven grouse shooting, and the economic, social and environmental impacts of each option, and compares these to the BAU option.

5. Impacts of policy options for grouse moor management

5.1 Impacts examined

This section assesses the implications and analyses the impacts of each of the three main policy options.

It examines:

- **Direct implications for the grouse moor sector and government** - including numbers of businesses and areas of grouse moor affected, implications for management, administrative and compliance costs;
- **Effects on land use and land management** – including likely changes in the area of grouse moor, grouse moor management practices, possible changes in overall land use and land management in the uplands;
- **Economic impacts** – including effects on rural employment, supply chains and tourism;
- **Social impacts** – including effects on rural communities, services, cultural heritage and animal welfare;
- **Impacts on biodiversity** – including effects on upland habitats, red grouse, other ground nesting birds, raptors and wider biodiversity;
- **Impacts on climate and ecosystem services** – including effects on carbon storage and sequestration, water quality and flood risk management.

A summary is provided of the overall economic, social and environmental effects of each option.

5.2 Business as Usual (BAU)

5.2.1 Direct implications for grouse moor sector and government

This option would have the least impact on the grouse moor sector, requiring no changes in the legal requirements affecting grouse moor management and imposing no additional costs.

It would also impose no additional obligations or costs on government.

The sector would continue to be subject to existing legal requirements, including those relating to species protection, heather burning and the protection of designated sites.

The management of grouse moors will also be affected in different ways by a range of other policy, environmental and socio-economic factors, including:

- The reform of agricultural subsidies, including the phasing out of the Basic Payment Scheme, and increases in public payments for public goods (to varying extents in each country);
- Increasing public funding for nature restoration, including restoration of peatlands and creation of woodlands, in pursuit of net zero and biodiversity ambitions;
- Further development of carbon markets and net zero strategies, which are increasing investment in peatland restoration and woodland expansion;
- Increased focus on nature-based solutions for water quality and flood management as well as climate change, both through public (e.g. natural flood management) and private (e.g. water company payments for ecosystem services) investments;
- Biodiversity targets and net gain requirements, which also focus attention on nature restoration;
- Public and political opinion, which may also influence future decisions by upland land owners and managers;
- Increasing prevalence of grouse disease, with emergence of parasite resistance to veterinary medicines; and
- Changes in climate impacting on grouse habitat, food supply and breeding success.

Grouse moors need sheep grazing to manage habitat and, in some places, to help control tick numbers (GWCT, 2021). The Basic Payment Scheme provides an important source of income for upland estates, maintaining grazing in many areas where it might otherwise be uneconomic. Agricultural subsidy reform will impact differently in each country, with Environmental Land Management schemes set to represent a large proportion of support in England, but a greater focus on maintaining support for farmers and food production expected in Scotland. In England at least, the phasing out of basic payments threatens to make many upland farms unviable unless they are able to find new sources of income (Rayment, 2019). Farm subsidy reform can be expected to influence land use and land management decisions in

the uplands, encouraging estates to seek new opportunities through agri-environment schemes, carbon related investments and other forms of diversification (such as tourism).

This, combined with developments in carbon markets, increasing demand for carbon investments from asset managers, and a greater focus on nature-based solutions, can be expected to encourage some diversification from the traditional focus on grouse and sheep in upland land management under the BAU option.

While public and political opinion related to grouse moors does not appear to be a major driver for change at present, it could be a significant factor if the issues highlighted by proponents of policy change were to gain higher profile.

Carbon and nature investments in Scotland

In Scotland, there has been a recent trend in “green lairds” buying increasing areas of land for investment in carbon storage and sequestration, which has taken over from a surge in demand for sporting estates five years ago. The John Muir Trust (2022) reports that the property firm Savills, which in 2017 sold 26 sporting estates for a combined total of £90 million, announced another “extraordinary year for the Scottish estate market” in 2021. Savills reported a 98% increase in the number of wealthy clients registering to buy land, with the focus now on carbon investments. A Savills spokesperson is quoted as saying that “climate change is fuelling a seemingly insatiable demand for land suitable for tree planting.”

Kildrummy, a 2,200 hectare estate on the edge of the Scottish Highlands with a history of grouse shooting, was purchased by American owners, Camille and Christopher Bently in 2020, for £11 million. The Bentlys are reported to have ceased all trapping and sport shooting on the estate, which will be restored for nature (Marshall, 2022).

Aviva Investors and Par Equity announced in December 2021 the acquisition of 6,300 hectares of moorland in the Glen Dye area of West Aberdeenshire. Applications will be made to undertake extensive peatland restoration work across 1,800 hectares and new planting over 3,000 hectares, including up to 1,000 hectares of productive conifer and 2,000 hectares of native woodland, with the aim of capturing 1.4 million tonnes of carbon. This is expected to deliver new employment opportunities (Aviva Investors, 2021).

In 2020, Brewdog purchased the 3,700 hectare Kinrara Estate near Aviemore, launching a major woodland planting and peatland restoration project known as its “Lost Forest”, with the aim of capturing 1 million tonnes of CO₂ over 100 years. It forms a major part of the company’s pledge to remove twice as much carbon from the atmosphere as it emits (Mace, 2022). Kinrara was a mixed estate including a grouse moor reported to be one of the finest in the Highlands. Gamekeepers were made redundant, with various reports putting the number of jobs lost at between two and six.

Standard Life Investments Property Income Trust (SLIPIT) announced in 2021 that it had purchased nearly 1,500 hectares of moorland in the Cairngorm National Park in a carbon offset transaction. Its plan is to reforest 956 hectares of the site with 1.5 million broadleaf trees, with around 115 hectares set aside for peatland restoration and the remainder managed as open ground habitats for biodiversity. This is expected to remove 195,630 tonnes of carbon up until 2060, equivalent to nearly three-quarters of the company’s residual and operational emissions (SLIPIT, 2021).



Common snipe
Mike Read (rspb-images.com)

5.2.2 Effects on land use and land management

Under the BAU option, and in response to the factors set out on page 64-65, some changes in land use and land management can be expected, including:

- Further investment in peatland restoration on grouse moors, including re-wetting and restoration of blanket bog vegetation;
- Reduced burning on peatlands, in response to legal changes already introduced, and an increase in heather cutting where this is feasible;
- On some estates, adoption of a more balanced, multi-objective approach to grouse moor management, balancing shooting with environmental interests and opportunities, while some estates continue more intensive forms of management;
- The sale of some grouse moors to carbon/natural capital investors, in response to enhanced returns from these asset classes, leading to a cessation of grouse moor management and a focus on natural capital restoration.

No changes in species protection legislation or its enforcement are envisaged under this scenario, so continuing illegal persecution of raptors on some estates is likely.

In the longer term, further contraction of the grouse shooting sector can be expected as a result of the effect of climate change on red grouse populations, with grouse moor management gradually becoming more concentrated in the north of the UK. This in turn could encourage more intensive management on those Scottish estates where healthy populations of red grouse persist.

In general, the grouse moors covered by the case studies are expecting to continue current patterns of land management under a BAU scenario (see box on the right).

Future land use and land management at the case study estates

Bolton Castle estate sees a continued future for grouse shooting on its moorland, with the current management seen as being most compatible with nature designations. A potential risk comes from increased regulation of the grouse shooting sector, which could threaten future viability. The estate sees large grouse bags as being compatible with sustainability objectives and good conservation practice.

At **Geltsdale**, the current direction of management is expected to continue in future years; this will deliver a more varied and natural vegetation structure, in contrast to neighbouring moors which are expected to remain intensively managed for grouse shooting.

At **Langholm Moor**, it seems unlikely that driven grouse shooting will return in future. Time will be needed to judge the success of the Langholm Initiative's Tarras Valley Nature Reserve, its financial sustainability and its contribution to the development of the area.

At **Peak Naze**, the grouse moor manager expects management of the moor to continue under the current syndicate arrangement.

Rottal Estate sees grouse shooting as having an important role to play in the sustainable management of the uplands, contributing positively to biodiversity and natural capital, while providing jobs and supporting local communities. Investment in management of heather moorland and restoration of peatland will continue, and no significant land use change is envisaged. The estate will aim for a balanced and sustainable approach to moorland management that delivers healthy populations of grouse alongside other species, enhancing the overall experience of the shooting client rather than seeking to maximise bag sizes alone. This vision for the future of the sector is increasingly shared by neighbouring estates.

Four **Driven grouse moors in Scotland** examined by McMorran et al (2020) experienced a significant decline in grouse numbers in 2018-2019 (with no shooting on some of the estates during this period), reflecting a wider trend across Scotland. Challenges noted included increased prevalence of heather beetle and tick, perceived as being linked to climatic factors (increased drought and high rain events). The case study interviewees did not see walked-up shooting as a viable alternative to driven grouse shooting, given its low revenues and employment impacts. It was also noted that a healthy population surplus is required even for commercial walked up shooting. Further woodland expansion was being considered on two of the four estates, where it was compatible with existing land uses and would not impact on peatland conservation. A wind farm development at one estate was seen to be compatible with the grouse shooting enterprise. All four estates saw grouse shooting as an integral part of estate activities. The removal of grouse shooting from the estate mix would therefore require structural changes, and reduction of estate spending and employment, with implications for the overall 'quality' of estate management (e.g. due to lower staff numbers overall).

5.2.3 Economic impacts

The BAU option is likely to see a small decline in the economic contribution of grouse moors, offset by an increase in other activities (particularly natural capital management, forestry and ecotourism).

Some contraction in the extent and economic contribution of grouse moors can be expected, as well as some changes in management on some moors, in pursuit of a wider balance of objectives (Section 5.2.2).

As a result, a small reduction in employment of gamekeepers can be expected. New jobs will be created in peatland restoration, woodland planting and natural capital management. Some growth in ecotourism revenues and employment can be expected, as estates seek new opportunities for diversification linked to natural capital investments.

Any changes in land use and land management will be in response to new opportunities for investment in carbon and natural capital management, rather than being forced on the sector, so any job losses will be at least partly offset by gains in other activities.

The case study examples show that former grouse moors at Geltsdale and Langholm have replaced jobs lost for gamekeepers with new jobs in conservation and tourism.

Natural capital investments such as peatland restoration and woodland planting offer potential to increase employment on grouse moors in the short term, but then support much lower levels of employment in ongoing maintenance activities.

Overall, therefore, we might expect some reduction in employment and economic impacts of grouse moors under the BAU option, with this likely to be at least offset by increases in employment in the restoration and management of natural capital, and related tourism opportunities.

There has been some debate about whether the increasing shift from sporting to carbon uses of Scottish estates will result in a loss of employment in the grouse shooting and deer stalking industries (Marshall, 2022).

Job creation in investment in Nature Based Solutions

Peatland restoration is estimated to support three temporary jobs per 100 hectares of peatland restored (30 jobs per 1,000 hectares). After the restoration work is completed, ongoing maintenance actions are estimated to support seven job years of employment per 100 hectares over 100 years, equivalent to 0.7 ongoing FTE jobs per 1,000 hectares.

Woodland creation is estimated to support 25 temporary jobs per 100 hectares of peatland restored (250 jobs per 1,000 hectares). After the restoration work is completed, ongoing maintenance actions are estimated to support six job years of employment per 100 hectares over 100 years, equivalent to 0.6 ongoing FTE jobs per 1,000 hectares.

Source: Cambridge Econometrics (2020)

5.2.4 Social impacts

The social impacts of the BAU option are expected to be limited, with limited effects on employment and rural communities, cultural heritage and animal welfare.

5.2.5 Impacts on biodiversity

A small decline in species benefiting from grouse moor management, with some increase in wider biodiversity, can be expected under the BAU option. Negative effects of intensive grouse moor management and illegal persecution of wildlife will continue on many grouse moors.

The benefits that grouse moors currently provide for red grouse, breeding waders and heather will be maintained to a greater extent than under the two other options. At the same time, negative effects associated with limited structural and species diversity of vegetation and continued illegal persecution of raptors on intensively managed grouse moors will continue. Overall species diversity may increase on grouse moors that adopt a balanced, multi-objective approach to moorland management, investing in restoration of peatlands and natural capital while continuing to shoot grouse. Woodland expansion on some grouse moors – designed to capture carbon – can be expected to reduce populations of red grouse and breeding waders, while providing new habitats for woodland species.

5.2.6 Impacts on climate and ecosystem services

Wider policy and economic drivers are likely to lead to some gains for climate and ecosystem services under BAU, but negative effects of intensive management will continue.

The BAU option can be expected to deliver gains in carbon management and ecosystem services, but less than under the two other options. The wider policy

and economic drivers identified above can be expected to enhance restoration of peatlands and other upland habitats on grouse moors, as well as driving some land use change motivated by natural capital and carbon investment. The recent ban on burning of deep peat on European protected sites in England should help to limit adverse impacts. However, some moors will continue to be managed intensively with adverse effects on carbon, water quality and flooding.



Volunteer repairing dry-stone wall,
RSPB Geltsdale reserve
Andy Hay (rspb-images.com)

5.3 Licensing of Grouse Shooting

5.3.1 Direct implications for grouse moor sector and government

Licensing of grouse shooting should not require any changes in practice for grouse moors that are currently compliant with legislation and codes of practice on species protection and moorland management.

It should, however, provide an additional means of ensuring compliance with legislation protecting species and designated sites and regulating heather and grass burning. This should help to reduce illegal killing of raptors, other breaches of wildlife legislation such as rules relating to trapping and snaring, and contravention of burning regulations. Environmental groups argue that, as well as a long history of illegal raptor persecution, there have been numerous illegal burns on deep peat soils on SACs and SPAs since the introduction of the new burning regulations in England in 2021.

Increased legal compliance can be expected to have some impacts on grouse moor businesses, for example by increasing predation by raptors (thereby potentially reducing grouse bags and associated revenues), and by increasing cutting of heather and grass rather than burning (potentially with increased costs of moorland management).

Annual administration costs of licensing



However, it is standard practice in impact assessment to assume full compliance with existing legislation; the effect of licensing should be to ensure compliance with existing rules only, and there should be no additional costs for legally compliant businesses.

The main costs of grouse moor licensing will result from administrative costs and burdens.

The administrative costs incurred by licensees include:

- The time and cost of making licence applications;
- The time and costs of reporting and information provision;
- Any fees charged by the authorities administering the system, to recover the costs of administration.

It is envisaged that the initial process for applying for a licence could be relatively light in terms of information requirements. Applications could be managed online and require provision of basic information on the licensee and the grouse moor. In addition, plans for vegetation burning, and details of moorland management practices, predator control, medication and grouse bags in recent years could be required.

Licensees could be required to report information on grouse bags, predator control, heather burning and cutting and medication annually as a condition of their licence.

As it would be good practice to keep records of these management and shooting practices routinely, this should not create substantial additional burdens. It could be assumed that each licence application and annual report could take each enterprise approximately two days to complete, at an annual cost of around £520 per grouse moor². The annual administrative costs incurred by grouse moors would amount to approximately £99,000 in England and £62,000 in Scotland overall. This assumes 190 estates in England and 120 in Scotland would be licensed, based on best available estimates in Section 2.

A licensing scheme could require three staff to administer it in each of England and Scotland. This would involve administration of applications, processing of annually reported data, monitoring of compliance, enforcement action, and preparation of annual reports on grouse shooting and management in England and Scotland. It is likely that the costs of administering such a system would be in the order of £200,000 - £300,000 annually in each country, to cover staff costs, overheads, travel expenses, legal and professional fees.

If the costs of administration of the system were to be recovered through licence fees, the cost per licence would average around £1,600. The average cost per moor might be higher in Scotland than in England, where grouse moors are fewer in number but larger in

size. Fees could be set at a higher rate for larger moors, based on area or annual grouse bags.

Such a fee rate would represent a relatively small proportion of revenues for larger grouse moors. For example, it would represent just over 1% of the average revenues of nearly £150,000 of four case study driven grouse moors in Scotland examined by McMorran et al (2020). It would be equivalent to the revenues gained from shooting nine brace of grouse at an average fee of £180 per brace (from Section 2).

A tiered fee system, or exemptions for moors shooting low numbers of grouse, would be needed to avoid adverse impacts on small or less intensively managed moors, including those practicing walked-up shooting only. The effect of a licence fee on the viability of larger grouse moors is more difficult to predict, particularly since experience suggests that many grouse moors operate at a loss and are subsidised by their owners. It is possible that the imposition of a licence fee would lead to the cessation of shooting on some moors, particularly in cases where owners were already considering selling their holdings or changing land use or land management, reflecting the trends outlined in the BAU option. Some shooting interests have argued that there is a danger of grouse moors reaching a “tipping point”, where further regulation discourages investment and causes some moors to cease shooting (Scotland’s Regional Moorland Groups, 2021).

²Based on an average cost of £260 per day, assuming a reporting is undertaken by an estate manager or head gamekeeper earning £40,000 per year, and adding a 50% mark-up for overheads.



One benefit of a grouse moor licensing system would be that it would provide a means of collecting data that would help to address many of the evidence gaps identified in this report. Annual reporting by licensees would provide a means of collecting and reporting data on the size of the sector, grouse bags, management practices and potentially socio-economic factors such as numbers of employees.

A grouse moor licensing system would have some benefits for the sector overall by enabling it to demonstrate that it operates legitimately and

sustainably, thus enhancing its public image and placing it on a more sustainable footing.

Stakeholders interviewed expressed mixed views about the merits of a licensing system. Some shooting interests expressed opposition, on the grounds that licensing would add additional administrative burdens, and that it would not be necessary, claiming that illegal activity is limited and declining and can be addressed through enforcement of existing legislation. Environmental interests are generally in favour, arguing that it should help to address the problem of

Grouse moor licensing and regulation – views from the case studies

The **Bolton Castle** interviewee does not object to licensing in theory but is concerned that it would be bureaucratic and put grouse moors at risk from vested interests in the conservation sector. He questions the necessity of further regulation, arguing that the police should continue to be responsible for enforcing existing legislation on wildlife protection. He would object to a fee being charged to licensees to fund a licensing system. He cites declines in moorland birds at Berwyn and Langholm following cessation of grouse shooting and is concerned that more widespread losses would take place if grouse shooting was over-regulated or banned.

The **Geltsdale** site manager would welcome a grouse moor licensing system; this would enable action to be taken in known cases of illegal raptor persecution in the area where criminal prosecutions have so far been unsuccessful.

At **Peak Naze**, the grouse moor manager does not see a problem with licensing in principle, though believes that grouse moors are already over-regulated and is unsure whether licensing would bring benefits. He would be against paying a fee for a licence, as this would limit funds available for habitat management, unless this was to a respected body and was seen to deliver benefits to the sector. He argues that if grouse shooting were to be banned, this would have negative consequences, including regular wildfires and damage to the remaining peatland, as well as incursion of non-native conifers. There would be disbenefits for carbon (because of wildfire) and for biodiversity (fewer grouse and waders). Large scale rewetting of peatlands would not be feasible on the sloping ground.

The **Rottal Estate** owner sees potential benefits in a licensing system, which could help to tackle illegal and unsustainable management practices and improve the image of the grouse shooting sector overall. It would be important for a licensing system to be proportionate, unbureaucratic and with a fair and transparent appeals procedure. It would be reasonable for estates to undertake some reporting of grouse bags and management practices. While asking each estate to pay a licence fee to contribute to administration costs might be reasonable, this would be burdensome if it amounted to thousands rather than hundreds of pounds. He would strongly oppose a ban on grouse shooting, which he believes would have negative consequences for wildlife and the local community.

Interviewees at four **Driven grouse moors in Scotland** examined by McMorran et al (2020) noted increasing political pressures on the sector, as well as increased public interest and a shift in public perceptions linked to reduced numbers of people involved in land management and an increasing presentation of all grouse shooting as intensive and environmentally damaging. This was perceived as contrasting with the reality of an increasingly regulated and professionalised industry which delivers both socio-economic and environmental outcomes within the context of declining grouse bags (relative to the pre-1950s period). Increased regulation, wider policy dimensions (including land reform) and the threat of licensing of grouse moors were perceived as undermining landowner confidence around long-term investment and threatening the potential for controlling predators in the future.

raptor persecution, by enabling enforcement action to be based on a civil rather than criminal burden of proof, placing responsibility on grouse moor managers to ensure that illegal activity does not take place. One grouse moor owner expressed the view that it could have a positive effect, if well designed and implemented, in providing a framework for sustainable management and stamping out illegal practice, thus helping to enhance the image of the sector.

5.3.2 Effects on land use and land management

Under a licensing scheme, current patterns of land management would be expected to continue as before for most grouse moors, and especially those that are compliant with legislation on species protection, heather burning and protection of designated sites.

However, some changes could be expected at the margin, and the pace of change would likely be greater than under the BAU option.

Licensing could be expected to reduce illegal management practices, potentially increasing raptor predation and requiring more cutting rather than burning of vegetation. This, as well as increasing administrative costs for all grouse moors, would have some negative impacts on the sector's financial performance, potentially persuading more grouse moor managers to leave the sector than under the BAU option.

Overall, therefore, licensing of grouse shooting could be expected to lead to similar types of changes in land use and land management to the BAU option, but the rate of change would be greater – a minority of moors would cease to be managed for grouse, but this number would be larger than under BAU. Those continuing as grouse moors would be required to demonstrate sustainability and legal compliance; as a result, balancing management of grouse populations with wider investments in natural capital might emerge as the norm.



RSPB Dovestone, Project Officer
Jacqui Green planting a new Memory Tree
Ben Hall (rspb-images.com)



Ramblers group walking along the valley in mountains of Snowdonia National Park. Cwm Eigiau Conwy North Wales Alamy

Most of the heather moorland currently managed for red grouse would continue to be managed in this way, but more grouse moors would convert to other uses such as forestry, carbon and natural capital management. The result might be a more varied land cover mix than under BAU, with increased restoration of blanket bog, planting of woodlands and natural regeneration of native vegetation compared to BAU – alongside management of heather for red grouse. Some grouse moors would continue to be managed intensively to generate large grouse bags, within legal constraints.

Reductions in illegal killing of raptors would increase focus on how to manage conflicts with raptors, for example through deployment of diversionary feeding and more contentious measures such as the brood management scheme currently being trialled for hen harriers in England (Natural England, 2022). It could

also reduce expectations among grouse moor managers and shooting clients regarding bag sizes, since accepting smaller bags might be necessary to deploy legal and sustainable management practices.

5.3.3 Economic impacts

The introduction of a licensing system would be expected to magnify the economic impacts of the BAU option.

A larger contraction in the extent of grouse moors would be expected, as well as changes in management on some moors, in pursuit of a wider balance of objectives. However, a large share of existing employment and economic activity associated with grouse moors would be maintained.

As a result, a moderate reduction in employment of gamekeepers could be expected. This would likely be offset by new jobs created in peatland restoration,

woodland planting and natural capital management. Growth in ecotourism revenues and employment would also be expected, as estates seek new opportunities for diversification linked to natural capital investments.

Any impacts would result from marginal changes in the viability of grouse shooting compared to alternative land use and land management options, rather than dramatic effects on the sector's costs or revenues. Therefore they might be expected to take place gradually over time, rather than being enforced suddenly, as would be the case if grouse shooting were banned. Rather than being enforced, changes in land use would be expected in places where alternative options became more attractive, with grouse shooting expected to be replaced by other forms of land management activity (e.g. ecosystem restoration, natural capital management, forestry).

As under the BAU option, any major gains in employment through natural capital investments such as peatland restoration and woodland planting would mostly be short term in duration and followed by lower levels of employment in ongoing maintenance activities.

These alternative land uses would benefit from increased public investment in natural capital management, largely funded through reductions in Basic Payments, as well as increasing private investment in nature-based solutions to climate change and water management.

There would be both positive and negative effects in the wider rural economy. Some businesses supplying grouse moors would face reduced demand, while contractors involved in ecosystem restoration would benefit. Accommodation and catering businesses would face some reductions in demand from grouse shooting clients but benefit from growth in ecotourism and other forms of outdoor recreation.

5.3.4 Social impacts

Grouse moor licensing would be expected to have limited effects on rural communities.

Changes in employment and economic activity would be relatively small, and likely offset by growth in other economic activity.

There could be some positive effects on overall social attitudes to grouse shooting if licensing was successful in enhancing the sustainability and public image of the grouse shooting sector.



New housing development building houses for increased demand in rural areas i-stock

5.3.5 Impacts on biodiversity

Grouse moor licensing would help to address the negative impacts of intensive management on biodiversity, while reducing populations of some species.

The benefits that grouse moors currently provide for red grouse, breeding waders and heather would largely be maintained under the grouse moor licensing option, but some declines would be expected relative to BAU.

Licensing should help to reduce the illegal persecution of raptors, thus increasing raptor populations – this could dramatically increase the population of hen harriers in particular. Analysis by the RSPB estimates that the UK has sufficient habitat to maintain a population of 2,650 pairs of this species, compared to 575 pairs at present (RSPB, 2019).

Some grouse moors would continue to be managed intensively, even if licensed, with negative effects on vegetation diversity and overall species diversity. However, a larger proportion of moors can be expected to reduce the intensity of management and to invest in natural capital restoration compared to BAU. Some increases in vegetation diversity and species diversity may be expected as a result. Licensing could help to enforce legislation on heather and grass burning, helping to prevent damage to peatland vegetation and enhance the condition of blanket bog habitats in European protected sites.

5.3.6 Impacts on climate and ecosystem services

Gains in carbon management and ecosystem services are expected to be greater than under the BAU option.

This would be the result of enhanced enforcement of heather and grass burning regulations, and greater changes in land use and land management, enhancing restoration of peatlands and other upland habitats on grouse moors, and driving greater changes in land use

motivated by natural capital and carbon investment. However, some moors will continue to be managed intensively with adverse effects on carbon, water quality and flooding.

5.4 A Ban on Driven Grouse Shooting

5.4.1 Direct implications for grouse moor sector and government

This option would ban driven grouse shooting, leading to the immediate closure of grouse moors and grouse shooting enterprises.

If walked up shooting were allowed to continue, some management of heather for red grouse might continue on a small scale.

5.4.2 Effects on land use and land management

A ban on grouse shooting would profoundly affect the management of around 1 million hectares of land managed for red grouse in the UK (roughly 4% of the UK land area).

The withdrawal of gamekeepers would lead to the widespread withdrawal of management practices currently designed to enhance populations of red grouse, including the burning and cutting of heather, control of predators and use of medication to control parasites in grouse populations.

Some of these practices would be maintained in some areas managed for conservation – for example vegetation cutting and control of some predators (such as foxes and crows, to benefit ground nesting birds) are undertaken at the RSPB's Geltsdale reserve.

It is likely that, even if walked-up shooting were still to be allowed, moorland management would decline substantially, because financial returns from walked-up shooting would be insufficient to justify the significant levels of investment currently undertaken. It is possible, however, that some heather management and predator control would continue on a small scale.



Red grouse
RSPB (rspb-images.com)

These changes would be introduced with immediate effect from the date of the ban.

It is likely that many grouse moors would be sold, while others would undergo changes of management under their current owners. Changes in management would likely be similar to those identified for the BAU and licensing options (peatland restoration, re-wilding, forestry, grazing management) but would need to take place on a much larger scale. It is likely that some of these changes would be enforced rather than being positive, planned changes in management. Coupled with the ongoing and phased removal of Basic Payments, it is likely that active management of significant areas of land would cease, unless there was a large scale increase in agri-environment and natural capital payments. Reductions in land prices might be expected, at least in the short term, opening new opportunities for natural capital investors and potentially purchases by local communities.

The likely consequences of these changes would be a decrease in the area of heather moorland, replaced by a combination of grassland (in heavily grazed areas), blanket bog (through restoration of degraded peatlands) and scrub / woodland (through natural regeneration and tree planting). The balance of these vegetation changes might be expected to vary, depending on differences in the quality and accessibility of land, opportunities to deliver nature-based solutions, variations in availability of environmental land management payments and other factors.

5.4.3 Economic impacts

A ban on grouse shooting would lead to the immediate loss of employment on grouse moors and in the supply chain.

The best available estimates suggest that the sector and its supply chain support approximately 4,000 FTE jobs in the UK (less than one tenth of one percent of rural employment), although this may be an overestimate.

This loss of employment and economic activity would be offset, at least to some extent, by growth in other activities, such as ecosystem restoration, forestry and agriculture. Many estates would seek to develop other forms of tourism and recreation, such as ecotourism, walking and other outdoor pursuits. Because a ban on grouse shooting would have profound effects on the overall landscape over time (with less heather moorland and more scrub and woodland), there could be implications for the wider tourism economy, depending on the preferences of visitors to spend time in open moorland compared to more varied landscapes.

The net effects of these changes would be uncertain.

It is likely that, because of its immediate effect and wide-ranging nature, a ban would have a greater impact on rural economies than the BAU and licensing options. While under the other options estates would have the freedom to pursue alternative land uses and develop new enterprises where they had greatest value, a ban would end grouse shooting even in areas with few viable alternatives. As a result, there could be negative impacts on some local economies, particularly in more remote areas, those attracting fewer tourists, and those offering least opportunity for natural capital restoration (on account of lower nature

value, and lower potential to deliver ecosystem services because of their location relative to water supplies and conurbations).

Therefore, the overall effect on economic activity would be limited, but some areas highly dependent on grouse moors could experience some negative effects.

A ban on driven grouse shooting could deliver wider economic benefits through the delivery of ecosystem services. The available evidence suggests that the benefits of enhanced ecosystem service delivery could potentially dwarf local economy effects, though data are patchy.

5.4.4 Social impacts

A ban on driven grouse shooting would have more profound impacts on local communities than the other two options.

The loss of jobs for gamekeepers and in supply chains would have a small effect on overall rural employment, but could have an impact at local level, particularly in remote areas with few alternative employment opportunities. This may reduce the viability of rural services in some areas. In most areas, however, any impacts would be offset by growth in other land management activities and in other forms of tourism and recreation.

There would also be effects on the cultural heritage and identity of some rural areas with a history and tradition of grouse shooting. While some may see a ban as bringing the loss of a valued cultural activity, others would welcome the closure of a sector seen as highlighting inequalities and differences in social attitudes. There would be a large decline in the numbers of predators killed legally and illegally in the uplands, which many would see as beneficial for animal welfare.

5.4.5 Impacts on biodiversity

If driven grouse shooting were banned, there would likely be a decline in heather moorland, and negative effects on populations of some ground nesting birds. Wider biodiversity would increase in the short term, though longer-term effects would depend on ongoing management.

Some species benefiting from moorland management and predator control would decline, including red grouse and breeding waders. There would be an increase in the species and structural diversity of upland vegetation, at least in the short term. It is likely that overall biodiversity on land currently managed as grouse moors would increase. Bird species favouring greater vegetation diversity – such as black grouse, whinchat and grasshopper warbler – would increase (as has been observed at Geltsdale). Over time, the area of woodland would increase, benefiting a range of woodland species. While species diversity

may initially increase in response to increased habitat diversity, longer term effects would depend on ongoing management, and particularly whether grazing (and where necessary cutting) occurred at appropriate levels to maintain a diverse vegetation structure.

A ban on driven grouse shooting would have benefits in eliminating illegal killing of species such as raptors seen as impacting adversely on grouse populations. It would achieve this with greater certainty than the licensing option because there would be no longer be an incentive to kill raptors on moorland. Overall effects on raptor populations would depend on land use changes as well as reductions in persecution. For example, while a major factor limiting the growth of hen harrier populations would be removed, the degree of growth in the population would depend on the extent of suitable habitat (given the expected reduction in the area of heather moorland).



5.4.6 Impacts on climate and ecosystem services

A ban on grouse shooting should have positive effects on carbon, water quality and flood management, although securing these benefits depends on ongoing investment in ecosystem restoration.

Intensive management of grouse moors is widely found to have negative effects on carbon emissions, water quality and flooding. A ban on driven grouse shooting should have benefits in enhancing the storage and sequestration of carbon, improving water quality (and thus reducing treatment costs and potentially water bills), and slowing water flows, hence reducing flood risk. However, ongoing funding (public and private) for investment in restoration of ecosystems (especially blanket bog) would be needed to maximise these benefits, especially where peatlands have been heavily degraded. Grouse shooting interests argue that cessation of heather burning would increase fire risk (by allowing the development of older, longer stands of heather) and thus have adverse impacts on carbon emissions, though evidence is inconclusive. Whilst the threat of unmanaged fires to open habitats, particularly peatland habitats (and associated carbon stocks) is a concern, action to re-wet peatland habitats would reduce dwarf shrub cover and make these habitats wetter and more resilient to fire, should a fire occur. The establishment of areas of broadleaf woodland could also help to prevent fires spreading onto areas of recovering and intact heath and peatland.

A ban on grouse shooting would lead to a more varied upland landscape, with uncertain effects on the value of cultural services (landscape, cultural heritage, recreation and tourism).

It is likely that there would be a reduction in extent of heather moorland but larger areas of scrub and woodland. It is not clear whether this would enhance or reduce overall landscape value; shooting interests argue that heather moorland is attractive to visitors, while proponents of change assert that a more varied and less open landscape would be beneficial.

The value of ecosystem service changes that would result from an end to grouse moor management is uncertain. However, available studies suggest that the benefits of land management change and ecosystem restoration are likely to exceed the costs, and to greatly outweigh the value of grouse moor management itself.

Studies such as that by eftec (2015) and Clarke et al (2015) estimate that the benefits for climate and other ecosystem services of restoration of blanket bog, including through cessation of rotational burning, greatly exceed the costs, and exceed the per hectare revenues of grouse moors.

5.5 Overall assessment

The table on the right summarises the expected impacts of each of the three options, based on the analysis above.

Summary of expected impacts of policy options

	Business as usual (BAU)	Grouse moor licensing	Ban on driven grouse shooting
Direct implications and costs	No change.	Little change in practice required for legally compliant moors, but should help to reduce illegal activity. Admin costs could amount to £150k annually for grouse moors and £500k annually for public sector in Britain; cost recovery could impose licence costs averaging £1,600 per grouse moor.	Immediate ban on driven grouse shooting, leading to closure of grouse shooting enterprises.
Effects on land use and management	Likely small decline in grouse moor area, in response to wider opportunities for carbon and natural capital investment.	Extra costs and regulatory scrutiny can likely be absorbed by grouse moors but may cause more to change land use/ land management to carbon/ forestry/ natural capital restoration than under BAU. Most grouse moors continue to be managed as at present, but legal compliance increases. Greater focus on how to manage conflicts with raptors.	Cessation of heather management, predator control, medication of red grouse over ca. 1 million hectares of Britain. Some conservation management (e.g., vegetation cutting and predator control) might continue, as well as small scale heather management for walked up shooting. Some grouse moors would be sold, others would change management under existing ownership. Widespread change in land use and land management – peatland restoration, afforestation, rewilding, changes in grazing.
Economic impacts	Small decline in grouse moor employment and income, offset by increases in other activity.	Moderate decline in grouse moor employment and income, offset by increases in other activity.	Up to 4,000 jobs in grouse moors and supply chains lost; at least partially offset by increases in other management activities, tourism and recreation. Overall small effect on rural economies but could be locally significant. Less orderly transition than under other options. Local economy effects could be dwarfed by benefits of enhanced ecosystem services.
Social impacts	Limited effect on rural communities, cultural heritage or animal welfare.	Small overall effect on rural communities, cultural heritage, animal welfare. Grouse shooting sector could be seen as more sustainable, enhancing public image and reducing divisions of opinion.	Possible effect on some local communities and services in areas dependent on grouse shooting, but generally small impact on rural life. Some impact on cultural heritage and identity on some areas with history and tradition of grouse shooting. Some would see benefit in ending of an activity seen to highlight social inequalities and differences in social attitudes, as well as benefits for animal welfare from large decline in predator control.
Biodiversity impacts	Small declines in heather moorland, red grouse, breeding waders, with small increase in vegetation and species diversity. Continuing illegal persecution of raptors.	Similar but slightly magnified trends to BAU. Illegal persecution of raptors reduced, helping species populations to recover. Improved regulation of heather burning could reduce negative impacts.	Likely decline in area of heather moorland, and populations of species such as red grouse and breeding waders. Enhanced vegetation and species diversity, at least in short term; long term effects would depend on grazing and cutting regimes. Illegal raptor persecution on grouse moors would cease; effects on raptor populations would depend also on habitat change.
Impacts on climate and ecosystem services	Small gains in carbon and ecosystem services, but less than other two options; continuing adverse impacts where moors are intensively managed.	Carbon and ecosystem service benefits greater than under BAU, but some moors continue to be managed intensively with adverse impacts.	Likely benefits for climate, water and flood management. Possible increases in wild fire risk. Changes in landscape could be seen as positive by some and negative by others. Value of ecosystem service changes expected to outweigh local economy impacts.

6. Conclusions

1. This study has examined evidence of the economic, social and environmental impacts of grouse moors in Great Britain and assessed the likely impacts of broad policy options for the future of the sector.
2. The analysis has been constrained by evidence gaps and uncertainties regarding many aspects of grouse moors and their impacts. These include basic data on the number and area of grouse moors, employment and sector revenues, as well as scientific uncertainties, data gaps and different interpretations of evidence regarding biodiversity, climate and ecosystem service effects.
3. Different stakeholders have widely diverging views on the benefits and costs of grouse moors for society, and the available evidence is often used selectively to support differing policy positions. This study has attempted to provide a balanced, independent analysis of alternative policy options in this context.
4. The context in which decisions are made regarding land use and land management in the uplands is complex and rapidly evolving, with major changes underway in government support, as well as a surge in private sector investment in carbon and ecosystem service markets. These developments, as well as the complex range of motivations affecting grouse moor management decisions, make it difficult to predict responses to alternative policy options.
5. Given these challenges, a robust quantitative assessment of the costs and benefits of alternative policy options is not possible. The analysis has instead attempted to identify the nature, direction and where possible relative value of likely changes in a range of economic, social and environmental effects.
6. Given wider policy and market developments, some further contraction of the grouse shooting sector is likely under the business-as-usual option. This will create new opportunities for biodiversity, climate, ecosystem services, rural economies and communities, as well as having some negative effects. However, this option would not address ongoing impacts of intensive grouse moor management on protected wildlife, climate and ecosystem services.
7. Introduction of a licensing system for grouse moor management would help to support the enforcement of existing legislation for protected species and heather burning, therefore addressing some of the negative environmental impacts of intensive grouse moor management. It would impose administrative costs on the sector but should only require changes in practice for those grouse moors that are not currently legally compliant. While it is expected that the additional costs would be absorbed by most grouse moor businesses, it would be expected to magnify the trends expected under the BAU scenario. By improving sustainability and transparency, licensing could have benefits in enhancing the public image of the sector, while sustaining gamekeeping jobs.
8. A ban on driven grouse shooting would have much larger and more immediate impacts than the other two options, bringing immediate changes in land use and land management. Up to 4,000 jobs could be lost among gamekeepers and in supply chains, though this would represent a small change in the context of rural economies overall and would be at least partially offset by the impacts of new opportunities in natural capital management and ecotourism, and likely outweighed by benefits for climate and ecosystem services. Some species benefiting from grouse

moor management would decline; overall biodiversity would likely increase in the short term, though long-term effects would depend on future strategies for grazing and vegetation management in the uplands. Overall effects would be subject to greater uncertainty and a less gradual or orderly change than might occur under the licensing option.

9. Future analyses would benefit from an improved evidence base in a number of areas, including in relation to the size of the grouse moor sector (number and areas of grouse moors, grouse bags), economic impacts (employment, revenues, wages, purchases, gross value added), social and community effects, interactions with other land management practices (grazing, natural capital management), effects on the extent and value of a range of ecosystem services (carbon storage and sequestration, water quality, flood management, landscape, tourism and other cultural services), and comparisons of the above effects with other land uses and land management practices.
10. One benefit of a grouse moor licensing system would be that it would provide a means of collecting data that would help to address the evidence gaps identified. Annual reporting by licensees would help to fill evidence gaps on the size of the sector, grouse bags, management practices and potentially socio-economic factors such as numbers of employees. This would strengthen the evidence base for future policy analysis.



Aerial view of peatland pools in blanket bog,
RSPB Forsinard Nature Reserve
David Tipling (rspb-images.com)

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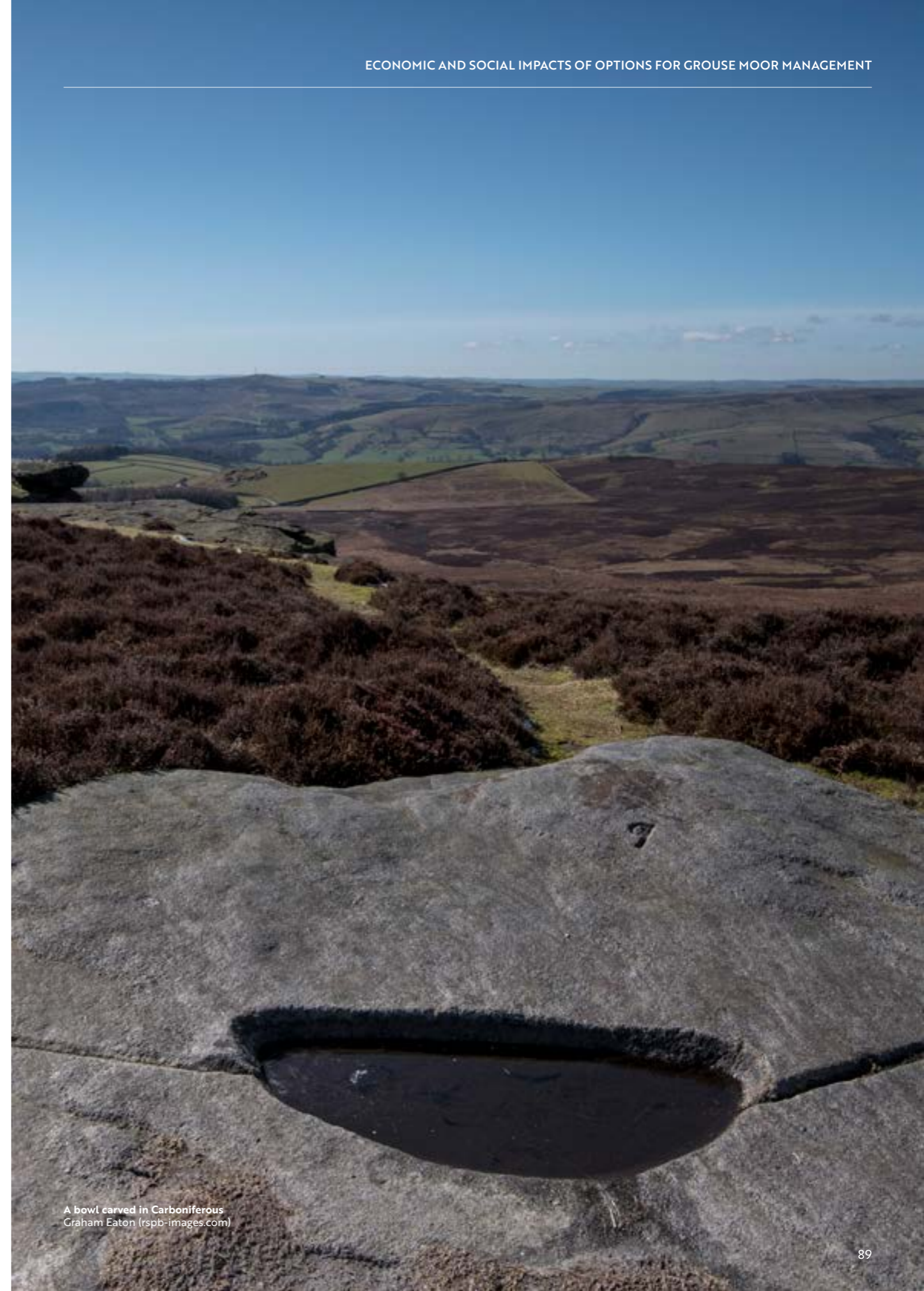
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A bowl carved in Carboniferous
Graham Eaton (rspb-images.com)

Annex: Case studies

This Annex presents seven case studies from current and former grouse moors.

For four case studies (Bolton Castle, Geltsdale, Peak Naze and Rottal) the content presented and views expressed are drawn from interviews with representatives of each site or estate, and represent the views of the interviewees themselves.

The other three case studies (Langholm Moor and Tarras Valley; driven and walked-up grouse shooting in Scotland) are based on documentary evidence.

1. Bolton Castle

Location: Wensleydale, N Yorkshire



Castle Bolton village and castle in Wensleydale
Shutterstock

Area of grouse moor/estate:

Bolton Castle is a 4,800 hectare estate, the upper half of which is heather moorland, and the lower half predominantly grassland, used for dairy, sheep and beef farming. The heather moorland is all SSSI, SAC and SPA. Three quarters is heather dominated, and a quarter predominantly grassland. It comprises a mixture of blanket bog and dry heath, predominantly on peat soils.

All but 80 hectares of the lower land is tenanted. The estate also has 520 hectares of managed woodland and is aiming to increase woodland cover to contribute to climate change mitigation. The woodland is broad-leaved, managed for amenity and sport as well as timber, with 400 hectares let for pheasant shooting, and a small pheasant shoot managed by the state itself.

The estate is owned by Lord Bolton, who manages the grouse moor, and has been in the family for more than 800 years. His son, Tom Orde-Powlett (TOP) is closely involved in managing the grouse moor and has a particular interest in curlew conservation.

History of grouse moor management:

There is a long history of grouse shooting at Bolton Castle, with photographs of driven shooting going back at least to the 1880s. Heather burning used to be undertaken in bigger areas, but has transitioned to smaller mosaics, with an agri-environment agreement in 1997 stipulating burning rotations. Burning management has been improved through investment in improved equipment, including bowsers on Argocat all-terrain vehicles. Fires are now smaller and more controlled, in accordance with the Heather and

Grassland Code of 2007, with cooler burns limited to the canopy and enabling quicker recovery of blanket bog vegetation. As a result an increasing proportion of quadrats have vegetation in favourable status.

Current management and shooting practices:

Grouse shooting is predominantly driven, and mostly by paying customers. Driven grouse shooting pays the bills, while walked up shooting does not. TOP doubts whether walked up shooting could be sustainable, as it does not raise sufficient income to fund the management needed to generate a shootable surplus of birds. It also causes as much disturbance as a driven shoot.

Grouse numbers are surveyed in spring and autumn in a sample of eight 100 acre blocks, to calculate the shootable surplus. Recent years have seen between 0 and 4,500 brace of red grouse shot annually, with an average of around 1,750, allowing approximately 17 driven shooting days with an average of 100 brace per day. The best ground in the Yorkshire Dales produces a maximum of a brace per acre per year. Annual income varies according to the numbers of birds, with the shoot generating a profit in most years but occasional significant losses. The financial surplus generated by the shoot is important in funding other estate conservation activities, while the two

Shoot provides
£100,000
of beaters' wages
in a good year

gamekeepers are closely involved in conservation work, including peatland restoration. The shoot attracts a diversity of paying customers, with a mix of old money and new money.

The estate practices legal control of a range of predators - foxes, crows, stoats, rats, feral cats and mink. Grazing is let to a single licensee, while agri-environment payments also contribute to the estate's revenue.

Economic impacts of management:

The grouse shoot employs two full-time keepers. Another keeper is employed part-time on the low ground. The shoot provides £100,000 in wages for beaters in a good year – typically between 22 and 26 on a driven day. Shooting clients also employ loaders – typically local farmers – and up to eight per shoot. The estate provides lunches on shooting days, but not accommodation. Local businesses – including a pub and a bed and breakfast provider – cater for grouse shooting clients. One business estimated that it lost revenue of £110,000 in a recent year when no grouse shooting took place on the estate. The local tourism industry benefits from walkers in the summer months, with grouse shooting providing an important share of business in September and October. Other local businesses, including garages, fuel stations, restaurants, pubs and dry cleaners benefit from expenditures by the estate and its visitors.

Social and community benefits:

The grouse shoot is in a remote rural area and plays an important role in bringing people together on driven shoot days, including beaters and loaders – often from the farming community - as well as shooting clients and caterers. Driven grouse shooting brings together people from diverse backgrounds and provides camaraderie and healthy exercise.

Biodiversity benefits:

The moorland supports a range of important bird species including curlew, golden plover, lapwing, snipe, redshank, ring ouzel, merlin and hen harrier. Breeding Bird Survey records show strong increases in populations of a range of wader species, especially golden plover, lapwing and curlew, between 2007 and 2016. A BTO survey of upland waders found that the tetrad had amongst the highest populations of curlew and lapwings nationally in 2016³. Wader populations have benefited from keeping and predator control. They benefit from the scale of available habitat – small patches of habitat in the lower areas of the estate can attract breeding waders but make them vulnerable to predation. TOP is concerned about increased predation from gulls, which he is unable to control, which threatens to reduce curlew nest productivity below levels required to sustain the population (0.55 fledged young per pair).

TOP supports the hen harrier brood management scheme, which he sees as being a good way of increasing the species population and range. The estate has served as a receptor site for the scheme. TOP believes hen harriers can co-exist with driven grouse shooting but argues that “it is a pleasure to have a pair of birds, but not a colony”.

The SSSI was designated in 1995 as an outstanding example of North Pennines moorland, having an extensive and complete west to east transition from blanket bog to dry heathland and supporting an important assemblage of moorland breeding birds. SSSI condition assessments focus on vegetation indicator species. The proportion of quadrats including the threshold of seven indicator species has increased from 30% to 70% and is therefore showing a positive transition towards the 90% required to reach favourable condition.

The estate is restoring blanket bog, in accordance with a Natural England survey and restoration plan, with restoration of the hydrology central to achieving

ecosystem function. The peatland has been degraded by a history of mining as well as burning caused by historic aeroplane crashes.

Ecosystem service delivery:

TOP believes that well controlled burning of heather moorland has no adverse effects on carbon emissions or water quality, citing the work of Andreas Heinemeyer. While peatland restoration can enhance sphagnum and inhibit heather growth, burning or cutting remain necessary on drier heather moorland, to reduce fuel load, and cutting is not possible on all land. He is frustrated by the ban on burning of deep peat, which covers 30-70% of the grouse moor – this requires an increase in cutting, but this is not possible on at least 10% of the area.

Policy and economic drivers:

TOP expects government funding for land management to decrease, with a risk that farmers will intensify in an attempt to maintain incomes. Private finance may enhance opportunities for peatland restoration. While there has been increasing interest in forest expansion, this is not an option for the grouse moor, which is entirely designated as SSSI to protect open ground habitats.

Future options and implications:

TOP sees a continued future for grouse shooting on Bolton Castle’s moorland, arguing that the current management is most compatible with its nature designations. The main risk he sees comes from over-regulation of the grouse shooting sector, which could threaten future viability. He does not see a trade-off between grouse bags and sustainability objectives, arguing that large bags and financially viable grouse enterprises go hand-in-hand with good conservation practice.

³ Figures referred to in this paragraph are presented in an unpublished paper by Tom Orde-Powlett (2020) “The Biggest Threat to Curlews, Carbon and Communities in the English Uplands”

Possible implications of grouse moor management policies:

TOP does not object to licensing in theory but is concerned that it would be bureaucratic and put grouse moors at risk from vested interests in the conservation sector. He questions the necessity of further regulation, arguing that the police should continue to be responsible for enforcing existing legislation on wildlife protection. He would object to a fee being charged to licensees to fund a licensing system. He cites declines in moorland birds at Berwyn and Langholm following cessation of grouse shooting and is concerned that more widespread losses would take place if grouse shooting was over-regulated or banned.

Breeding bird survey records strong populations of golden plover, lapwing and curlew



Lapwing
Andy Hay (rspb-images.com)

2. Geltsdale

A reserve in the north west corner of the North Pennines, Cumbria

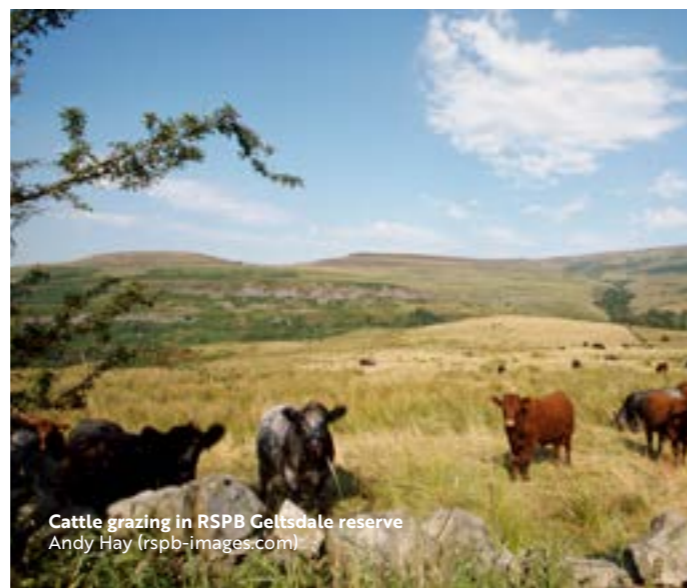


Area of grouse moor/estate:

Geltsdale reserve encompasses two hill farms - Geltsdale and Tarnhouse - covering 5,350 hectares. The majority of the reserve (4,500 hectare) consists of unenclosed blanket bog and mosaics of upland heath and acid grassland, together with smaller areas of enclosed in-bye land and wood pasture. The RSPB controls the management of 2,000 hectares and owns the sporting rights to the other 2,500 hectares of moorland (with grazing undertaken by a tenant farmer).

History of grouse moor management:

Geltsdale was previously part of Lord Carlisle's estate, which was divided in 1929, with the Boothby estate subsequently divided in 1967. It was previously managed as a grouse moor and for sheep grazing. From the 1960s onwards, land management at Geltsdale became more intensive: there was a large increase in densities of sheep, grips were excavated to drain the blanket bog, and heather burning became more organised and frequent. By the mid-1970s, there were more than 4,000 sheep grazing the two farms at



Cattle grazing in RSPB Geltsdale reserve
Andy Hay (rspb-images.com)

Geltsdale and much of the blanket bog had been drained. The combination of drainage, burning and sheep grazing left significant areas of bare and eroding peat. By the late 1990s, over 90% of the blanket bog within the Geltsdale and Glendue Fells SSSI had been assessed by English Nature as being in unfavourable condition⁴.

The RSPB has been involved at Geltsdale since 1975 and began habitat management on part of the reserve in 1990. In 2001, after the gamekeeper and tenant farmer retired, the Society bought the 2,000 hectare Tarnhouse Farm and acquired the sporting rights for the whole reserve, including Geltsdale Farm, which is owned and managed by the Weir Trust and its farming tenant. RSPB has had agri-environment schemes at Geltsdale since the 1990s and started a large Countryside Stewardship scheme in 2003 on Tarnhouse Farm. Geltsdale Farm reduced sheep numbers in 2004 when the tenant entered Countryside Stewardship and removed the sheep in 2009 with a Higher Level Stewardship agreement, now extended through Countryside Stewardship.

The farming tenant at Geltsdale Farm entered the Countryside Stewardship scheme in 2009, removing all his sheep and introducing cattle, after the former tenant retired; the RSPB owned land at Tarnhouse Farm has been in Countryside Stewardship since 2003. There was an overall reduction in numbers of sheep from about 4,400 in the mid-1990s to around 300 in 2018, and an increase in cattle from about 20 to 240 over the same period.

Current management and shooting practices:

The Geltsdale reserve is within the North Pennines Moors SPA and SAC, and the Geltsdale and Glendue Fells SSSI and forms part of the North Pennines AONB. The European designations recognise the particular importance of the area's blanket bog and dwarf shrub heath, alkaline fen, ash and oak woodlands, and its upland-bird assemblage.

Grouse shooting ceased at Geltsdale in 2001, following the RSPB's acquisition of shooting rights, apart from on a few hundred hectares which continue to be leased for walked-up grouse shooting.

Current management aims to achieve a varied and naturally sustainable vegetation structure. As well as grazing this currently involves cutting of 15-30 hectares of heather per year, to enhance vegetation diversity. Heather burning was reduced from 2000 and ceased in 2009. The RSPB aims to stop cutting when a diverse and sustainable vegetation structure has been achieved. Bog restoration has included blocking of around 250km of grips, as well as removal of 100 hectare of planted Lodgepole pine since 2009. Regeneration of sphagnum has followed cessation of grazing on about 400 hectares. In 2004/05, about 240 hectares of broadleaved trees were planted, and have now achieved a natural looking woodland structure.

Changes to vegetation management have been agreed with Natural England; although changes in vegetation structure have adverse effects on populations of some

breeding waders (notably golden plover), the local NE advisor has argued for further increases in scrub than are currently present.

Predator control focuses on foxes and crows only. The Society undertakes monitoring on sample plots annually, and across the whole 5,350 hectare reserve when resources allow; the entire reserve was surveyed in 2022.

Two neighbouring estates are managed intensively for driven grouse shooting and owned by wealthy US businessmen. Another neighbouring estate is managed intensively for a red-legged partridge shoot.

Economic impacts of management:

Employment has increased on site since the RSPB acquired the reserve, and now totals approximately 5.75 FTE - one full-time site manager, three wardens, an estate worker and an average of 1.5 seasonal research staff annually (2.5 this year). The reserve has an annual budget of £270,000, most of which is spent in the local economy. After income from Countryside Stewardship and the farm tenancy, the reserve runs at an annual financial deficit of around £80,000. This deficit may increase as farm tenancy income is expected to decline following the withdrawal of the CAP basic payment scheme. The reserve has a small visitor centre and attracts annual visits of about 6,000, bringing some visitor spending into the local economy.

240ha
broadleaved
trees planted
250km
of grips blocked

⁴Steve Garnett, Jen Selvidge, Stephen Westerberg, Malcolm Ausden and Pat Thompson (2019). RSPB Geltsdale - a case study of upland management. British Wildlife (409), August 2019.

Social and community benefits:

Geltsdale is located in a remote rural area with a low population density of 27 per square kilometre across the local parliamentary constituency. The employment and spending in reserve management therefore have a significant impact on the local economy and community.

Biodiversity benefits:

The changes in vegetation management have increased biodiversity at Geltsdale; 90 species of breeding birds have been recorded, many more than on typical grouse moors, and including species such as grasshopper warbler and whinchat which were previously mostly absent. However, there have been criticisms from shooting interests that this has been at the expense of breeding waders. Populations of golden plover have declined. There has also been a decrease in curlew, but a healthy population of around 50 breeding pairs remains, helped by vegetation cutting and bog restoration. Black grouse have benefited from the more varied vegetation structure and increased to 40-50 breeding males in the decade to 2013, with numbers continuing to remain well above 1990s levels.

Populations of red grouse are healthy, and, while fluctuating, have followed an overall upward trend in numbers of both adults and young. Productivity exceeded that on neighbouring grouse moors in 2019. It is thought that the varied vegetation structure, especially the woodland cover, benefits this species in harsh winters. Hen harriers attempt to nest at Geltsdale annually but breeding success has been affected by a series of unexplained disappearances of breeding birds, believed to be linked to illegal persecution on neighbouring moors. The previous keeper at Geltsdale was accused of illegally killing hen harrier chicks in 1990, but the prosecution was unsuccessful (evidence ruled to be inadmissible).

Ecosystem service delivery:

Peatland restoration and woodland expansion, as well as the cessation of heather burning have benefited carbon sequestration and water quality, as evidenced by studies by the University of Leeds. The reserve is part of the water collection area for Carlisle, with United Utilities reporting that water from the reserve is of better quality than other parts of the catchment.

Policy and economic drivers:

Agricultural subsidy reforms will adversely impact on the financial viability of the farming tenant, leading to a drop in rental income, though this may be offset by increased receipts through the new environmental land management schemes.

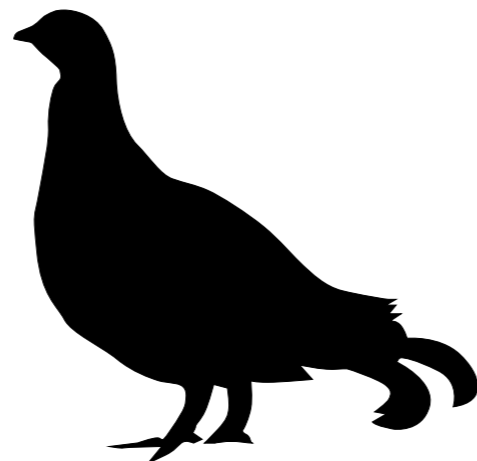
Future options and implications:

The current direction of management is expected to continue in future years; this will deliver a more varied and natural vegetation structure, in contrast to neighbouring moors which are expected to remain intensively managed for grouse shooting.

Possible implications of grouse moor management policies:

The site manager would welcome a grouse moor licensing system; this would enable action to be taken in known cases of illegal raptor persecution in the area where criminal prosecutions have so far been unsuccessful.

**Black grouse
breeding
males
increase to
40-50**



Two male black Grouse jousting
Niall Benvie (rspb-images.com)

3. Langholm Moor and Tarras Valley

Langholm Moor is in the southern uplands of Scotland, east of the town of Langholm, a once thriving textile centre which has suffered industrial decline.



Area of grouse moor/estate:

Langholm Moor, the focus of the Langholm Moor Demonstration Project between 2008 and 2017, covered 11,500 hectares of heather moorland, blanket bog and acid grassland, and was then wholly owned by Buccleuch Estates. It included most of the 7,500 hectare Langholm–Newcastleton Hills Special Protection Area (SPA, designated in 2001 to protect hen harriers) and Site of Special Scientific Interest (SSSI, designated in 1985 for the upland breeding bird and habitat assemblage). Buccleuch Estates have since sold some of the land to the local community.

History of grouse moor management:

Langholm Moor had a long history of management for driven grouse shooting. Grouse bags at Langholm followed cyclical fluctuations but declined by 3% per annum between 1948 and 1988, with overgrazing leading to the loss of 48% of the heather-dominated moorland to grass.



Between 1992 and 1997, the Joint Raptor Study measured the scale of raptor predation on grouse and worked out the likely effect this would have on shooting and subsequent breeding stocks of grouse. It showed that predation by raptors could prevent the recovery of a red grouse population and brought about an increase in the hen harrier population, which peaked at 20 pairs in 1997, leading to the moor being designated as a SPA for the species. Raptor predation at Langholm reduced autumn grouse abundance by 50%, leading to the re-deployment of gamekeepers and cessation of driven grouse shooting⁵.

The subsequent Langholm Moor Demonstration Project (LMDP) ran from 2008 to 2017 had the main objective to re-establish a financially viable driven grouse moor and to meet the nature conservation objectives for the SPA and SSSI. It aimed to achieve a 'win: win', where breeding raptors co-existed with commercial driven grouse shooting. The project was funded and delivered by a partnership of Buccleuch, Scottish Natural Heritage, Game & Wildlife Conservation Trust, Royal Society for the Protection

of Birds and Natural England, employing gamekeepers to deliver grouse moor management practices until 2016 and a science team to monitor these effects until 2017. Five gamekeepers and a project manager were responsible for planning and carrying out the hill management. The LMDP was successful in addressing decades of heather loss through removal of grazing and gamekeeper management. It increased grouse to numbers that would have previously been sufficient for driven grouse shooting, but did not succeed in achieving the increased level of breeding success then considered necessary to sustain a financially viable driven shoot. The project concluded that continuing management over a longer time period would be unlikely to achieve target grouse numbers, which would probably require further reductions in predation pressure⁶.

In May 2019, Buccleuch Estates announced its decision to sell 10,625 hectares of Langholm Moor and the Tarras Valley in its Borders Estate. The Langholm Initiative (a community partnership formed in 1994) announced a plan to purchase 4,200 hectares of this land in two tranches. In October 2021, the Langholm Initiative reached its target to raise £3.8 million to fund the purchase of half of the land and launched a second crowdfunding initiative to raise the further £2.2 million needed to purchase a further 2,100 hectares⁷.

Current management practices:

Grouse shooting ceased at Langholm in 1996; management designed to reinstate it resumed in 2008 under the LMDP and ended in 2016.

The land purchased by the Langholm Initiative is being used to create a large new Tarras Valley nature reserve, designed to tackle climate change, boost nature restoration and support community regeneration. It will restore peatland and woodland

and create new native woodland, supporting eco-tourism and bringing visitors to the area. A new model of conservation grazing, through a mix of sheep, wild goats and cattle will aim to improve vegetation and promote habitat restoration.

Economic impacts of management:

When managed as a grouse moor, Langholm Moor employed one keeper per grouse beat, with the core beats averaging 1,070 hectare in size. The LMDP invested approximately £215,000 annually between 2008 and 2015, employing and equipping five gamekeepers. This represented the income that, were there a reasonable likelihood of shooting, would have come from a tenant and shoot day income. Over the eight years around £1.5 million of capital funds from both public (Scottish Rural Development Programme and SNH) and private sources were reinvested in the moor on fencing, new and upgraded tracks, grazing control and heather reseeded. However, the LMDP failed to deliver sufficient increases in the red grouse population to generate a shootable surplus of birds. A project target had been set of delivering a sustainable harvest of 1,000 brace of grouse in at least one year before the end of the 10 year project term, the threshold judged to make management for driven grouse shooting economically viable.

£215,000
LMPD annual investment
between 2008 and 2015
employing and equipping
5 gamekeepers

⁵ <http://www.langholmproject.com/jointraptorstudy.html>

⁶ <http://www.langholmproject.com/PDF%20downloads/Langholm%20Moor%20Demonstration%20Project%20Final%20Report.pdf>

⁷ <https://www.langholminitiative.org.uk/>

In the new Tarras Valley Nature Reserve, the Langholm Initiative aims to create new economic opportunities through restoration of peatlands and woodlands, woodland creation, conservation grazing, eco-tourism, renewable energy, research and environmental education, thus helping to diversify the local economy and provide new forms of employment locally. The original Langholm Moor Business Plan identified the need to create 3.5 FTE jobs in estate management at the point of purchase and identified opportunities for considerable new job creation over time, including up to 25.6 FTE through business space provision, 20 FTE in tourism, and 12 FTE in forestry/woodland management⁸.

Social and community benefits:

The town of Langholm has suffered from industrial decline, with a paucity of alternative employment opportunities, limited diversification and little new investment in new housing or business. There is a declining and aging population, with young people leaving to find employment and further education. The Langholm Initiative sees community ownership as a catalytic step in community development and empowerment, enabling local people to make decisions about how assets within their communities are used. The successful acquisition of Langholm Moor represents a long-term economic, social and natural capital development project. Volunteering and environmental education form an important part of plans for the Tarras Valley Nature Reserve. There are plans to develop a derelict property at Lodgegill as a field centre and bunk house for environmental education, research, volunteering and walking. Community ownership will allow the improvement of picnic areas, footpaths, hides and parking facilities for the enjoyment of all visitors.

Biodiversity benefits:

Hen harrier numbers at Langholm experienced a rapid increase during the Joint Raptor Study (benefiting from protection and habitat management), but then declined following the cessation of heather management, before stabilising at six to seven pairs. Curlew, golden plover and lapwing all bred in good numbers on the moor through the 1990s but declined after the gamekeeping stopped in 1998. Mountain hares were also lost from Langholm at this point. The LMDP brought a recovery in heather cover and helped to increase the populations of a range of moorland bird species including hen harrier, merlin, curlew, golden plover, black grouse and meadow pipit. The Langholm Initiative's long term management plan aims to enhance the special characteristics of the SSSI and SPA, including by increasing the population of breeding hen harriers, and to put in place the facilities and infrastructure for visitors to experience them sustainably.

Ecosystem service delivery:

The Langholm Initiative's management of Tarras Valley will restore peatlands, blocking drains to enhance carbon sequestration and biodiversity. Natural regeneration of woodland along the Tarras Water is creating a wilder landscape and reducing river bank erosion, downstream flooding and providing spawning grounds for fish. Creation of new native woodlands will capture carbon, create employment opportunities, increase biodiversity and resistance to climate change, and support amenity for the local community.

Policy and economic drivers:

Grouse moor management ended at Langholm when it became clear that it could not deliver sufficient numbers of red grouse to sustain a financially viable driven grouse shoot. Continuing public subsidy of the management practices implemented during the LMDP could not be sustained over time. Enhanced agri-environment payments, development of carbon markets, and growth in eco-tourism and renewable energy offer opportunities for economic diversification at the Tarras Valley Nature Reserve.

Future options and implications:

It seems unlikely that driven grouse shooting will take place at Langholm in future. Time will be needed to judge the success of the Langholm Initiative's Tarras Valley Nature Reserve, its financial sustainability and its contribution to the development of the area.

Possible implications of grouse moor management policies:

The Joint Raptor Study and Langholm Moor Demonstration Project highlighted the conflicts between raptors (especially hen harriers) and grouse moor management at Langholm, and concluded that at this site, predation by protected raptors made it impossible to restore grouse populations to sufficient levels to allow commercial driven grouse shooting. Post-breeding densities in excess of 60 grouse per square kilometre are required for driven grouse shooting to be commercially viable. These conflicts help to explain why illegal persecution of raptors takes place, and why there is resistance to policy initiatives such as grouse moor licensing, designed to stop it. The community-led nature restoration project at Langholm, should it be successful, offers a potential case study of an alternative management model for a former driven grouse moor.



Tarras Valley Nature Reserve
Alamy

⁸ https://www.langholminitiative.org.uk/_files/ugd/0cb14b_7e7ed14763094f089ed376a2fd3b7cd9.pdf

4. Peak Naze

Peak Naze is a moor near Glossop in the High Peak



History of grouse moor management:

The moor is owned by United Utilities. It has a history of grouse shooting over the last 150 years. The shooting tenancy was taken on 15 years ago by Richard May (RM), a solicitor, who organises shooting for a local syndicate of eight to 10 members. According to RM, while it sustained some shooting for a variety of tenants, the grouse moor had been under-managed, and suffered from frequent wildfires. The syndicate comprises local professionals from the business, motor, medical and property sectors, who share in the costs of management and come together for four to five driven grouse shooting days per year, providing grouse populations permit. RM is responsible for management of the shoot; syndicate members join on these terms. Around six have left the syndicate over the years, usually because they have moved away or grown too old; there is a waiting list of people who wish to join. RM estimates that this arrangement also occurs on another 10 moors in the Peak District; it mirrors the historic model of grouse shooting in the area where local businessmen from Manchester and Sheffield come together to form shooting syndicates, as friends to spend holiday time on the moors.



Current management and shooting practices:

The moor is managed by a full-time gamekeeper, who can be on site where necessary 24 hours per day, seven days per week. This constant, on the ground presence is important in limiting wildfire risk. Heather is managed by cutting to create short mosaics spanning 20x30 metres, with around 10% of the area of the moor cut annually. This is a time consuming and labour-intensive exercise, occupying the keeper for two to three months per year. Cutting also requires more equipment than burning. However, it is preferred to burning because it can be undertaken by a single keeper in all weathers and is more precise in delivering patches of the required size. RM is not opposed to burning, which should not damage the peat if undertaken correctly. Limiting heather height (preferably to less than 12 inches) is important to reduce wildfire risk, make vegetation palatable to grouse and sheep, prevent emergence of trees/scrub and create nesting areas for waders and grouse which enable visibility of predators. Peak Naze has not experienced a wildfire in the last 12 years. In contrast, RM says that there are annual wildfires on land managed by RSPB under arrangement with United Utilities on the other side of the valley – Dovestone, Crowden and Arnfield.

Shooting is entirely driven and yields an average of 200 brace of grouse annually. In bad grouse years, of which there have been two in the last 12 years, no shooting may take place – this is understood by members of the syndicate who go to the pub instead.

The grouse population is carefully managed. A viable population is needed to deliver a shootable surplus of birds; at the same time the population needs to be limited to control outbreaks of pests and disease. RM considers an ideal stocking rate to be one breeding pair of grouse per five acres (400 pairs for a 2,000 acre moor). He takes dogs onto the moor in April to assess the breeding stock, and again in late July to count the post-breeding stock. It is necessary to leave 600 pairs of birds after shooting ceases, to maintain the target breeding population of 400 pairs, allowing for winter mortality. This determines the shootable surplus.

RM emphasises the importance of shooting older birds as much as possible, to leave a healthier, less aggressive and more fertile breeding population. He believes that driven shooting helps to achieve this, driving stronger flying older birds towards the butts while the young birds are more likely to drop into the heather before reaching the butts. With walking up the reverse happens as the old birds fly off with the benefit of surprise.

The keeper undertakes a large amount of legal predator control, focusing especially on foxes, crows, weasels and stoats. Parasites should not present a large problem – medicated grit was used in one previous year but has not been used in the last three years – shooting management of the grouse population helps to ensure the moor is not overstocked, keeping parasites under control.

Economic impacts of management:

Managing the grouse shoot costs an average of £65,000 annually, comprising the wages of the gamekeeper, vehicle and equipment costs, and payments for beaters (typically £50 per day for 25 beaters on five days per year). This requires careful control of costs. These costs are shared by members of the syndicate through an equal annual fee. Members of the syndicate do not therefore need to be very rich, but to have several thousand pounds of disposable income to spend on grouse shooting annually. RM emphasised the social aspect of the arrangement, likening it to membership of a golf club; members enjoy gathering socially in the fresh air, and are fairly relaxed about the numbers of grouse shot. RM notes that this model works well for smaller moors; many larger moors work on a similar principle where owners involve others to share the cost of their shooting, but typically with more commercial arrangements where management is funded by a larger number of paying clients.

Social and community benefits:

The grouse moor helps to enhance social interaction in a rural upland area, through engagement with the local farming community, members of the syndicate and beaters. Syndicate members benefit socially, meeting at the local pub for breakfast and dinner on shoot days. The shoot provides income for the pub as well as beaters.



Biodiversity benefits:

Peak Naze has a good population of curlew (14 pairs) and is one of the most productive moors for them in the Peak District. Lapwing are also present, and peregrines bred successfully in 2020. RM welcomes raptors on the moor, as part of the natural experience, and does not see them as a problem for the shoot, providing the habitat is well managed and other predators are controlled.

Ecosystem service delivery:

United Utilities benefits from the management of the moor, which contributes to maintaining water quality, particularly because there is no burning. There is no active programme of bog restoration – while rewetting the moor could benefit grouse by enhancing insect numbers – the opportunities for this are limited because of the steepness of the ground. RM considers that much of the peatland restoration work undertaken by Moors for the Future is a waste of money.

Policy and economic drivers:

While the grouse moor may be affected by a range of policy and economic factors, which may present challenges for future management, RM does not see problems emerging that cannot be overcome.

Future options and implications:

RM expects Peak Naze to continue to be managed as a grouse moor under the current syndicate arrangement.

Possible implications of grouse moor management policies:

RM does not see a problem with licencing in principle, though believes that grouse moors are already over-regulated and is unsure whether licencing would bring benefits. He would be against paying a fee for a licence, as this would limit funds available for habitat management, unless this was to a respected body and was seen to deliver benefits to the sector. If grouse shooting were to be banned, this would have negative consequences, including regular wildfires and damage to the remaining peatland, as well as incursion of non-native conifers. There would be disbenefits for carbon (because of wildfire) and for biodiversity (fewer grouse and waders). Large scale rewetting of peatlands would not be feasible on the sloping ground.



Northern lapwing
Malcolm Hunt (rspb-images.com)



Red grouse
Richard Brooks (rspb-images.com)

5. Rottal Estate, Angus Glens Glen Clova near Kirriemuir, Angus, Scotland



Glen Clova, Angus

Area of grouse moor/estate:

3,000 hectares, including 2,500 hectares of heather moorland, upland grassland and peatland used for grouse shooting, as well as riparian grassland and woodland. The grouse moor is mostly dry heath, but there is 300 hectares of peatland, much requiring restoration. The estate has two holiday lets and an events space, and offers dinner, bed and breakfast, with accommodation for up to 32 visitors in total. It also has a hydro-electric power plant.

History of grouse moor management:

The estate was purchased by its current owner, Dee Ward (DW), in 2005, having previously been part of a larger estate. The land has a long history of grouse moor management, but there had been underinvestment in the grouse moor, which was overgrazed by deer and sheep.

Current management and shooting practices:

The estate has invested in deer management and has reduced sheep numbers, to restore heather moorland for the benefit of grouse and other species. This is seen as an investment in natural capital, yielding multiple benefits for the estate. Predator control includes control of stoats, weasels, rats, foxes and corvids. Cool burning of heather takes place in small patches, to create a mosaic of habitat and varied vegetation height. Cutting of heather is impractical because the hill is steep and rocky and use of machinery would damage the habitat. Burning of peat – which is at higher altitudes – is unnecessary and avoided. As well as red grouse, this management has benefited other species including breeding waders, black grouse, ring ouzel and golden eagle. Red grouse numbers have responded positively but have not reached large peaks. Ticks remain a problem but have been reduced through control of deer numbers.

The estate practices a mix of driven and walked up grouse shooting. Depending on grouse numbers, early season walked up shooting tends to be followed by five to six driven shoots in September and October.

On driven days, eight to nine guns will typically shoot a total of 50-75 brace of grouse. Walked up shooting typically involves five to six guns. Overall numbers of grouse shot may range from 200 brace in a poor year to 500 in a good year. Rather than seeking to maximise bag numbers through intensive management, the estate prides itself on the overall quality of the shooting experience, with shooters appreciating the wider wildlife and landscape quality that the estate offers.

The different estate enterprises are closely linked. Grouse shooting generates around 20% of estate revenues, farming and related subsidies and agri-environment payments 30%, hydro-energy 40% and other enterprises around 10%. Gamekeepers are involved in peatland restoration and other agri-environment activities, and their work to enhance wildlife and landscape benefits the tourism enterprise.

The revenue from grouse shooting probably does not repay the levels of investment required; however, this is seen as investment in the overall natural capital value of the estate, as well as complementing other estate enterprises. While this approach to natural capital offers some benefit to the current enterprises, it also has potential to enhance the value of the estate and the returns from future management, particularly if the Scottish Government increases public payments for public goods through its land management schemes.

Economic impacts of management:

The estate has eight full-time employees as well as the owner – three gamekeepers (including one trainee), two housekeepers, a shepherd, a general estate worker and a personal assistant. Expenditures in maintaining estate vehicles benefit the local garage and petrol station. As much food as possible is sourced locally, benefiting local butchers and bakers. Visitors often eat lunch and sometimes stay in local pubs and hotels, while the estate also hires additional chefs and front of house staff to cater for events. The estate provides

up to 150 days of employment for beaters on driven days (typically 25 beaters on six days per year).

Social and community benefits:

By providing local employment, the estate helps to maintain demand for local services. The estate works in partnership with organisations such as the RSPB, Cairngorm National Park Authority, NatureScot and the local fishing board.

Biodiversity benefits:

Monitoring data are lacking, but habitat management has increased populations of red grouse and curlew in recent years. There are healthy populations of a range of breeding birds including golden plover, dunlin, lapwing, snipe, black grouse, ring ouzel, cuckoo, golden eagle, merlin, peregrine and short-eared owl. Rottal has gained Wildlife Estates accreditation.

Ecosystem service delivery:

The estate has restored 30 hectares of peatland and would like to restore a further 100 hectares. Blocking of ditches has reduced water flows and enhanced river water quality, which has also benefited from riparian tree planting. Rewetting of the peatland has enhanced insect life, which has benefited red grouse.

Policy and economic drivers:

The estate sees opportunities in the reform of agricultural subsidies and enhanced agri-environment payments, according to the principle of public money for public goods, as well as increased interest in natural capital and the potential for natural capital management to contribute to the value of the estate and its enterprises.

There is also scope for growth in tourism revenue. The estate currently attracts walkers as well as grouse shooters, and there is potential for growth in events, wildlife tourism, activities such as outdoor retreats and writers' retreats, and development of off-grid bothies.

Future options and implications:

DW firmly believes that grouse shooting has an important role to play in the sustainable management of the uplands, contributing positively to biodiversity and natural capital, while providing jobs and supporting local communities. He will continue to invest in management of heather moorland and restoration of peatland, and does not see benefits in significant land use change at Rottal. He believes in a balanced and sustainable approach to moorland management that delivers healthy populations of grouse alongside other species, enhancing the overall experience of the shooting client rather than seeking to maximise bag sizes alone. He believes this vision for the future of the sector is increasingly shared by neighbouring estates.

Possible implications of grouse moor management policies:

DW sees potential benefits in a licensing system, which could help to tackle illegal and unsustainable management practices and improve the image of the grouse shooting sector overall. It would be important for a licensing system to be proportionate, unbureaucratic and with a fair and transparent appeals procedure. It would be reasonable for estates to undertake some reporting of grouse bags and management practices. While asking each estate to pay a license fee to contribute to administration costs might be reasonable, this would be burdensome if it amounted to thousands rather than hundreds of pounds. He would strongly oppose a ban on grouse shooting, which he believes would have negative consequences for wildlife and the local community.



A Grouse shooting on the Rottal Moor estate, in Kirriemuir, Scotland
REUTERS/Russell Cheyne



A Grouse shooting on the Rottal Moor estate, in Kirriemuir, Scotland
REUTERS/Russell Cheyne

6. Driven grouse shooting in Scotland

Four case study estates in Scotland, practicing driven grouse shooting, documented by McMorran et al (2020)



Moorland hillside showing patchwork of burnt areas to encourage young heather shoots for Red grouse
David Tipling (rspb-images.com)

Area of grouse moor/estate:

DR1:

Small upland mixed estate of 2,000 hectare, with 1,900 hectare of grouse moor, as well as sheep, woodland and conservation objectives.

DR2:

Mixed sporting estate, 9,240 hectare (owned + leased), with 4,900 hectare of grouse moor as main focus, as well as deer stalking, sheep, hydro scheme.

DR3:

Mixed sporting estate of 5,600 hectare. 4,500 hectare of grouse moor, as well as deer stalking, renewables (wind/hydro), sheep, cattle and forestry.

DR4:

Large mixed estate, 20,000 hectare including 18,000 hectare of grouse moor, deer stalking, sheep, forestry, wildlife tourism, four hydro schemes, property and farm tenancy lets.

History of grouse moor management:

The length of current estate ownership varied from eight years (DR2) to more than 250 years family ownership (DR4). All four estates were managed to maintain traditional values and established land uses. Grouse shooting played an important part in the

management of all four estates, providing personal shooting opportunities and contributing to the overall viability of estate management. Conservation of biodiversity and landscape was cited as being important on all four estates, alongside maintenance of traditional cultural activities, staffing levels and the contribution of the estate to the community. Locally, interviewees noted recent increases in employment of gamekeepers and investment in grouse moor management since the 1990s, reflecting sustained demand for driven grouse shooting opportunities and increased recognition of the need for proactive grouse moor management. All four estates had some woodland and/or forestry elements, with DR3 and DR4 having recently undertaken native woodland creation schemes (<100 hectare), and DR3 having undertaken woodland creation on an area of moorland where grouse had not been successful

Current management and shooting practices:

All four estates had commercial driven grouse shooting, subject to the availability of a sufficient surplus of grouse, and practiced some private shooting. Management included predator control, reduction of deer populations (in line with wider pressures to reduce deer numbers and to reduce the

transfer of tick), tick-mopping operations using in-house sheep flocks and the use of medicated grit. With the development of new areas of regulation and codes of practice (e.g. the Muirburn Code and meat hygiene regulations) the gamekeeping industry was considered to have become more professional over the last two decades, with increasing levels of training. All four estates had in-house sheep flocks (with DR3 also farming beef cattle) and sheep were considered complementary to grouse shooting with potential for tick mopping and contribution to maintaining open moorland habitats. Deer management was undertaken on all four estates, with varying levels of emphasis on commercial stag stalking on DR2, DR3 and DR4. Deer numbers had declined on these estates in recent years but commercial stalking remained a major aspect of the sporting enterprise on DR4. Current shooting practices documented in the 2020 case study were as follows:

DR1:

25 driven days, 850 brace shot; minimal walked-up shooting; no commercial deer stalking.

DR2:

11 walked up days (192 brace shot); eight driven days (792 brace shot); 50-60 commercial deer days.

DR3:

Mixed private and commercial, driven and walked up; 15 walked-up days; eight driven days shooting 792 brace; 38 deer stalking days.

DR4:

Mostly commercial, with 16 driven days shooting 1,259 brace; <five walked up days; 150 deer stalking days.

Economic impacts of management:

Sporting activities on all four estates were loss making or just managing to break-even in better years, and therefore subsidised by other estate activities or owner contributions. Interviewees recognised the contribution that grouse numbers can make to the capital value of their estates, though none cited this as a primary motivation because they did not envisage selling their landholding. Deer stalking, although providing less financial return than driven grouse shooting (when sufficient numbers of grouse were available), was considered relatively consistent in terms or costs and revenue, whereas forestry/woodlands only provided occasional income from grants or timber sales. Farming activities on all four estates either broke even or were loss making. However, both deer and sheep management were seen as complementing other land uses and therefore an important aspect of wider estate management. Renewable energy was considered more consistently profitable than other estate activities.

Annual capital expenditure on grouse moor management averaged £8.07 per hectare across the four estates, ranging from £1.03/ha for DR4 to £68.05/ha for DR1. Overall, 59% of this capital spend was on property development or refurbishment, 29% on vehicles, 6% on sporting equipment and 8% on fencing and drainage. 76% of this spending was made locally (within 20 miles of the estates) and a further 20% regionally (20-50 miles).

Annual recurrent spend on grouse moor management averaged £14.30/ha across the four estates, ranging from £7.44/ha (DR4) to £37.63/ha (DR1). Overall, 20% of this spending was on vehicle maintenance and running costs, 13% on building repairs, 10% on land management inputs, 9% on hospitality, and the remainder on a variety of other goods and services. 71% of this spending was made within 50 miles of the estates.

The four estates employed an average of 6.0 FTE sporting staff (keepers, shepherd, ghillie, admin, handyman), with an average of 3.5 FTEs attributed to grouse management. Total grouse related employment, including casual employment of beaters, averaged 5.1 FTE per estate. Grouse-related staff costs averaged £13.93 per hectare and ranged from £8.11/ha (DR4) to £31.84/ha (DR1). On average grouse activities on the case study estates required 1,446 hectares of grouse moor per FTE worker (ranging from 463 hectare in DR1 to 2,483 per FTE on DR4).

There was a mix of national and international shooting clients on all four estates, with international clients making up 40-50% of overall custom. Revenues from grouse activity averaged £20 per hectare, compared to annual running costs of £30 per hectare. Annual losses for the grouse enterprise therefore averaged £10 per hectare (before capital expenditure), ranging from £1 to £40 per hectare across the four estates.

Social and community benefits:

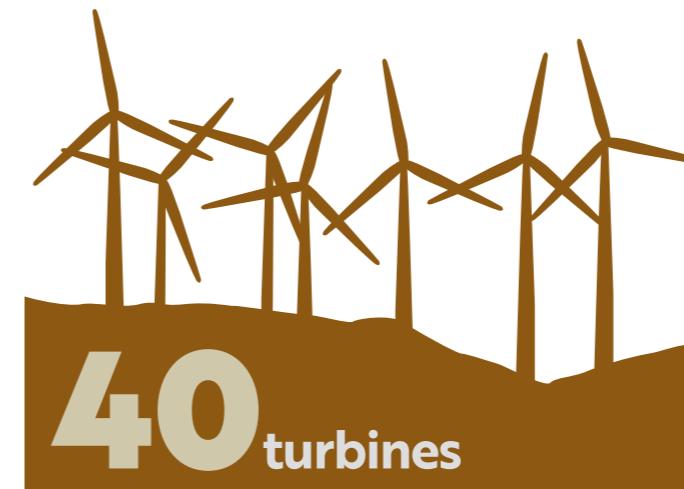
Gamekeeping staff on all four estates were accommodated in tied housing and received additional expenses including dog allowances and vehicles. In all four cases sporting employees had young families with children attending local schools. Catering and accommodation provision was a more established feature on these estates compared to walked-up estates, with all four estates either utilising on-estate accommodation or making use of local hotels as accommodation providers. The four estates were engaged with the local community to varying extents, with DR2 particularly involved with its local primary schools and facilitating estate school visits to demonstrate estate-based land uses to local children.

Biodiversity and ecosystem service benefits:

The increasing emphasis on biodiversity and climate change related outcomes in Scottish Government policy were seen as both a potential constraint (bringing increased pressure to afforest moorland sites) and an opportunity, with DR4, for example, emphasising the potential for restoration of peatland sites and landscape scale approaches that considered the potential for more integrated land use mosaics. Greater environmental outcomes could be achieved through ongoing estate management plans and biodiversity audits. Increased woodland cover was recognised as increasing cover and habitat for predators and creating challenges for moorland management; however, improved night vision systems were seen as offering some potential for managing predators more effectively within more mixed land use settings. One estate had begun to develop an ecotourism enterprise in recognition of this increasing market and potential for capitalising on the estate's natural capital.

Policy and economic drivers:

Interviewees saw no major conflict between driven grouse shooting and other estate land uses, more commonly referring to the complementarity of land uses. Two estates (DR2 and DR4) referred to the growing importance (due to policy shifts, including the climate change agenda) of limiting the degree of intervention (e.g. the use of medicated grit and tick mopping) where feasible, to ensure the industry maintained a degree of public support and avoid being heavily legislated/controlled. This was perceived by one estate as reflecting the wider (unavoidable) direction of travel, with the 'right to roam' and deer-related policy (for example), having increased access rights and resulted in deer population reductions on many estates.



The development of a 40 turbine windfarm had no perceived impact on shooting interest

Future options and implications:

The estates experienced a significant decline in grouse numbers in 2018-2019 (with no shooting on some of the estates during this period), reflecting a wider trend across Scotland. Challenges noted included increased prevalence of heather beetle and tick, perceived as being linked to climatic factors (increased drought and high rain events). The case study interviewees did not see walked-up shooting as a viable alternative to driven grouse shooting, given its low revenues and employment impacts. It was also noted that a healthy population surplus is required even for commercial walked up shooting. Further woodland expansion was being considered on two of the four estates, where it was compatible with existing land uses and would not impact on peatland conservation. In the case of DR3, the development of a 40 turbine wind farm was not perceived to have negatively affected the estate's grouse shooting interests, with the area around the wind farm maintained for driven grouse shooting and the two land uses seen as relatively compatible in practice. All four interviewees noted that grouse shooting was an integral part of a holistic set of estate activities. The removal of grouse shooting from the estate mix would therefore require structural changes, and reduction of estate spending and employment, with implications for the overall 'quality' of estate management (e.g. due to lower staff numbers overall).

Possible implications of grouse moor management policies:

Interviewees noted increasing political pressures on the sector, as well as increased public interest and a shift in public perceptions linked to reduced numbers of people involved in land management and an increasing presentation of all grouse shooting as intensive and environmentally damaging. This was perceived as contrasting with the reality of an increasingly regulated and professionalised industry which delivered both socio-economic and environmental outcomes within the context of declining grouse bags (relative to the pre-1950s period). Increased regulation, wider policy dimensions (including land reform) and the threat of licencing of grouse moors were perceived as undermining landowner confidence around long-term investment and threatening the potential for controlling predators in the future.



Golden plover
Mark Hamblin (rspb-images.com)

7. Walked up grouse shooting in Scotland

Four case study estates in Scotland, practicing walked up grouse shooting, documented by McMorran et al (2020)



Area of grouse moor/estate:

WU1:

Mixed estate of 4,000 hectare, with 1,600 hectare of grouse moor. Active management for grouse but low numbers. Large sheep flock.

WU2:

Small, remote, upland sporting estate, 5,100 hectare, with 5,000 hectare of grouse moor, as well as deer stalking, sheep herd, hydro scheme.

WU3:

Mixed upland estate of 6,500 hectare. 3,300 hectare of grouse moor, as well as forestry, deer, hydro scheme, holiday cottages, limited sheep flock.

WU4:

Large mixed estate, including 12,500 hectare of grouse moor, deer stalking and a wider land use mix.

History of grouse moor management:

WU1 had no commercial shooting for several years and was managed with the aim of restoring grouse populations, following a recent change of ownership. WU2 also changed hands in recent years, while WU3 and WU4 had been in long term family ownership. Increasing grouse numbers enabled WU3 to transition

from walked-up to driven grouse (with some walked-up shooting remaining) during the last 30 years. Commercial deer stalking occurred on WU1, WU3 and WU4 and represented an important component of management activity and income on WU3 and WU4.

Current management and shooting practices:

All four estates had commercial driven grouse shooting, subject to the availability of a sufficient surplus of grouse, and practiced some private shooting. Management included predator control, reduction of deer populations (in line with wider pressures to reduce deer numbers and to reduce the transfer of tick), tick-mopping operations using in-house sheep flocks and the use of medicated grit. With the development of new areas of regulation and codes of practice (e.g. the Muirburn Code and meat hygiene regulations) the gamekeeping industry was considered to have become more professional over the last two decades, with increasing levels of training. All four estates had in-house sheep flocks (with DR3 also farming beef cattle) and sheep were considered complementary to grouse shooting with potential for tick mopping and contribution to maintaining open



moorland habitats. Deer management was undertaken on all four estates, with varying levels of emphasis on commercial stag stalking on DR2, DR3 and DR4. Deer numbers had declined on these estates in recent years but commercial stalking remained a major aspect of the sporting enterprise on DR4. Current shooting practices documented in the 2020 case study were as follows:

WU1:

Numbers insufficient for commercial shoot; two to three private shooting days shooting 14 brace of grouse;

WU2:

Shared ownership involving a combination of private (owners paying estate) and commercial shooting; total of 21 walked-up days shooting 242 brace of grouse;

WU3:

Mixed private and commercial, driven and walked up; nine walked-up days shooting 322 brace and 13 driven days shooting 1,057 brace;

WU4:

Mostly commercial, with 29 walked up days shooting 301 brace and 0.5 driven days shooting 30 brace.

All four estates were actively managed for grouse, which included heather burning, predation control and the use of medicated grit. Due to a combination of low staffing levels and owner motivations, most referred to management as being relatively low input.

Economic impacts of management:

Sporting activities on all four estates were loss making or just managing to break-even in better years, and therefore were required to be subsidised by other estate activities or owner contributions. Other estate activities such as tourism and hydro-electricity were considered more profitable. Gamekeepers were funded from multiple sporting activities and carried out various estate functions. Interviewees expected to maintain similar levels of investment in grouse moor management, to contribute to the maintenance of sporting activities and the viability of the estates overall; while it was recognised that the quality of the sporting experience could contribute to the capital value of the estate, this was not a major motivating factor as none had plans to sell their land.

Annual capital expenditure on grouse moor management averaged £1.90 per hectare across the four estates, ranging from £0.28/ha for WU4 to £8.18/ha for WU1. Overall, 43% of this capital spend was on vehicles, 29% on buildings and refurbishments, 22% on new sporting infrastructure, 8% on sporting equipment, 7% on roads and tracks and 6% on fencing. Over 80% of this spending was made within 50 miles of the estates.

Annual recurrent spend on grouse moor management averaged £5.16/ha across the four estates, ranging from £1.03/ha (WU4) to £19.18/ha (WU1). Overall, 32% of this spend was on agents / contractors, 23% on vehicle maintenance and running costs, 15% on building repairs, 15% on land management inputs and 8% on tax/business rates. 53% of this spending was made within 50 miles of the estates, indicating larger levels of leakage for spending on agents, insurance, taxation and some sporting related costs.

The four estates employed an average of 2.8 FTE sporting staff (keepers, stalkers, estate staff), with an average of 1.2 FTEs attributed to grouse management. Overall, they employed one FTE sporting worker per

1,949 hectares of grouse moor, and one grouse specific FTE worker per 4,685 hectares. Grouse-related staff costs averaged £5.97 per hectare, 45% of overall sporting staffing costs, and ranged from £1.17/ha (WU4) to £33.34/ha (WU1).

Revenues from grouse activity averaged £4.68 per hectare, compared to annual running costs of £11 per hectare. Annual losses for the grouse enterprise therefore averaged £6 per hectare, ranging from £1 to £53 per hectare across the four estates.

Social and community benefits:

No information.

Biodiversity benefits:

No information.

Ecosystem service delivery:

No information.

Policy and economic drivers:

No interviewees reported significant land use conflicts, though some noted potential for conflicting objectives between shooting/stalking, recreation and afforestation. A perceived future challenge related to

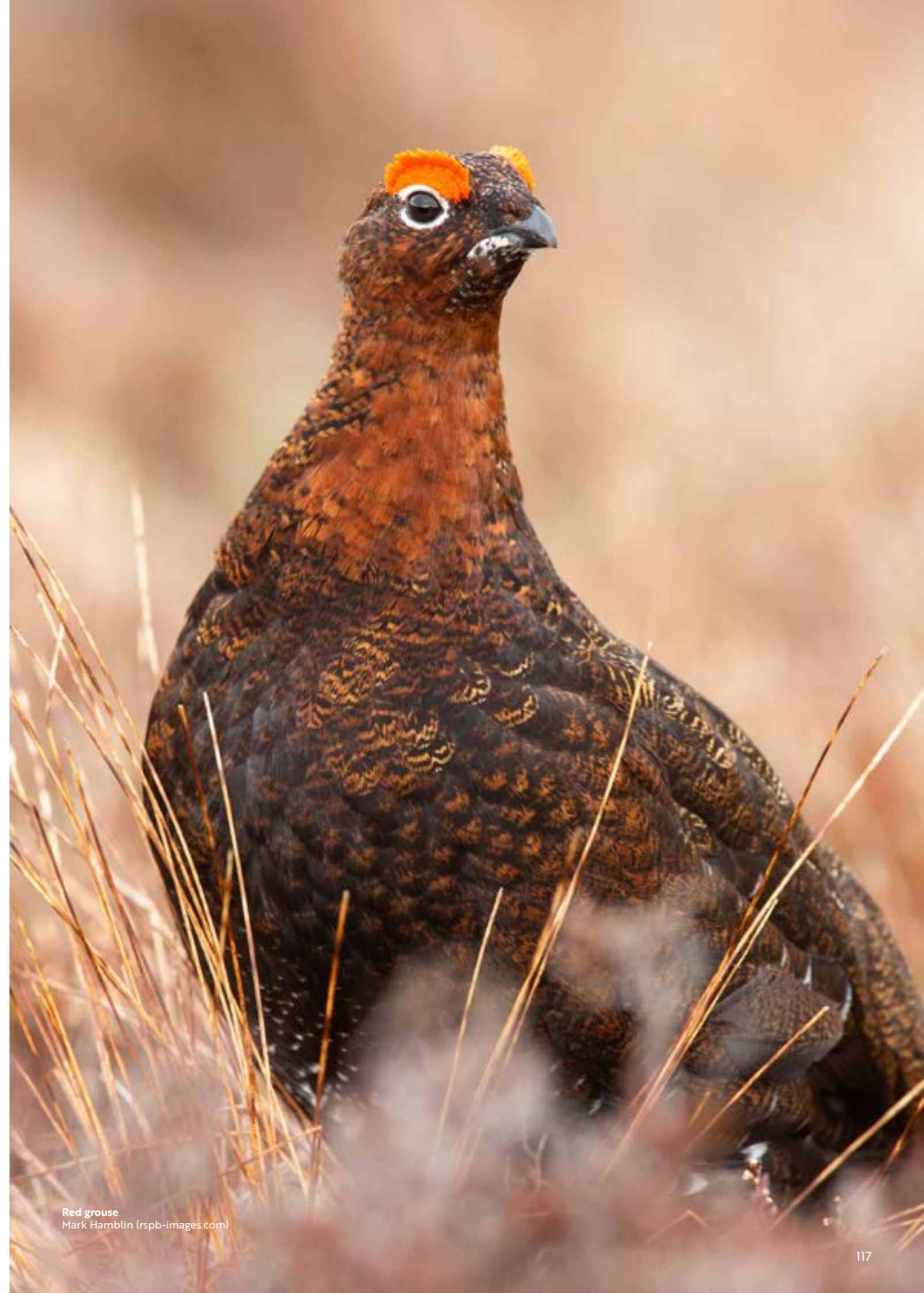
Scottish Government objectives to increase forest cover. In contrast, sheep farming and walked-up grouse shooting were seen as very compatible land uses.

Future options and implications:

Grouse numbers are declining on the case study estates, for a range of reasons including: climatic factors, predation, loss of heather habitat (due to agricultural improvements and historic afforestation), heather beetle attacks, and increasing prevalence of tick on higher ground (perceived as linked with climate change).

Possible implications of grouse moor management policies:

Political pressure to reform or ban grouse shooting was perceived as reducing confidence in the sector. Respondents considered the decline in the number of people involved in land management and increasing numbers of incoming retirees in rural areas influenced by environmental groups as leading to changing public and political attitudes.





Common cotton-grass
Sue Kennedy (rspb-images.com)

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