

# Sustainable Driven Grouse Shooting?



**A review of the evidence of the economic, environmental and social sustainability of driven grouse shooting. A guide for stakeholders and policy makers: Second edition**

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Front cover image courtesy of Swinton Estate

For every complex problem there is an answer that is clear, simple, and wrong.

**H. L. Mencken**

# Foreword



**Professor James Crabbe**

MA, BSc, MSc, PhD, DSc,  
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Oxford, July 2023

I am delighted to have been invited to write the Foreword for this Second Edition. As with the first edition, it is clear that both the grouse and grouse shooting are just small parts of a much bigger picture involving ecology, conservation, land management, economics, and social impacts of a significant area of our country's land and heritage. The latest edition brings in new evidence underlying that larger canvas that this report seeks to capture and evaluate. This edition is more concise than its predecessor yet highlights even further the importance of sustainable development to achieve environmental, social and economic harmony in a more equitable world. Many new references have been included and the contents have been restructured to address more directly the issue of sustainability, thus making it even more helpful to land users and policy makers.

As before, objectivity based on available evidence is the core of the report. We feel that the recognition and understanding of the evidence within our report will be of vital importance in both driving improvements in sustainability, and in ensuring that irreversible negative environmental, economic or social impacts do not occur. Despite – or because of – our research-led approach, it is clear that there are a number of areas that need significantly more research in order to reach a valid evidence-based conclusion. Those areas are detailed in this report.

This is not the end of the story. It is clear that in many areas more research is needed. From the outset we intended our report to be a 'living document' that will be updated regularly. We therefore hope that this report will be an important resource now, and in the future, for policy-makers, and for anyone who cares, not only about driven grouse shooting, but about the sustainable development of our rural communities and of the people that they serve.

**Professor James Crabbe, Oxford, July 2023**



I.O

# Introduction



**Professor Simon Denny**  
BA, MA, PhD, Holder of The Queen's Award for Enterprise Promotion

The first edition of this report was published in July 2021. Since then, new research has been published and new political decisions have been taken. Therefore, the Regional Moorland Groups<sup>1</sup> have commissioned Simon Denny to produce a second edition of the report.

The second edition has the same remit as the first version of the report: to review the evidence on whether driven grouse shooting is sustainable. The definition of 'sustainable' is based on that produced by the International Union for Conservation of Nature (IUCN). This definition, involving the assessment of economic, environmental and social factors, introduces significant complexity into any discussion or decision about the sustainability of driven grouse shooting, or alternative uses of moorland. The intention was to complete the second edition so that it could be published in the summer of 2023. The target audiences for this document continue to be policy makers, people directly involved in driven grouse shooting, people with a vested interest in the activity, academics in related fields, and other stakeholders and interest groups.

Two crucial points are worth making at this stage: firstly, there is no shared broad vision for the British uplands (something lamented over 20 years ago by Gimingham<sup>2</sup>); secondly, the current state of the evidence is neither robust nor extensive enough for

the impacts of management practices associated with grouse shooting activities, or alternative uses of moorland, to be identified and ranked. The bulk of the literature consists of isolated, relatively small plot-scale, and short-term environmental or ecological studies which do not provide a holistic and comprehensive evidence base for decision-making about the impacts of different moorland management regimes. The current evidence certainly does not encompass the reality of integrated moorland management and, importantly, nearly always fails to consider the economic and social elements of 'sustainability' that the IUCN advocate.

Having produced the second edition of the report and further examined the complexities involved in the subject, the author is increasingly of the view that 20th century journalist H L Mencken was right when he said: "For every complex problem there is an answer that is clear, simple, and wrong."

**The second edition has the same remit as the first version of the report: to review the evidence on whether driven grouse shooting is sustainable.**

## References

<sup>1</sup> The Regional Moorland Groups have taken over the role of commissioning the report from the Uplands Partnership, who commissioned the first edition.

<sup>2</sup> Gimingham, C.H. (2002) Foreword to The British Uplands: Dynamics of Change (UNCC Report No. 319)

## References

<sup>3</sup> <https://www.peta.org/living/food/animal-ingredients-list/> sourced 19th June 2023

understanding of the evidence within this report is of vital importance in driving improvements in sustainability, and in ensuring that irreversible and negative environmental, economic, and social impacts do not occur.

Driven grouse shooting has economic, environmental, and social impacts within the UK. This report points out that these impacts (particularly the social and economic impacts) are more widespread than most people realise and affect more people than those directly involved in the activity. Importantly, **it highlights the fact that driven grouse shooting is not an activity that occurs in isolation; rather it is part of a complex 'web' of activities that together comprise what the report calls 'integrated moorland management'.**

There are people who are opposed to driven grouse shooting. These opponents, most of whom hold sincere beliefs, have traditionally used emotive language to appeal to policy makers and the general public. However, in recent decades they have become more skilful at influencing policy makers and in using judicial challenge to attack driven grouse shooting. Some opponents of driven grouse shooting have been very selective in their use of research findings or have misused these findings to support their case. Some have even resorted to falsehoods. Such practices are regrettable as failing to acknowledge the complexities of the issues involved and not considering the overall evidence both weakens their arguments and generates resentment.

There is a wealth of valid and reliable evidence relevant to the question of whether driven grouse shooting is sustainable. There is also much that is not yet known. This report brings together widely dispersed evidence and, importantly, highlights gaps in current knowledge. By presenting the evidence relevant to the sustainability of driven grouse shooting, it is hoped the report provides a valuable resource to policy makers and other audiences.

## 1.3 The Logic Of Opposition To Driven Grouse Shooting

Hundreds of products used by people derive from animals, in most cases from animals that have been killed. The Peta website<sup>3</sup> lists an impressive number of such products, from Adrenaline and Alanine, to Wool Fat and Wool Wax. These products are used in medicine, cosmetics, household products, clothing as well as food and drink. Yet there do not seem to be UK-based pressure groups advocating that policy makers should ban the production of lanolin (derived from both living and dead sheep) or keratin (derived from horns, hooves, feathers and hair of living and dead animals), both of which are used in hair-care products, among other items.

## 1.1 Aim Of The Report

The aim of this report is to present the current evidence-based knowledge relating to the economic, environmental, and social sustainability of driven grouse shooting. The report is intended to enable policy makers, those involved in driven grouse shooting, and other stakeholders to consider all aspects of sustainability before making policy or management decisions about driven grouse shooting. It is also hoped that the report will suggest new topics for research by academics.

The aim of the report is not to defend, or otherwise, driven grouse shooting.

## 1.2 Relevance And Audience

The IUCN has stated that:

*"The core of mainstream sustainability thinking has become the idea of three dimensions, environmental, social and economic sustainability"* (Adams, 2006, p.3).

These three dimensions should be carefully considered by anyone making political or management decisions about the current and future use of moors on which driven grouse shooting takes place. The report does not argue that one of the three dimensions of sustainability is more important than the other two; they are integrated. The report does make the argument that, if a change in land use is contemplated, then it should either deliver net improvements to current levels of environmental, social and economic sustainability, or be at least as beneficial as existing practices. The recognition and

## References

<sup>4</sup> UK Fishing Statistics Research Briefing published 23rd November 2020, House of Commons Library

<sup>5</sup> <https://www.theguardian.com/commentisfree/cif-green/2010/sep/14/fish-forgotten-victims#:~:text=Not%20for%20fish,ship%20and%20allowed%20to%20suffocate.>

<sup>6</sup> <https://www.hsa.org.uk/news-events/news/post/61-fish-welfare-at-slaughter>

<sup>7</sup> <https://www.communitiesforseas.scot/tonnes-of-fish-discarded-as-bycatch-in-the-uk-foi-finds/>

<sup>8</sup> <https://www.hsa.org.uk/faqs/general#n1>

<sup>9</sup> <https://www.poultryworld.net/Meat/Articles/2020/5/Thailand-to-boost-chicken-exports-after-50-fall-in-domestic-576398E/>

<sup>10</sup> See for example, the Farmed Animal Welfare Council report of 2009, <https://www.ongehoord.info/wp-content/uploads/2017/12/11-1.pdf>

<sup>11</sup> <https://sustainablefoodtrust.org/news-views/leading-in-animal-welfare/>

<sup>12</sup> [https://www.lemonde.fr/environnement/article/2022/10/31/26-stories-of-swine-world-s-largest-pig-farm-opens-in-china\\_6002372\\_114.html](https://www.lemonde.fr/environnement/article/2022/10/31/26-stories-of-swine-world-s-largest-pig-farm-opens-in-china_6002372_114.html)

<sup>13</sup> <https://petition.parliament.uk/archived/petitions/266770> Ban Driven Grouse Shooting: wilful blindness is no longer an option.

<sup>14</sup> <https://www.rspb.org.uk/our-work/policy-insight/agriculture-and-land-use/farming-land-use-and-nature/uplands/driven-grouse-shooting/>

<sup>15</sup> If rats are included.

# The evidence reviewed in the report suggests that this caricature is a gross over-simplification that fails to recognise the complex and integrated nature of moorland management that includes driven grouse shooting.

The UK fishing fleet lands around 400,000 tonnes of fish each year in the UK, and between 200,000 and 300,000 tonnes abroad<sup>4</sup>. There is no humane slaughter requirement for wild fish caught and killed at sea nor, in most places, for farmed fish. Fish caught in nets by trawlers are dumped on board the ship and allowed to suffocate.<sup>5</sup> The most common methods of slaughtering fish expose them to substantial suffering over a prolonged period of time. Many species of farmed fish are typically killed by being taken out of water and left to asphyxiate in air, or fish might be frozen or gutted when still conscious<sup>6</sup>. There seems to be no concerted outcry against these practices. Nor are there concerted protests against the by-catch from the UK fishing industry which, according to a Freedom of Information request, could have led to as much as 10,500 tonnes of 'waste' fish being discarded in 2019 in the waters of the North Sea around the west coast of Scotland alone<sup>7</sup>.

Every year in the UK approximately 2.6 million cattle, 10 million pigs, 14.5 million sheep and lambs, 80 million fish and 950 million birds are slaughtered for human consumption<sup>8</sup>. Millions of live birds are imported into the UK from countries thousands of miles away<sup>9</sup>. There are no large petitions opposing this slaughter, nor the intensive production of animals that is required to provide these animals for consumption, despite the concerns raised about the welfare of farmed animals<sup>10</sup>. The intensive production of animals for human consumption has grossly changed landscapes and has had widespread negative impacts on biodiversity. The negative impacts on landscapes and biodiversity have to be seen in the context that the UK's standards of animal husbandry and welfare are regarded by many people as world-leading.<sup>11</sup> Certainly the UK would not permit such extreme practices as the vertical pig farms that are now seen in China.<sup>12</sup>

Yet Wild Justice was sufficiently opposed to driven grouse shooting to organise a petition with over 100,000 signatories to be debated in Westminster Hall in June 2021<sup>13</sup>. The Royal Society for the Protection

of Birds (RSPB) claims that driven grouse shooting causes significant damage to both biodiversity and ecosystems services<sup>14</sup>.

Why does driven grouse shooting stimulate such passionate opposition; opposition that often seems to ignore – or at least be very selective about – all the evidence? The report examines some of the claims made about integrated moorland management practices and their impact on wildlife and vegetation, and suggests that the claims of those opposed to driven grouse shooting are not, perhaps, based on a full understanding of the currently available evidence.

Looking at the issue of killing a grouse dispassionately, it seems not entirely logical to single out driven grouse shooting for such opposition in a country that seems happy for more than a billion animals to die each year so they can be consumed as food or used in products. As pointed out in the report, the dead grouse is a valuable commodity that is eaten in the UK and exported to restaurants abroad. It is claimed that grouse moor management, along with other so-called 'gamekeeping' practices, kill predators. This is correct, but grouse moor managers are not alone in killing predators. Others engaging in such activity are the RSPB, WWT, National Trust, many county-based Wildlife Trusts, and every Local Authority in the country<sup>15</sup>. There are many reasons why different people are vehemently and genuinely opposed to driven grouse shooting. It must be wondered, however, if one of the main (often unspoken) reasons for opposing the activity is because it is associated with the rich enjoying themselves. The 'grouse moor image' of "a fattish plutocrat being lowered reverently down from his well-groomed sturdy pony by willing hands, and then seated in his butt, mowing down the poor deluded birds which are herded up to him" (Stanford, 1968), may be deeply rooted in some psyches. Perhaps Macaulay's quote: "The puritan hated bear baiting, not because it gave pain to the bear, but because it gave pleasure to the spectators," applies to driven grouse shooting?

The evidence reviewed in the report suggests that this caricature is a gross over-simplification that fails to recognise the complex and integrated nature of moorland management that includes driven grouse shooting. Furthermore, it takes no account of the evidence about the sustainability of the practice, or the evidence of the impacts that it – and alternative uses of the UK moorlands – have on people, the economy, and the environment.

## 1.4 About The Author

**Simon Denny BA, MA, PhD, Holder of The Queen's Award for Enterprise Promotion**

After leaving school Simon Denny served in the British Army from 1976 to 1986. He then worked

for a major UK retailer until 1992 when he moved into Higher Education. He worked at the University of Northampton (and its predecessor institutions) until 2018. At Northampton he initially specialised in designing bespoke development programmes for companies; three of these schemes won National Training Awards. He also designed, won funding for, and managed numerous large-scale projects aimed at helping disadvantaged people develop the confidence and skills necessary for employment, or self-employment. In 2006 Simon was awarded the University's Court Award for services to local enterprise. He became Professor of Entrepreneurship in 2007. In 2010 he was granted The Queen's Award for Enterprise Promotion. He set up the Institute for Social Innovation and Impact, and from 2015 to 2018 was Executive Dean for Research, Impact and Innovation.

Since 2018 he has worked as an independent researcher and consultant. His clients have included the Ministry of Defence, the Royal College of Nursing, the Motivational Preparation College for Training, CVQO, and the Uplands Partnership. He is an external associate of the Institute for Social Innovation and Impact at the University of Northampton. He is a member of two Wildlife Trusts, is a keen birdwatcher both in the UK and abroad, and enjoys watching Northamptonshire County Cricket Club, gardening, fishing, and shooting.

## 1.5 Independent Review

The production of this report has been overseen by Professor James Crabbe, Supernumerary Fellow and former Governing Body Fellow at Wolfson College, Oxford University. Professor Crabbe is a Consultant and Red List Assessor with the IUCN and is involved with a wide range of universities worldwide. His research, spanning environmental and biomedical sciences, education, and the humanities has resulted in 329 research publications in refereed journals and books, plus 14 items of commercial molecular modelling software produced by Oxford University Press. He has won several awards for his research including the 6th Aviva/Earthwatch International Award for Climate Change Research in 2006. In 2022, he won the International Engineering and Technology Institute (IETI) Green Development and Sustainability Award, the Institute's highest honour in the environmental category. Professor Crabbe has no links to organisations either for or against driven grouse shooting and has therefore provided independent oversight to the completion of this edition of the report.

Additionally, the second edition of the report has been peer reviewed by three academics from UK universities who all have extensive publications in relevant areas and none of whom are involved in shooting or field sports.



# Executive Summary

The IUCN has stated that: "The core of mainstream sustainability thinking has become the idea of three dimensions, environmental, social and economic sustainability." These three dimensions underpin this report.

Driven grouse shooting is not a stand-alone activity; it exists as part of a complex system of what this report calls 'integrated moorland management' that results in ecological, economic, and social impacts. The critical questions are whether these impacts deliver benefits to society and the environment that are sustainable, and whether alternative uses of the UK's moorlands would deliver greater benefits.

Discussions about the future of driven grouse shooting have centred, almost exclusively, on whether it is environmentally sustainable. There is depressingly little attempt made by researchers to consider the economic or social sustainability of driven grouse shooting compared with alternative management regimes for moorland. Legislation and regulation almost completely ignore economic and social sustainability.

The contribution of this report is that it reviews evidence relevant to all three legs of the IUCN 'sustainability stool': economic, environmental and social.

## 2.1 Economic Sustainability

Few, if any, moorland estates or moor owners depend solely on grouse shooting for their income. They are engaged in year-round operations and have several income-generating activities in addition to shooting and other sporting activities, typically livestock grazing, commercial forestry, renewable energy generation, and tourism.

Viewed as an isolated activity, driven grouse shooting is not always profitable; the majority of moorland owners and tenants do not set out to make a profit from driven grouse shooting. It is important to recognise that driven grouse shooting is not practised in isolation and its economic sustainability has to be considered as part of the complex mix that is integrated moorland management.

A 2020 study identified six different types (or 'orders') of economic impacts resulting from moorland managed for driven grouse shooting (Denny and Latham-Green, 2020). This study is the most comprehensive of its type yet published. Measuring and quantifying all these impacts exactly is not possible. However, the fact that it is not possible to measure an effect does not mean that it is not present, and that it is not important.

The six orders of economic impact resulting from moorland where driven grouse shooting is practised are:

1. Employment and housing, etc, of full-time staff; expenditure of the people shooting grouse (referred to as 'Guns' in this report); employment of casual and part-time labour.
2. Engagement of contractors, both outdoors and indoors; expenditure with local shops and businesses by estate staff; engagement of professional services eg. lawyers, accountants, etc.
3. Financial facilitation role of estates in enabling farmers to access agricultural subsidy schemes.
4. Maintenance of a landscape and vegetation attractive to tourists; enhancement of facilities for tourists, eg. hotels, inns and restaurants.
5. Reduction in cost of health risks to humans and farm animals through control of ticks and bracken.
6. Provision of ecosystem services, eg. reduction in wildfires, increase in peat formation, flood reduction, carbon sequestration<sup>16</sup>.

These orders of impact become increasingly long-term in their effects and harder to measure as they descend from the first to the sixth.

To date there has been no attempt to define, let alone measure, the economic sustainability of the alternative uses of moorland using a similar holistic economic model. This absence of evidence is a glaring omission in any evidence-based discussion on the optimal ways in which moorland can be managed.

## 2.2 Environmental Sustainability: Biodiversity

Grouse moor management uses various tools to produce a big enough surplus of red grouse *Lagopus lagopus scotica* to enable shooting, ie. a 'shootable surplus'. The tools used include the legal control of generalist predators (eg. red foxes, stoats, and carrion crows), disease regulation (eg. the application of medicated grit) and vegetation control (eg. prescribed burning of heather). The red grouse is an upland species, which means grouse moors are restricted to the British uplands, mainly in England and Scotland.

Most areas where driven grouse shooting takes place have developed a sustainable model of operation. These moorland areas have developed over the centuries a unique, diverse and apparently sustainable flora and fauna, the extent and richness of which has been (and presumably will continue to be) influenced by government policy and funding regimes. Alternative uses proposed for UK moorlands would be very unlikely to maintain the current landscape and biodiversity and would inevitably result in very different effects, which are unknown in many cases.

Shooting estates account for 29% of upland Sites of Special Scientific Interest (SSSI), compared with an expected 16% if grouse moors were randomly distributed. Many SSSI designations in the uplands were originally made because of the habitats and species on moorland, which are typically delivered because of management for driven grouse shooting. Some of the best examples of heather moorland in the UK are designated as SSSIs and 'Natura' sites – Special Protection Areas (SPA) and Special Areas of Conservation (SAC) – in recognition of their importance. In England, 74% of upland SPAs are managed as grouse moors.<sup>17</sup>

During the 20th century, government funded schemes promoting afforestation and intensification of sheep grazing in the British uplands led to widespread declines in globally rare heather moorland. Since World War 2, government policy and funding regimes have largely determined the number of livestock grazing on heather moorland.

As priorities have changed from maximising food production to maximising biodiversity and mitigating climate change, upland farmers and landowners have responded as they seek to generate income.

Predator control, the legal killing of feral cats, crows *Corvus corone*, foxes *Vulpes vulpes*, stoats *Mustela erminea* and weasels *Mustela nivalis* undertaken as part of grouse moor management to minimise predation of red grouse has been shown to benefit other ground-nesting birds (Fletcher et al, 2010; Newey et al, 2016; Littlewood et al, 2019; Mustin et al, 2018), and probably benefits mountain hares (Patton et al, 2010; Brooker et al, 2018; Hesford et al, 2019). The only place in the British Isles where mountain hares thrive at the uniquely high densities associated with the UK is on grouse moors. Predator control will suppress the local population of controlled species. However, the wider biodiversity impacts of predator control on the controlled species are poorly understood (Brooker et al, 2018).

Integrated moorland management, including management regimes to enable grouse shooting to take place, by producing a patchwork or mosaic of different age classes and vegetation composition of heather and other vegetation, is likely to support a richer population and diversity of invertebrates than a heather-dominated moor without regenerating burnt, cut or grazed heather patches.

The number of tick-borne diseases is increasing dramatically (seven diseases currently pose serious health risks to birds, mammals, and people in the UK). The rates of infection in ticks and multiple pathogen loads are also increasing. New pathogen strains (eg. the *Flavivirus* causing tick-borne encephalitis) have become 'native' in the UK in the very recent past. Lyme disease is a 'headline' problem but there are several other chronic (as well as acute) tick-transmitted infections affecting a much larger number of people, as well as companion animals, stock and wild mammals and birds.

## 2.3 Environmental Sustainability: Natural Capital And Ecosystems

The UK has no single formal definition of 'peat', 'deep peat' and 'peatland', with differing interest groups having differing definitions<sup>18</sup>.

In England 'deep peat' and 'blanket bog' are not synonymous – almost all blanket bog is deep peat, but there are large areas of deep peat in the lowlands that are fens (often badly degraded)<sup>19</sup>. 'Moorland' is a term which is often, and incorrectly, used interchangeably with 'peatland'. In fact, moorland includes upland heathland, blanket bog, upland grassland, bracken, scrub, native woodland and exposed rock, as well as peat. There is often peat, including deep peat, on moorland, but not all

### References

<sup>16</sup> The economic impacts of points 4 and 6 could, in theory, be extended to include research and monitoring of landscape and ecosystem projects that are funded by research organisations. However, given the difficulty of defining the impact of funding academic research, this edition of the report will not consider it.



### References

<sup>17</sup> GWCT, The Moorland Balance <https://www.gwct.org.uk/media/1153026/Moorland-Balance-2-1-.pdf>  
<sup>18</sup> <https://www.iucn.org/>  
<sup>19</sup> <http://publications.naturalengland.org.uk/publication/5419124441481216>



moorland is peatland and some has hardly any or no peat. Heather will grow on mineral soil with just a few centimetres of an organic layer. It is important to note that most peatland in the UK is not found on moorland.

It is estimated that England's total upland peat area emits around 603,000 tonnes of CO<sub>2</sub> per year, which is 5.6% of the total peatland greenhouse gas emissions in England. The remaining 94% of England's peatland emissions come from lowland peat<sup>20</sup>. Estimates put the amount of carbon stored in peat on grouse moors at between 66 and 205 million tonnes, which is between 11% and 35% of the total carbon stored all English peatlands. English grouse moors would thus emit between 1% and 5% of the net CO<sub>2</sub> emissions from England's peatlands per year. Therefore, English grouse moor CO<sub>2</sub> emissions are proportionally likely to be well below the proportion of carbon that they store, compared with other peatland uses.<sup>21</sup>

The current state of the evidence is neither robust nor extensive enough for the impacts of management practices associated with grouse shooting activities, and alternative uses of moorland, on natural capital and ecosystem services to be identified and ranked. The current evidence certainly does not encompass the reality of integrated moorland management. The limited objectives of much existing research have resulted in people selecting findings to support prejudiced positions. It is essential that ecosystem functions are the basis for decisions, because the problems in nature are mostly problems of the ecosystem rather than of soil, animals or plants<sup>22</sup>. There is no 'golden ticket' solution that results in all aspects of natural capital being improved. Systems that measure natural capital will have to identify how to maximise net gain.

Wildfires are a major source of CO<sub>2</sub> emission. Wildfires are typically large, burn out of control and can cover extensive areas. They are frequently described as

'hot burns' as opposed to prescribed fires which are described as 'cool burns', and can emit many times more CO<sub>2</sub> as a controlled/prescribed/managed burn of the same size. Wildfires occasionally result from lightning strikes, but the vast majority are due to either accidental<sup>23</sup> or deliberate actions, which tend to be in the spring or summer, often at weekends or on Bank Holidays.

The evidence base for controlled burning and wildfire in the UK does not enable robust conclusions about ecosystem services impacts to be made, particularly in relation to carbon storage, greenhouse gas emissions, flooding, and water quality.<sup>24</sup> To date, no study has assessed rotational burning impacts using a real-world approach, with measurements made across active grouse moors and extending over a complete management cycle (Heinemeyer et al, 2019, 2023). The results of many burning studies are unreliable because they use experimental designs that are unable to detect causal relationships and/or make significant statistical errors.

Due to the uncertainties within the evidence base, the precautionary principle is often cited as a reason to halt prescribed burning on peatlands. However, it is rarely (if ever) applied when considering other even more under-studied or unproven peatland management options, for example mowing or cutting of heather; or no management leading to tree encroachment; or restoration measures like rewetting. These management options are also likely to cause negative impacts when applied in certain contexts. The precautionary principle should not be used as a basis for decision-making solely for burning.<sup>25</sup> The move towards cutting of heather and associated vegetation as a prescribed alternative to controlled burning is taking place without sufficient scientific study to compare the risk and benefits of each treatment. For peatlands, less is known about the impacts of cutting (some likely to be negative) than the impacts of burning (Heinemeyer et al, 2019, 2023).

There is no consensus in the current literature that prescribed burning is damaging to peatlands. The overall effect of burning on peatlands is unclear due to insufficient, contradictory, or unreliable evidence on carbon, water quality and biodiversity. Bare ground resulting from controlled burning is short-lived and small-scale. Large carbon emissions data cited are largely based on lowland arable peatlands. There is no overall emissions inventory for net greenhouse gas data from managed grouse moors.<sup>26</sup>

The claim that rewetted bogs will become fire resilient (a claim often made) seems not to be based on any applicable evidence and ignores the fact that many peatlands might not offer the necessary water balance to achieve the needed wetness, especially considering climate change (as indicated by model scenarios, Gallego-Sala & Prentice, 2013), topographic impacts and seasonal drought conditions (Ashby & Heinemeyer, 2021). Wetter areas, as observed in forests, might actually increase biomass and fuel production and thus increase fire severity (Arkle et al, 2012). However, although wetter areas should support more Sphagnum moss, which is likely to enhance resilience to fires, this might equally increase heather growth in all but the wettest areas and the outcome will depend on the site conditions, especially the wetness potential. There are important known unknowns which need to be considered in relation to site-specific vegetation composition, fuel load build-up, limitations for rewetting, and long-term resilience to wildfire of heather-dominated moorlands. In addition, the potential impacts of pyro-convection (Dowdy et al, 2019) resulting from moisture-releasing latent heat and leading to enhanced convection need to be much better understood.

When contextualised against wildfire risk, the current published science does not show that controlled burning is detrimental to carbon capture on managed heather peatlands (eg. Harper et al, 2018). On the contrary, there is a lot of peat-core evidence, modelling studies and newly-emerging science to suggest that biochar produced by controlled burning is an effective – and thus potentially valuable – means of locking up carbon in peatland soils (eg. Worrall et al, 2013; Leifeld et al, 2018; Heinemeyer et al, 2018). Charcoal has also been linked to reducing the microbial action associated with decay (Flannagan et al, 2020), and the release of greenhouse gases like methane from peatland (Davidson et al, 2019). These biochar effects may also be more effective at capturing carbon compared with cutting vegetation (Heinemeyer et al, 2019; 2023) and compared with unmanaged litter decomposition (Worrall et al, 2013). Notably, recent debates about the role of charcoal in peatland carbon accumulation are not about the quality of the science, but have been based on unfounded accusations about how the science is

interpreted, inappropriate use of terminology and misleading model scenarios about drainage (Young et al, 2019; Ashby & Heinemeyer, 2021; Young et al, 2021). Moreover, unmanaged, ageing heather on blanket bogs seems to dry out the peat, stimulating decomposition and is likely to reduce the net carbon uptake, whereas alternative heather cutting seems to increase sedge cover with likely increased methane emissions (Heinemeyer et al, 2023). However, although an increased *Sphagnum* cover might buffer against these effects (eg. Larmola et al, 2010), we lack understanding about where this is possible and how all these findings relate to heather-dominated shallow peat soils.

## 2.4 Social Sustainability

Driven grouse shooting has important and positive social impacts. Driven shooting, unlike walked-up shooting, involves a wide range of individuals from a variety of backgrounds, not just Guns<sup>27</sup>, but also beaters, pickers-up, drivers, flankers, caterers, supporters, and others. This extensive 'cast list' facilitates contact between individuals from different backgrounds and maximises the potential for social impacts.

Integrated moorland management, including driven grouse shooting, delivers positive impacts on the social and working lives of both active participants in driven grouse shooting, and those who use the moorlands for exercise and cultural activities. The World Health Organisation (WHO) Health Economic Assessment Tool (HEAT) tool<sup>28</sup> can provide an estimate of the societal value of reduced mortality from physical activity of regular walking for a person aged 45 and over. Using this tool, the societal value of acting as a beater on a grouse shoot twice a week can be calculated as up to £1,966<sup>29</sup> per year. The societal value for a person aged 44 and under could be up to £211<sup>30</sup> per year. Although these values are indicative, the calculations highlight a major and positive social impact that should be recognised by policy makers and others.

Participation in driven game shooting, including that of red grouse, has been found to have a statistically significant impact on participants' mental health and well-being<sup>31</sup> compared with the national average (Latham-Green, 2020b; Denny & Latham-Green, 2020). The overall costs of poor mental health in the UK have been estimated at £105 billion per annum (Department of Health Independent Mental Health Taskforce, 2016). Maintaining well-being can be valued at approximately £10,560 per person, per year (Cox, Bowen & Kempton, 2012; Maccagnan et al, 2019)<sup>32</sup>. This is a key finding that highlights a positive and measurable social impact that should be noted by policy makers and others.

### References

<sup>20</sup> <https://www.gwct.org.uk/policy/briefings/carbon-storage-on-grouse-moors/>

<sup>21</sup> <https://www.gwct.org.uk/policy/briefings/carbon-storage-on-grouse-moors/>

<sup>22</sup> Watt, 1947

<sup>23</sup> Such as the wildfire on Marsden Moor of April 2021. A box of fireworks was discovered at the scene of the fire <https://www.bbc.co.uk/news/uk-england-leeds-56901934> Police interviewed a man and a woman and subsequently submitted a file to the Crown Prosecution Service <https://www.bbc.co.uk/news/uk-england-leeds-56931147>

<sup>24</sup> Ashby, M. & Heinemeyer, A. (2021) A Critical Review of the IUCN UK Peatland Programme's "Burning and Peatlands" Position Statement, Wetlands 41:56 <https://doi.org/10.1007/s13157-021-01400-1> (Ashby & Heinemeyer, 2021) and A. Heinemeyer & M.A. Ashby (2021) An outline summary document of the current knowledge about prescribed vegetation burning impacts on ecosystem services compared to alternative mowing or no management. <https://ecoevorxiv.org/qg7z5/> [Preprint not yet submitted] (Heinemeyer & Ashby, 2021).

<sup>25</sup> Ibid

### References

<sup>26</sup> Ibid

<sup>27</sup> We use the term 'Guns' to describe the people who shoot.

<sup>28</sup> World Health Organisation (WHO) (2019)

<sup>29</sup> 2021 figure, converted from 2,270 Eur to GBP at a rate of 0.8666 on 09.04.2021 (Bank of England, 2021)

<sup>30</sup> 2021 figure, converted from EUR to GBP at a rate of 0.8666 09.04.2021 (Bank of England, 2021)

<sup>31</sup> Measured using the nationally recognised short Warwick-Edinburgh mental well-being score (SWEMWBS)

<sup>32</sup> The figure of £10,560 may seem high, but it is a reasonable indicative figure when we consider that The Social Value Bank developed by HACT and Fujiwara shows that being in good health may be worth £20,141 per year, stopping smoking around £4,000 per year and overcoming depression problems even £36,766 per year. Doing regular physical exercise can be valued between £3,500 and £4,200 per year depending on the level of the activity, see <https://www.socialvaluebank.com/how-it-works>

Communities in areas where driven grouse shooting takes place receive health and well-being benefits through employment, engagement, and communal activities. The cohesion and resilience of small, often remote, communities are enhanced through the maintenance of social and economic networks. Driven grouse shooting activities are part of the intangible cultural heritage of many people and communities.

The social impacts of driven grouse shooting are positive and sustainable. Some of these impacts can be valued and these values are significant. There is no evidence that alternative uses of UK moorlands would deliver the same level of benefits.

## 2.5 The Arguments Of Opponents Of Driven Grouse Shooting And Sustainability

Opposition to driven grouse shooting can be on ethical grounds. Other opponents state that they are not opposed to all sports shooting, but believe that driven grouse shooting is not sustainable and should be replaced with a less intensive alternative. Although conflicts between those for and against shooting may appear at first to concern wildlife, they often make up part of wider debates surrounding land use, land ownership and natural resources' governance (Hodgson et al, 2018). Organisations that are opposed to all blood sports, such as Animal Aid and the League Against Cruel Sports, are clear in their motivation for a ban of driven grouse shooting. However, it is sometimes unclear whether opposition to grouse moor management is a fundamental opposition to driven grouse shooting or based on opposition to private ownership of large estates.

Opposition to driven grouse shooting can be summarised under eight headings. These headings do not include an ethical opposition to the killing of any animal, a belief that even if not shared must be acknowledged and respected (in the same way that the belief that it is legitimate to kill some animals in certain circumstances should also be acknowledged and respected). The eight arguments employed against driven grouse shooting are:

1. Driven grouse shooting is not economically viable and there are better alternative uses for moorlands such as tourism and forestry.
2. Walked-up grouse shooting is a 'better' alternative to driven grouse shooting.
3. Driven grouse shooting involves the illegal killing of raptors.
4. Opposition to predator control.
5. Use of lead shot.
6. Heather burning results in damage to peat, thus releasing carbon.

7. Moorland management for driven grouse shooting involves draining the moors, resulting in an increased risk of flood.

8. Driven grouse shooting involves the killing of mountain hares *Lepus timidus*.

If the arguments deployed by those opposed to driven grouse shooting are considered against the current research-based evidence, it is concluded that they are not supported. The eight arguments against driven grouse shooting are individually contradicted by the evidence available. Moreover, these arguments collectively fail to consider the definition of sustainability used by the IUCN, and this report. Opponents of driven grouse shooting take little or no account of the economic or social impacts of driven grouse shooting which, as this report has shown, are significantly positive to the mainly remote locations in which driven grouse shooting is practised. It is important that those opposed to driven grouse shooting understand the holistic nature of 'sustainability' before advocating for it to be banned.

Interest group bias on both sides of the debate has also influenced the available research base for driven grouse shooting, with much research sponsored by those for or against shooting. Interest groups bias has also influenced policy making, with ministers in Wales and Scotland not following the recommendations of independent evidence review panels (Grouse Moor Management Review Group (GMMRG) (National Resources Wales, 2018a; Bodkin, 2018; GMMRG, 2019; Scottish Government, 2020)). Many people involved in shooting believe that its positive impacts are not understood. There is increased conflict between those for and against driven grouse shooting (and other forms of shooting).

The criminal damage<sup>33</sup> and threatening behaviour of some individuals opposed to grouse shooting suggest that they are not interested in developing

shared outcomes with other stakeholders. Where people and groups are prepared to discuss their points of view, share information about what they do and the impacts they have, accommodation and co-operation are common. Multiple stakeholder working is sustainable, provided that people act in accordance with the law.

The methods used by opponents are varied, organised and sometimes aggressive, utilising tools such as social media with expertise, which those who take part in driven grouse shooting do not feel confident to use to dispel mistruths and inaccurate perceptions of their pastime (Latham-Green, 2020b). The use of selected evidence and misrepresentation of evidence, including in parliamentary debates, along with the failure of policy makers to accept the recommendations of independent review committees in relation to driven grouse shooting and other shooting regulation, exacerbates the feeling of helplessness and resentment among many people involved in shooting, and increases the conflict between those for and against driven grouse shooting.

## 2.6 The Sustainability Of Alternatives To Driven Grouse Shooting

Commonly cited alternative uses of moorlands include livestock grazing, commercial forestry, renewable energy, rewilding, tourism, and conservation. These alternative uses are normally advocated as part of a 'mixture' with other alternative uses. Studies that comprehensively measure and attempt to value the economic, environmental and social impacts of the commonly cited alternative uses of moorland do not seem to exist. In the absence of such studies, there is no evidence that banning driven grouse shooting and moving to an alternative use of the landscape would deliver the range of sustainability benefits that current practices provide. The alternative uses proposed for 'grouse moors' are

likely to result in a reduction of positive impacts, with negative implications for the sustainability of communities.

There is a need to recognise that, as the IUCN points out, the three elements of the sustainability stool cannot and should not be viewed in isolation.

## 2.7 The Key Points About Sustainability

Driven grouse shooting does not take place in isolation. It is part of a complex web of integrated moorland management activities. Many landowners either graze their own animals, or their land is used by tenant farmers and graziers. Landowners frequently have relatively small areas of forestry. An increasing number of landowners are installing energy plants, with hydro-electric plants being seen as the least damaging to the environment. As described in the section on economic impacts, driven grouse shooting drives high-end tourism, and facilitates tourism from non-shooting people throughout the year. Nearly all landowners engage in moorland management practices that are classed as 'conservation' and others that can be classified, by some at least, as 'rewilding'. Driven grouse shooting is not an 'either/or' activity, it is part of a holistic mix. Those people who advocate the wholesale adoption of alternative uses of moorland are ignoring the current situation, and nearly all of the evidence for sustainability.

Integrated moorland management involves multiple stakeholders and should be outcomes-focused.<sup>34</sup> At a very local level there can be different stakeholders trying to make a living from an area of land. Disputes between stakeholders are not inevitable and multi-stakeholder initiatives can be successful in tackling complex sustainability issues, provided that different perspectives can be reconciled, which is not always possible. At a local level, it is clear that very often there is close collaboration between stakeholders.

### References

<sup>33</sup> In 2021 a single moor in the North of England had over 60 legal predator traps destroyed by people opposed to grouse shooting.

### References

<sup>34</sup> See, for example, <https://publications.naturalengland.org.uk/file/4780137623322624> and <https://www.moorsforthefuture.org.uk/our-resources/file-preview?id=87568>







## 3.0 Methodology

### 2.8 Conclusions

This edition of the report confirms the three important overall conclusions reached by the first edition:

- That any decision by policy makers about the sustainability of driven grouse shooting should be informed by a clear understanding of all the evidence and, importantly, its omissions and limitations;
- That integrated moorland management regimes practised by landowners and tenants should be informed by robust evidence, and changes made where necessary;
- That those opposed to driven grouse shooting, and those advocating alternative uses for grouse moors, should base their arguments on applicable evidence (for which more research is undoubtedly needed).

The crucial point about evidence is that it should cover the IUCN's three 'pillars' of sustainability; economic, environmental and social. Considering one or two of these pillars alone is not acceptable, they are an integrated, holistic structure; a three-legged stool. Bad policy, poor management, and illogical opposition will result from ignoring one or more of the legs of the stool, and economic, environmental and social sustainability will be diminished.

### 2.9 Recommendations

This edition of the report makes seven recommendations:

- Any decision about banning driven grouse shooting and alternative uses of moorland currently used for driven grouse shooting should use the Six-Order Economic model to identify the economic impacts and sustainability of these other options. Those who propose alternative uses of the UK's moorlands should demonstrate that the economic impacts of their preferred options deliver outcomes that are at least as valuable as those delivered by integrated moorland management, and that are sustainable.
- The maintenance of a mosaic of moorland vegetation as a result of grouse moor management delivers a uniquely diverse habitat and biodiversity. Those advocating alternative uses for grouse moors should demonstrate that their chosen option(s) deliver the same or higher levels of biodiversity.
- Landowners and tenants practising integrated moorland management should invest more resource into recording the levels of biodiversity on their land and develop and implement plans to enrich it.
- Landowners and tenants should invest resources to work with scientists to establish and, implement and monitor practicable and effective systems that measurably value and enhance the services delivered by their very complex and integrated ecosystems. This challenge needs to be met by any moorland owner who wants to demonstrate that the ways in which they use their land is sustainable, and to be rewarded for increasing natural capital.
- Those advocating alternative uses for grouse moors should invest resource in identifying and valuing the ecosystems services delivered by their chosen option(s) and demonstrate that they will deliver the same or higher values than integrated moorland management, including driven grouse shooting.
- Alternative uses of moorland will deliver different social impacts, but these have not yet been fully identified. Any decisions about the implementation of these alternative uses must take into account the potential loss, or gain, in social impact when compared with the significant social impacts arising from driven grouse shooting.
- Those involved in driven grouse shooting, those with a stake in the way moorlands are used, and those opposed to driven grouse shooting should engage with each other to develop positive dialogue and mutual understanding and a shared broad vision for the uplands.<sup>35</sup>

The second edition of this report is based on a review of what purports to be relevant literature, both articles published in peer-reviewed journals and reports produced either by research-based organisations or by task groups appointed by policy makers. It also makes use of material published on websites by governments, non-governmental organisations, and interest groups. Magazines and non-academic journals produced by relevant interest groups have been reviewed, as well as items appearing in the media. The earliest reference cited is dated 1577, but the vast majority of the references date from the last decade, with many items being published in 2022 and 2023.

Where relevant research the author of this edition has been involved in or with is cited. Latham-Green's PhD investigating the social impacts arising from participation in driven game shooting analysed qualitative and quantitative data gathered from over 2,400 respondents (Latham-Green, 2020b) and was supervised by, among others, the author. Her research is the largest, and most comprehensive, study of its type and sheds new light on a previously unmeasured aspect of sustainability. Denny & Latham-Green (2020) interviewed 61 people and gathered quantitative data via a questionnaire

completed by 583 respondents. Based on this data, a new framework for understanding the economic impacts of game shooting was proposed. The framework is developed in this report as, it is suggested, it provides a helpful way of thinking about economic sustainability.

The literature review as a research method has the advantage of enabling authors to be up-to-date with the relevant science, as well as enabling them to assess and compare different items of evidence. However, it is acknowledged that traditional literature reviews often lack thoroughness and rigour, especially when they are conducted ad hoc and do not follow clear methods (see, for example, the critique of Gregg et al, 2021, in Heinemeyer & Ashby, 2023), rather than following a specific methodology (Snyder, 2019). To attempt to guard against this weakness, all the peer-reviewed literature has been rated against firstly, the IUCN definition of sustainability; and secondly by reviewing the methodologies described by the authors.

It is not assumed that, because an article appeared in a peer-reviewed journal, it met a 'gold standard'. Peer review has become an essential component of the academic writing process, helping to ensure that papers published in scientific journals answer meaningful research questions and draw accurate conclusions based on professionally executed experimentation. However, despite its wide-spread use by most journals, the peer-review system has also been widely criticised for the slowness of the process to publish new findings, and the perceived bias shown by some editors and or reviewers (Kelly, Sadeghieh & Adeli, 2014). The increase in the number of online only or e-journals with little or no peer review may pose risk to the advance of knowledge. Articles in this type of publication have been avoided wherever possible. While recognising the drawbacks of peer review, this edition of the report has been reviewed by academics from three UK universities who were not involved, in any way, with its production.



#### References

<sup>35</sup> The 'Why Moorlands Matter' summit held on 25th to 30th May 2023 on a grouse moor near Lancaster is a good example of this recommendation in action. See, <https://www.countrylife.co.uk/comment-opinion/opinion-continuing-feuds-instead-of-seeking-compromise-is-irresponsible-as-we-argue-british-wildlife-collapses-256920>



4.0

# Overview Of Driven Grouse Shooting

## References

<sup>36</sup> The scientific name of the red grouse, *Lagopus*, is derived from Ancient Greek *lagos* (λαγός), meaning 'hare', and *pous* (πούς), 'foot', in reference to the feathered feet and toes typical of this cold-adapted genus, and *scoticus* is of Scotland<sup>1</sup>.

<sup>37</sup> <https://app.bto.org/birdtrends/species.jsp?year=2018&s=redgr>

<sup>38</sup> RSPB estimate <https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/red-grouse/>

<sup>39</sup> The 2022 study was the 33rd consecutive annual survey of capercaillie broods conducted by the GWCT. A report published by [www.birdguides.com](http://www.birdguides.com) on 27th March 2023 stated that there might be 'as few as 542' capercaillie. Whatever number is chosen, there are very few of the birds remaining.

<sup>40</sup> Scientific advisors to NatureScot reviewed the causes of the decline in capercaillie numbers in 2022 and recommended new and additional predator control measures be taken. Their advice seems not to have been followed

<sup>41</sup> Source for population estimates British Trust for Ornithology <https://www.bto.org/>

*The red grouse inhabits an extremely limited and ever-dwindling portion of the earth's surface, and has refused to multiply or become acclimatised elsewhere"* (Stanford, 1960)

## 4.1 The Red Grouse

This chapter introduces the red grouse, the bird at the heart of this document. It will describe the different species of grouse found in the British Isles and give a brief account of the appearance and behaviour of the red grouse. The habitat and distribution of this gamebird will be described and the main diseases impacting red grouse in the UK briefly examined. The chapter will conclude by observing that the red grouse is one of the UK's seven endemic bird species and summarising its legal status.

There are four different grouse species found in the British Isles: the black grouse (*Lyrurus tetrix*), the ptarmigan (*Lagopus mutus*), the capercaillie (*Tetrao urogallus*) and the red grouse (*Lagopus l. scoticus*, *L.l. hibernicus*<sup>36</sup>). All these birds have specific dietary requirements and specific habitats. Red grouse in Ireland are sometimes thought to belong to a separate subspecies *L. l. hibernica* (Bruun, Delin & Svensson, 2002). Black grouse, ptarmigan and capercaillie are found in several European countries whereas red grouse are endemic to the UK and Ireland.

The red grouse population is estimated to be 230,000<sup>37</sup> to 265,000<sup>38</sup> pairs although populations

can increase or crash in some years. It is one of this country's few endemic sub-species, meaning that they are only found in the British Isles. They inhabit heather moorland including areas of both blanket bog and upland heath. The black grouse population is estimated to be 5,100 males UK-wide. They are found on the moorland fringe and use hill-edge woodlands of both conifer and deciduous species. A survey conducted in August 2022 estimated that there were perhaps only 300 to 400 capercaillie remaining in a handful of pine-dominated Scottish woodlands<sup>39</sup>, mainly within Badenoch and Strathspey in the Scottish Highlands. The outlook for capercaillie in the UK is a concern as only around 0.25 chicks are raised per potential breeding attempt (Fletcher & Baines, 2020) and it suffers from significant levels of predation<sup>40</sup>. Ptarmigan live above 800 metres and like capercaillie are also only found in Scotland; the population size is estimated to be between 2,000 and 15,000 pairs<sup>41</sup>. Grouse populations tend to fluctuate in size over the years and in relation to management, so these figures are best seen as informed estimates.

During the 19th and 20th century there were a few shoots in Scotland where capercaillie<sup>42</sup> were driven by beaters over Guns<sup>43</sup>. However, from the 1960s the decline in suitable habitat and other factors resulted in a crash in capercaillie numbers and a voluntary ban on shooting them was introduced by nearly all estates. They were legally removed from the quarry

list in 2002<sup>44</sup>. Black grouse are legal quarry between 20th August and 10th December, but for many years there has been for conservation reasons a voluntary moratorium by landowners on shooting them, and are only exceptionally incidentally shot on driven grouse shoots. Ptarmigan are occasionally shot on walked up days in the mountainous areas where they live. However, the red grouse population is managed by humans to be large and productive enough to enable, in some years, some of them to be the quarry on driven grouse shoots between 12th August and 10th December<sup>45</sup>. It is the red grouse that is the subject of this report.

In appearance the red grouse is a dark reddish-brown in colour, with a black beak and a bright red or scarlet comb above each eye. Females are a lighter reddish-brown than males and have less conspicuous combs. Young birds are duller and lack the red combs. The tail of the adult bird is mostly black and the legs to the claws are feathered in pale grey as in other species of Lagopid grouse. The birds live in areas with potentially high snowfall, and the feathers help to keep the feet warm and to act like snow shoes, spreading the bird's weight so that it uses less energy walking on top of the snow, rather than sinking into it. When fully grown, red grouse are typically 37cm to 42cm from beak to tail, have a wingspan of around 55 cm, and weigh between 650g and 750g. They are mostly vegetarian and typically eat heather, seeds, berries and some insects (eg. craneflies), especially when grouse chicks are very young.

The call of the red grouse is distinctive and easily identified by a 'chut!chut!chut!chut!chut!chutttt' sound, sometimes described as 'Go-back, go-back, go-back'. The wings make a whirring sound when the bird is disturbed from its resting place. Grouse fly in the characteristic manner of gamebirds: rapid wingbeats alternating with long glides on rigid, bowed, slightly depressed wings.

Red grouse begin to form pairs during the autumn and males become increasingly territorial as winter progresses. The nest is a shallow scrape up to 20cm across which is lined with vegetation. About six to nine eggs are laid, mainly during April and May. The eggs are oval, glossy, and pale yellow with dark brown blotches and are incubated for 19 to 25 days. The young grouse chicks can fly 12 to 13 days after hatching and are fully grown after 30 to 35 days.

Red grouse are the only truly endemic wild gamebird in the UK. Like pheasants and partridges, they are straightforward to breed in captivity but their survival on release is typically extremely poor. As a result, grouse shoots never release grouse for shooting, but manage the red grouse's moorland environment to ensure a sustainably harvestable surplus.

Red grouse live on heather moorland across the UK uplands; mainly concentrated in the hills of central

and eastern Scotland, the Pennines and North York Moors. Grouse moors often (though not always) occur on peat soils; either deep peat, which can be blanket bog, or shallow peat and mineral soils, which are on heathland areas. Grouse mostly eat the young shoots of heather plants, so heather management, usually by controlled burning, grazing and cutting, is undertaken to encourage new growth. A mix of young and older heather provides both good food quality and cover for nesting. As a result of this management, and historically management for sheep, no other country has extensive heather uplands equivalent to those in the UK. Most other countries' heather areas are lowland or coastal, leaving the UK responsible for a considerable proportion of the world's heather moorland, estimated to be around 75%<sup>46</sup>. For this reason, the 1992 Rio Convention on Biodiversity recognised the global importance of UK heather moorland<sup>47</sup>. Heather-dominated moorland supports groups or 'communities' of plants growing together that are either only found in the UK, or are found more abundantly here than elsewhere in the world. These communities are different to those found under other land uses such as livestock farming or commercial forestry, so grouse moor management increases overall 'gamma' biodiversity in the uplands (GWCT, 2019). They include species of berry, grass, sedge and mosses such as *Sphagnum*, which together define habitats that are listed under the EU's Conservation of Natural Habitats and of Wild Flora and Fauna Directive.

Outside Scotland and Northern England, in Wales there are red grouse populations but their range has retracted. They are now largely absent from the far south, their main strongholds being Snowdonia, the Brecon Beacons and the Cambrian Mountains. There are reports of Welsh birds crossing the Bristol Channel to Exmoor, but they are not known to breed there and the most recent sighting of red grouse on Exmoor was in 2005. There is an isolated introduced population on Dartmoor<sup>48</sup>, and overspill Welsh birds visit the Shropshire Hills such as Long Mynd, where they breed. Red grouse were introduced to Exmoor, to Cannock Chase, and once a few pairs were introduced into West Suffolk<sup>49</sup> but breeding populations were not self-sustaining. In Ireland red grouse are found locally in many parts of the hill and bog country: it is commonest in Mayo, where the population is increasing, and on the Antrim plateau, with other healthy populations in the Slieve Bloom Mountains and the Knockmealdown Mountains; a few pairs still breed in south County Dublin. The small population in the Isle of Man is mostly concentrated in the southern hills but conservation work is ongoing throughout the uplands to ensure the species' continued viability.

Ever since Edward Wilson, the naturalist who perished with Scott in the Antarctic, began his research on

## References

<sup>42</sup> Capercaillie were re-introduced to Breadalbane in Scotland in 1837 when T.F. Buxton, an English MP, sent his gamekeeper, Larry Banville, to Sweden to collect and bring the birds back to the UK. They were presented to the Marquis of Breadalbane to thank him for the grouse shooting that Buxton had enjoyed in Tayside. Source: The Banville Diaries.

<sup>43</sup> For example, Donside in Aberdeenshire.

<sup>44</sup> Which sadly has not reversed the decline in numbers.

<sup>45</sup> In Northern Ireland the grouse season is 12th August to 30th November.

<sup>46</sup> This figure has been challenged and is uncertain, for example, due to definitions around heather moorland, but the UK certainly has most of the world's heather moorland.

<sup>47</sup> The global importance of the UK's heather moorland has implications for those that advocate alternative uses of the land.

<sup>48</sup> The author of this report can remember seeing a red grouse on Dartmoor in 1975.

<sup>49</sup> A red grouse was seen on Berners Heath near Elveden, Suffolk, in 1916. It was the last of its kind known in East Anglia.

## References

<sup>50</sup> There is a noticeboard by the church in Glen Prosen village (South Cairngorms) recording that Wilson's research on grouse took place in the surrounding Glens.

<sup>51</sup> This endoparasite is often eaten with the tops of young heather shoots and can lead to mortality and poor condition, including a decrease in the bird's ability to control the scent it emits.

<sup>52</sup> <https://www.gwct.org.uk/game/research/disease-and-welfare/strongyle-worms-and-strongylosis/>

<sup>53</sup> Repeated glaciations have what is sometimes described as a "wiped clean effect" resulting in many species having been forced out of the modern area of the UK to more southern parts of Europe, or perhaps becoming extinct.

<sup>54</sup> There is substantial colour polymorphism in willow grouse. The willow grouse that live in coastal areas of Norway look very like red grouse as they have much less white winter plumage than their mountain-dwelling counterparts.

<sup>55</sup> Dr Adam Smith, GWCT Director Scotland, March 2021

<sup>56</sup> The main elements of the Birds Directive, including Annex II, Article 7 still apply to the UK after 1st January 2021, <https://www.gov.uk/government/publications/changes-to-the-habitats-regulations-2017/changes-to-the-habitats-regulations-2017>

<sup>57</sup> It is interesting to note that *L. l. scoticus* and *L. l. hibernicus* are noted in Annex II/1 of the Birds Directive as distinct from *L. l. lagopus* ie. the EU recognises three sub-species of the species.

<sup>58</sup> JUDGMENT OF 13. 6. 2002 — CASE C-117/00. <https://curia.europa.eu/juris/showPdf.jsf?sessionid=40CD45DDDE54D93591B54E832C9E5237?text=&docid=47406&pageindex=0&doclang=EN&mode=lst&dir=&occ=first&part=1&cid=7313207>

grouse disease in 1906<sup>50</sup>, there have been biologists at work on grouse and the enemies of consistent brood productivity such as sheep-ticks, heather beetle and thread-worms. There has been more work for them to do as grouse diseases have increased in number and spread in geography. Grouse populations display periodic cycling, during which the population builds up to very high densities only to crash a few years later, and then recover. The three main diseases affecting red grouse are louping ill virus, strongylosis, and respiratory cryptosporidiosis.

Approximately one third of grouse moors carry the louping ill virus. Louping ill virus is a flavivirus (RNA virus), also known as sheep encephalomyelitis virus. Flaviviruses are transmitted by arthropods, and louping ill virus is transmitted by ticks. In red grouse, this virus can cause mortality as high as 78%. The main tick vector is the sheep tick *Ixodes ricinus*. Although the vast majority of louping ill transmission is caused when the parasite bites its host, red grouse chicks can rarely be infected with the virus when they eat ticks that carry the virus. This virus may be a significant factor in red grouse populations. The presence of louping ill reduces chick survival, with up to 80% of infected chicks dying. As a consequence, chick survival rates can average 50% lower on moors with louping ill.

The 'classic' grouse disease strongylosis is not caused by ticks or a virus but by a nematode worm *Trichostrongylus tenuis*<sup>51</sup>. This gut parasite is widespread in red grouse and high levels of infection can cause significant reductions in both breeding success and direct mortality. Research in the north of England carried out by the GWCT has shown that this parasite is largely responsible for the cyclical fluctuations in grouse numbers on moors in this region.<sup>52</sup> The parasite is most prevalent when grouse stocks have been high, but it may also reduce breeding success on low-density moors.

First diagnosed in the UK in 2010, respiratory cryptosporidiosis, caused by *Cryptosporidium baileyi*, is present in approximately half the grouse moors in northern England, where it reduces natural survival and productivity of red grouse. It is effectively absent from Scotland.

The British Isles have few endemic species of animals and plants due to past frequent glaciations<sup>53</sup> and the existence of a land bridge to Europe until about 9,000 years before present. Most endemic species to the British Isles are considered to be subspecies of a larger species, with mutations or adaptations slightly changing the species in the islands or in certain localities. Consequently, there are few endemic species of birds in the British Isles, although there are slightly more subspecies. However, it has been widely held that one of the birds that is endemic to Britain is the red grouse, which has been able to develop

in isolation from other subspecies of the willow ptarmigan which are widespread in northern parts of Eurasia and North America.

It appears that red grouse are more than simply colour variants of willow grouse<sup>54</sup>. There is an increasing body of evidence that there are genetic differences between the nominate race of willow grouse (*Lagopus lagopus lagopus*) and Scottish red grouse (*L. l. scoticus*) (Quintela et al, 2010) and Scottish red grouse and Irish red grouse (*Lagopus lagopus scoticus/hibernicus*) (McMahon et al, 2012). Whether these are distinct enough to say they are separate species is unclear and no one has committed: "There is nothing certain in science."<sup>55</sup> The genetic differences between Irish red grouse and Scottish red grouse also mean that the Irish grouse may well be *L. l. hibernicus* rather than *L. l. scoticus*. If that is the case, there could be similar genetic variance between Scottish red grouse and Peak District or Welsh red grouse.

The red grouse found in the British Isles is probably best described as an endemic (no natural population anywhere else, with very limited dispersal linkage, apparently over a period of at least 25,000 years) sub-species (because they can still produce fertile offspring) of the willow grouse. In any event, it is interesting to note that *L. l. scoticus* and *L. l. hibernicus* are already noted in Annex II/1 of the Birds Directive as distinct from *L. l. lagopus* ie. the EU recognises three sub-species of the species.

The red grouse thus is one of just seven species of birds that is unique to the British Isles; the others being the pied wagtail, the Shetland wren, the Fair Isle wren, the St Kilda wren, the Scottish crossbill, and the White-throated dipper. Importantly, the red grouse has much the largest population of the bird species endemic to British Isles.

In common with other wild birds, the red grouse is the subject of legislation designed to ensure its conservation. When it was a member state of the European Union, the UK was bound by the provisions of Council Directive 2009/147/EC on the conservation of wild birds (popularly called the Birds Directive<sup>56</sup>) to take the requisite measures for the protection of the red grouse<sup>57</sup>. However, as it is a species to which Annex II of the Directive applies, Article 7 permits hunting (shooting) under national law, provided population levels are not threatened as a result. Interestingly, in 2002 Ireland was found by the European Court of Justice to be in breach of its obligations under the earlier Directive to protect the red grouse because it had allowed a crucial breeding ground to become degraded through over-grazing by sheep<sup>58</sup>. Legal protection for the grouse is not new in the UK. As Stanford (1960) reports: "The red grouse has survived through uncounted centuries and has been protected by law in Scotland since the days of Mary Queen of Scots. As long ago as 1577

Holinshed described the "cokes and hennes which absteyning from corne do feed upon naught else but the leaves of cytilus which the Scottes do commonly call haddar."<sup>59</sup> The legal protection for the red grouse, which depends on a specific type of habitat, has obvious implications for some alternative uses of moorland, including forestry and, perhaps, some types of 'rewilding'.

## 4.2 What Is Driven Grouse Shooting? <sup>60</sup>

"Grouse shooting is reckoned by many to be the finest of all forms of game shooting. Not only is the red grouse an exceptionally fast and agile bird, which offers some of the most difficult of all shooting, but it also has its home in the most glorious upland countryside. The combination of sporting shooting and magnificent scenery, once experienced, is never forgotten, and draws grouse shooters back to the moors year after year." (Downing, 2018)

Unlike some other forms of game shooting, driven grouse shooting does not involve rearing birds in pens, which can be the basis of ethical opposition by some people to shooting (Humphreys, 2010). Grouse are not reared and released, but reproduction is encouraged through a combination of land management techniques designed to yield the maximum number of grouse each year. This is not a precise science, as there are factors outside of the control of gamekeepers, such as the weather, disease and predation. Typically, a moor may only have enough grouse to permit driven grouse shooting in three years out of five.

There are three ways in which grouse are shot in the UK, 'walked-up', flushed by dogs, and driven (McMorran, Thomson & Glass, 2020). In walked-up shooting, groups of shooters (the 'Guns') walk in a line across a moor. Dogs may be used to flush the grouse from the heather for the Guns to shoot at, or specialist pointing dogs used to locate and indicate where birds are so that one or more Guns then flush and shoot. The number of Guns on a walked-up day is typically four to eight and the number of birds shot normally ranges from 16 to 30 (McMorran, Thomson & Glass, 2020). In driven grouse shooting, teams of beaters work to drive the birds towards the Guns, who are stationary in a line and concealed in specially constructed 'butts' (interestingly, the Badminton Library<sup>61</sup> relates that the earliest recorded driven grouse were shot on the Stanhope moors in County Durham in 1805 by boys lying behind rocks, or crouched in sand scrapes, before butts were thought of). Butts may either be temporary screens made of wood, or permanent structures often built of turf and stone. The number of birds shot on a driven day can range from fewer than 100 (or 50 'brace' because they are braced together in pairs once

shot) to over 400 (200 brace)<sup>62</sup>. The RSPB suggests that walked-up grouse shooting is widely regarded as environmentally sustainable<sup>63</sup>. However, it has concerns about the sustainability of more intensive driven grouse shooting (RSPB, 2020a).

The cost of grouse shooting to people who own moorland are examined in detail in section 5.1, *The Economics of Driven Grouse Shooting*. However, the cost of a day's grouse shooting for an individual Gun is significant. 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 partridges where the bag could be 100 to 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 shown in Table 4.1<sup>64</sup>:

**Table 4.1 Indicative Cost Of Driven Grouse Shooting For One Gun In 2021**

Month	Number of birds	Cost per Gun/number of Guns
August and September	250	£2,906 per Gun, 8 Guns
October	200	£2,250 per Gun, 8 Guns
November	160	£1,740 per Gun, 8 Guns

Red grouse are regarded internationally as the paragon of gamebirds; the marketplace confirms this view.

A typical day's driven grouse shooting consists of meeting at 09.00 when the team will meet the hosts and any shoot day helpers (loaders/minders), who will take care of the Guns throughout the day's shooting. There are normally between eight and 12 Guns shooting. Following arrival and introductions, a safety speech will be given, and a draw will take place to establish each Gun's shooting position or butt numbers for the day. Guns will then leave the meeting location for the first drive<sup>65</sup> where they will head to their butt where their loader will be with all the necessary equipment for each drive, including guns and ammunition cartridges. Most days will consist of two drives followed by a break for snacks and drinks. Further drives will then be shot before heading back to the meeting location for a meal. However, the nature of driven grouse shooting is unpredictable. Grouse drives take place across wide, open moorland, and the beaters often walk many miles in order to move the coveys<sup>66</sup> forwards and ensure that they end up flying over the Guns. Their job can be an arduous one, especially when the weather is hot or if there is heavy rain. Despite the best efforts of the beaters, birds may try to fly away

## References

<sup>60</sup> Information in this chapter has also been sourced from 'The Shooting Man's Bedside Book Watkins-Fitchford (1948), republished 1994

<sup>61</sup> Walsingham Lord and Payne-Gallwey, R. (1902) Badminton Library – Shooting, Moor and Marsh, Longmans, Green and Co. London

<sup>62</sup> The record bag of 2,929 birds shot on 12th August 1915, by eight Guns, at Littledale and Abbeystead in Lancashire is extremely unlikely ever to be repeated. Source: The Shooting Man's Bedside Book

## References

<sup>63</sup> The question of what is meant by 'sustainable' is an interesting one. McMorran et al (2020) report the results of case studies of four walked-up grouse shooting estates in Scotland. Despite having walked-up shooting, all four estates were actively managed for grouse, which included heather burning, predation control and the use of medicated grit, the same management techniques that are used on moors where driven grouse shooting takes place. In these estates grouse management was referred to as being relatively low input, due to a combination of low staffing levels and owner motivations, and also due to less emphasis being placed on ensuring sufficient grouse numbers existed for driven grouse shooting. These cases do not obviously show that walked-up grouse shooting is more sustainable against the IUCN definition of sustainability.

<sup>64</sup> <https://www.dawnay.co.uk/sporting/prices-availability/>

<sup>65</sup> A 'drive' is the term used when beaters have flushed birds so that they fly over the line of butts (if the drive is successful) so they can be shot at. The Gamekeeper normally determines when a drive has finished and Guns should cease firing, using a horn or whistle to tell Guns to stop.

<sup>66</sup> The collective noun for a group of grouse is a 'covey'.



from the line of guns, hence the critical role that flankers have to play, or they may even fly away from the Guns back over the heads of the beaters. Beaters might have to walk for three or more miles per drive, thus Guns can spend a lot of time waiting for birds to appear. J K Stanford wrote: "I had been out for six hours, during which I had had about six 'unforgiving minutes'. The rest had been expectancy or regret." (Stanford, 1952). Moreover, if an eagle or other large raptor is flying over the moor, the grouse may ignore the efforts of the beaters and remain hidden in the heather. Finally, having grouse fly over the Guns is no guarantee that they will be shot. Grouse are agile and can fly quickly; with a following wind the birds can easily be moving at more than 70 mph when they go over the butts.

Although there may be only eight to 12 Guns shooting at the birds during a driven grouse day, the number of people involved in the day can be more than 50. A day's driven grouse shooting requires a great deal of planning and organisation, before, during and after the day. The next section will describe the roles of people involved in the driven grouse industry.

#### References

<sup>67</sup> The term 'industry' is opposed by many people and organisations involved in driven grouse shooting as they think it has connotations of exploitation and environmental degradation.

Although there may be only eight to 12 Guns shooting at the birds during a driven grouse day, the number of people involved in the day can be more than 50.

### 4.3 Who Is Involved In The Driven Grouse 'Industry'

*"The Twelfth is not all about the keepers, owners and their guests; it is a time when the local community, from all walks of life, becomes a part of the big event, and continues to work for all the subsequent days of the season. The Twelfth will usually see the most people out, sometimes close to a hundred if one includes beaters, loaders, flankers, pickers-up, house and cooking staff as well as others in support."* (Millington-Drake, 2015)

Setting up and running a day's driven grouse shooting is a complex operation, involving a 'cast list' that can be more than one hundred people on occasion, carrying out a surprisingly wide variety of different roles. Indeed, although the term 'industry' is sometimes controversial, both among those that shoot<sup>67</sup> and their opponents, it is an appropriate word to use to describe the highly developed, integrated network of roles and trades that have evolved to enable the occasional harvest of a wild bird.

The Guns, those people who want to shoot grouse, have a relatively simple part to play in the industry: they help fund it by paying to shoot. Other players in the cast list have roles that are understood by people who have no knowledge of grouse shooting eg. hotel and inn keepers, vehicle hire businesses, caterers and restaurants. However, other roles that are critical to the success of the industry are not commonly understood.

Table 4.2 lists the roles played by people involved in the driven grouse industry and provides a brief description of how they fit into the integrated network.

Table 4.2 The Roles Of People Involved In The Driven Grouse Industry

Role	Description
<b>Landowners</b>	Landowners are, obviously, those who own the land where driven grouse shooting takes place. Ownership may result from inheritance but is more frequently as a result of purchase. Some owners manage their land themselves, but owners with large holdings often employ Estate Managers. Owners may organise driven grouse shooting themselves, either directly or through Estate Managers, employing Gamekeepers and other staff, or rent out the rights to shooting to Sporting Tenants
<b>October</b>	Sporting Tenants rent moorland on which driven grouse shooting can take place. Leases are typically for several years. Sporting Tenants will employ Gamekeepers and other staff involved in the organisation of driven grouse shooting.
<b>Estate Managers and Factors</b>	Estate Managers, or Factors in Scotland, are engaged by some landowners to manage their estates. Their role can cover land surveying, tenant and community relations, and staff management. On a moorland estate the role typically includes managing conservation and wildlife, access and visitor/tourism management, recreation, woodland management, and shoot management.
<b>Sporting Agents</b>	Some estates market and sell their own shooting. However, many estates work with Sporting Agents who match people wishing to shoot driven grouse with availability. Agents will work with several estates. Some Guns simply want a day's shooting, while others will require a more bespoke service including the provision of transport, ammunition cartridges, loaders etc.
<b>Gamekeepers</b>	Gamekeepers on a grouse moor have the role of managing the habitat and wildlife, which can include vermin control, to provide a harvestable surplus of grouse for shooting. Grouse gamekeepers often also manage or help manage a property's pheasant/partridge shooting and deer stalking. Gamekeepers can be full- or part-time. The head-keeper is typically a full-time role with Under-Keepers (more junior staff) reporting to them. On some estates the head keeper is also the estate's sporting manager, selling and organising the shoot days.
<b>Beaters and Flankers</b>	Beaters walk (in teams organised by gamekeepers) across the moors to drive the grouse towards the line of butts behind which the Guns are waiting. They are normally supported by Flankers who have the role of using flags to try and ensure the grouse fly over the butts, rather than out from the side of the beating line. Flankers are normally more experienced in management of shoots than beaters. The numbers of beaters and flankers involved in a day's driven grouse shooting varies, but typically involves at least 20 to 30 people.
<b>Pickers-up</b>	Pickers-up are people with trained dogs (normally spaniels or retrievers) who wait behind the line of butts and collect the fallen birds when a drive is completed. Birds that have been shot can fall up to half-a-mile from the butts on very windy days and dogs are needed to find them as they are normally hidden in the heather (against which the birds are, of course, well camouflaged) or between rocks. A driven grouse shoot can involve five or more pickers-up, with 20 or more dogs between them.
<b>Drivers</b>	To move the Guns, beaters, flankers, pickers-up and keepers between drives, transport is often required <sup>68</sup> . In many cases these vehicles have dedicated drivers.
<b>Caterers</b>	Driven grouse shoots nearly always provide food and drink for all involved on the day, and meals of various size and quality are served, depending on the shoot. Typically, either local caterers are engaged or cooks are employed by estates for the season.
<b>Farmers</b>	Many large estates have long-established tenant farmers. Many farms have both lowland (typically in valleys) and moorland. Gamekeepers have to liaise with farmers as both are involved in managing the moorland environment.
<b>Graziers and Commoners</b>	Graziers and Commoners have rights, often long-established, to graze sheep on areas of moorland. Again, Landowners, Estate Managers, and Gamekeepers must liaise with graziers and commoners as they are involved in managing the moorland environment.
<b>Contractors</b>	Contractors can be divided into those providing 'domestic' services to an estate, such as carpenters, builders, plumbers, etc, and those providing landscape management services such as peatland restoration, bracken clearance, track maintenance, heather management, water-course management (including grip <sup>69</sup> blocking), etc. Landscape contractors typically work on grouse moors from January to July.
<b>Guns</b>	The people who shoot the grouse. Guns are either invited by people hosting the shoot or pay for the experience. Many Guns travel hundreds of miles to shoot driven grouse, with a several of them coming from outside the UK. Given the distances they travel to shoot, Guns normally spend at least one night in hotels, etc, local to the shoot. Some Guns spend several days in the local area and bring their partners with them.
<b>Loaders</b>	On some moors Guns only use one shotgun to shoot with (each shotgun holding two ammunition cartridges and therefore two shots). However, on many moors Guns use two shotguns and have people in the butt with them so they can quickly swap guns and fire while a covey of grouse fly over or near the line of butts. Loaders may live locally to the moor, but some Guns bring experienced Loaders with them. These visiting Loaders require accommodation, etc, and their costs are usually covered by the Guns.

#### References

<sup>68</sup> Of course, people used to have to walk between drives, but vehicles become a feature of driven grouse shooting from the 1940s onwards.

<sup>69</sup> A 'grip' is a ditch dug to drain wet areas of moorland.

Role	Description
<b>Loaders</b>	Grouse are mainly found in the more remote areas of the British Isles with low populations. Therefore, most people who wish to shoot grouse, and can afford to, will have to travel for their sport and will require accommodation in hotels or inns. For hoteliers and innkeepers, Guns and their guests represent high-value tourism between August and December. Many hotels and inns near grouse moors gain hundreds of bed-nights, etc, during the grouse season.
<b>Hotels/Inns etc.</b>	Guns buy their shotguns, ammunition cartridges, and specialist clothing from licensed gun dealers, most of which also sell a range of clothing specifically designed for game shooting.
<b>Vehicle hire</b>	Guns who live in the UK typically drive their own vehicles to shoots. However, Guns from overseas often hire vehicles to use while they are in the UK. Typically, the vehicles hired are expensive SUVs, such as Range Rovers. Some international Guns also hire drivers. <sup>70</sup>
<b>Game Dealers</b>	The dead grouse is a valuable commodity. In nearly all cases, birds are collected from the moor (on the day they were shot) by Game Dealers. These Dealers will collect birds from many moors in their local area, process them and then transport them to UK or international markets either using their own transport or couriers. Unless a grouse has been badly damaged when it was shot, or was not found by the Pickers-up, it will go into the human food chain.
<b>Restaurants</b>	Grouse shot in the UK is an attractive menu item for high-value restaurants in the UK and abroad.

It should be noted that Table 4.2 does not include insurance companies and other providers of business services. Insurance companies are involved in the driven grouse industry, but as indirect suppliers rather than players with a specialist role in the integrated network.

The interplay between some of the parties involved in the grouse industry can be complicated and often depends more on personal relationships rather than commercial transactions. Sheep have grazed on moorlands for hundreds of years, and cattle are becoming more common on some moors. Certain hardy sheep breeds have been adapted to live on the meagre fare many moors offer (although they are often crossed with other breeds of sheep and fattened on lower-lying pastures where they typically spend the winter). As the Moorland Association (MA)<sup>71</sup> notes: "It is important that grouse moor managers work closely with farmers, commoners and graziers to strike the right balance on this sensitive land. Grouse and sheep each need the best nutrition they can get from upland heath and blanket bog – without damage or domination." The ownership of land and the rights upon it are often complicated in the moorlands, especially on common land. "Compromises have to be made to meet the demands for clean water, flood risk and wildfire mitigation and carbon capture. They have to be reconciled with maintaining a beautiful landscape for all to enjoy, as well as being hard working living landscapes for people and wildlife. Close co-operation is crucial when carefully controlled heather burning and/or mowing takes place. This encourages diversity across the moors, helps spread out grazing sheep and boosts important fresh, nutritional growth of grasses and shrubs."<sup>72</sup> Driven grouse shooting often depends on people displaying high-levels of collaboration.

The ways in which the integrated network of parties in the driven grouse industry work together, and the

economic, environmental, and social impacts that result, are explored in the following sections of this report.

#### 4.4 The Size Of The Industry

This section examines the published evidence for the size of the driven grouse industry. It will review the evidence for the number of moors on which driven grouse shooting is practised, and how large these moors are, the numbers of people who are employed by the industry, and its financial value. The chapter will give an idea of the scale of the industry, but also highlight some of the issues that should be accepted by anybody discussing the sustainability of driven grouse shooting.

Many aspects of driven grouse shooting, like the red grouse itself, are elusive. It is not even clear how many moors are deemed to be grouse moors, those where shooting of grouse takes place. Moreover, some moors only have walked-up shooting, whereas others will host both driven and walked-up shooting. To complicate matters further, driven shooting cannot take place every year on many moors due to fluctuating numbers of grouse.

The GMMRG (Scotland) observed in its report of December 2019 that:

"A major challenge in undertaking this review was the lack of definition of a 'grouse moor' and the absence of official information on the number of estates on which grouse shooting occurs. We estimate that the current number of grouse shooting estates in Scotland is around 120 but note that this includes great diversity in both the size and level of investment in individual grouse shooting businesses." (GMMRG, 2019, p.3)

The MA estimates that grouse shooting takes place on 190<sup>73</sup> estates in England and Wales. Therefore,

there might be about 310 grouse moors in the UK on which either walked-up or driven grouse shooting is practised, or in some cases both forms of shooting (The Moorland Association). The Countryside Alliance (CA) believes there are 149 grouse moors in England. On the other hand, Animal Aid (a group opposed to shooting) states: "There are about 500 grouse moors in the United Kingdom covering 1.5 million hectares. These moors range from Wales and Derbyshire in the South to the Highlands of Scotland in the North. An average size moor is 2,000 hectares, while the smallest is 200 hectares and the largest, 10,000." (Animal Aid, 2016). A moor of 200 hectares is unlikely to contain sufficient grouse to make driven grouse shooting possible. Therefore, if the number of 500 grouse moors is taken at face value it must include any moorland where walked-up shooting might take place. However, the group Who Owns England claims to have mapped nearly all the 'around 100' grouse moor estates in England (Who Owns England, 2018), a figure which seems low compared with the MA's estimate of 190 estates in England and Wales, and the CA's figure of 149 grouse moors in England alone.

Unsurprisingly, given the different claims that exist for the number of grouse moors, the area covered by land on which driven grouse shooting is practised is also not certain. Who Owns England claims that the around 100 grouse estates in England cover an area of around 222,577 hectares (550,000 acres). This figure seems rather small when compared with data from other sources. The MA, which represents owners of moors in England and Wales states that its members are responsible for over a million acres of moorland (404,686 hectares), over 860,000 acres (348,030 hectares) of which are upland heather. Since 1999, the Game Conservancy Trust (latterly the Game and Wildlife Conservation Trust, GWCT), in collaboration with the National Gamekeepers' Organisation (NGO), the Moorland Gamekeepers' Association (MGA) and the Scottish Gamekeepers' Association (SGA), has collated a survey of their active gamekeeper members. The survey now covers 19,780 square kilometres (1,982,960 hectares or 4.9 million acres). This area includes 270 estates covering over 11,750 square kilometres<sup>74</sup> of the British uplands which the GWCT divided into groups based on the main quarry species: red grouse only; red grouse and red deer; and red deer only (GWCT, 2021a).

The location of these estates within the British uplands determines, through habitat and species availability, the main quarry species. Estates managed solely for red grouse were mainly in southern Scotland, northern England, and Wales. Estates managing both red grouse and red deer were mainly in north-eastern Scotland, with those managed solely for red deer in north-western Scotland. Location was shown to lead to differences in the estates' size and their habitat. Red grouse estates in England

were smaller than in Scotland by an average of 300 hectares. In Scotland, grouse moors were roughly half the size (3,300 hectares) of the other two types of estate (7,000 hectares).

The GWCT looked at whether grouse moors coincided with SSSIs.

It noted that: "On average, SSSIs make up 16% of the upland area of Britain, and the shooting estates in our survey covered 15%. Shooting estates accounted for 29% of this upland SSSI area compared with an expected 16% if it were randomly distributed."<sup>75</sup> These figures raise the interesting question of whether shooting estates gain SSSI status because of (rather than despite) the management regimes associated with shooting? It is not a simple question to answer. Interestingly, the GWCT concluded that: "Management for red grouse led to significantly improved chances of having breeding waders and black grouse on the moor. There is little doubt that moorland management has benefits that extend far beyond red grouse."<sup>76</sup> It is also worth noting at this stage that many grouse moors are in areas that have been designated as National Parks. The IUCN gives these National Parks a Category 5 designation<sup>77</sup>, classifying them as 'cultural landscapes', and park authorities carry a statutory obligation for sustainable economic development.

Those bodies that conduct surveys and then estimate both the numbers of people employed in driven grouse shooting and the economic value of the industry are, unsurprisingly, organisations that are pro-shooting. As might be expected the conclusions published by the different bodies vary<sup>78</sup>. The situation is complicated by a number of factors; for example, many full-time employees of grouse estates do not spend all their time on activities associated with driven grouse shooting, and driven grouse shooting employs large numbers of part-time workers. Answering what might be a simple question for a manufacturing company such as 'how many full-time equivalent (FTE) staff are employed by your business', is more complicated for many estate owners.



#### References

<sup>70</sup> The author of this report has met a Gun from Greece who keeps a Range Rover, shotguns and shooting equipment in the UK, in the care of an employee (a UK national). When this very wealthy person comes to the UK to go shooting, he is met at the airport by his employee who takes him to the relevant moor, and acts as his loader, driver, etc. This employee has no other duties.

<sup>71</sup> <https://www.moorlandassociation.org/farming-2/>

<sup>72</sup> Ibid

<sup>73</sup> Not all these estates are members of the Moorland Association, but 175 of them are.

#### References

<sup>74</sup> 11,750 square kilometres is 1,175,000 hectares.

<sup>75</sup> <https://www.gwct.org.uk/research/species/birds/red-grouse/grouse-moor-survey/>

<sup>76</sup> Ibid.

<sup>77</sup> A protected area where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value; and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values. Source: <https://www.eea.europa.eu/themes/biodiversity/protected-areas/facts-and-figures/IUCN-management-categories>

<sup>78</sup> It is not known what questions the various organisations asked, but it is assumed that they were not identical so different results are not unexpected.

The website of the British Association for Shooting and Conservation (BASC) claims that grouse shooting in England, Scotland and Wales supports the equivalent of over 2,500 full-time jobs and is worth in excess of £100 million to the economy annually (BASC, 2021). These figures presumably include data for walked-up grouse shooting. However, the MA claims that: “In England grouse moor management creates 42,500 work days a year and is responsible for over 1,500 full-time posts. Of these, 700 are directly involved in grouse moor management, with a further 820 jobs in related services and industries. Gamekeeper staff are employed all year round, irrespective of the season, and additional workers brought in on a casual basis, up to 50 people a day on the bigger moors. Research commissioned by the MA has shown that associated spin-offs from grouse shooting in the North of England are worth in excess of £15 million a year, benefitting a raft of rural businesses. These include game dealers, the hospitality industry, equipment suppliers and transport operators, many of them based in some of the most remote areas. Each year, owners and sporting tenants of our 175 member grouse moors in England and Wales spend a combined total of £52.5 million on land management, 90 percent of which is privately invested.” The Association’s website also claims that that businesses associated with grouse shooting in England and Wales benefit by an additional £15.2 million a year (The Moorland Association).<sup>79</sup>

The situation in Scotland is equally uncertain. In 2010 The Fraser of Allander Institute published its report, ‘An Economic Study of Grouse Moors’. The report includes data from 2005-2009 and is drawn from a survey questionnaire sent to a sample of 304 upland estates in late 2009 and early 2010. The report concluded that grouse shooting on those estates that responded to the survey supported a total of 324 jobs, £4.4 million worth of wages and contributed £7.0 million to Scottish GDP. It was projected that,

based on these figures, grouse shooting on 140 “core” grouse estates in Scotland is likely to support a total of 493 jobs, £6.7 million worth of wages and contributes £10.7 million to GDP. It was further estimated that if grouse shooting on responding estates reflected grouse activity on these 304 estates, then grouse shooting would support in Scotland a total of 1,072 jobs, £14.5 million worth of wages and contribute £23.3 million to GDP. Of course, not only is this data over a decade old, but it represents survey findings, a projection, and an estimation. Moreover, as the report observed, in 2009 grouse shooting took place on just 81.5% of surveyed estates, and the number of grouse shot had declined by nearly 50% compared with 2001. As noted above, grouse numbers fluctuate (Fraser of Allander Institute, 2010).

Hard facts about driven grouse shooting are elusive. Organisations that are pro- and anti-shooting are unable to say for certain how many moors host driven grouse shooting, how many acres are covered by these moors, how many people are employed by the activity, and what the financial value of the activity is. The key point to take away is that driven grouse shooting is not a constant, consistent activity. However, the data that does exist indicates that grouse moor management, some of which takes place in a ‘cultural landscape’, results in significant employment, both full-time and casual, and is positively associated with increased biodiversity as recognised by SSSI status.

## 4.5 The Legislative And Regulatory Landscape For Driven Grouse Shooting

People who own or lease moorland, and want to manage it, are subject to a significant amount of legislation and regulation. If they employ other people to work on their behalf, then they are subject to additional laws and regulations. This section of the report will review the main legislation and

regulation<sup>80</sup> that applies to landowners, tenants, estate managers and gamekeepers that work on moorland where driven grouse shooting takes place. This report groups legislation and regulation under three sub-headings: Licensing: Stewardship schemes; and People, Wild Animals<sup>81</sup> and Land management. The report looks at the ways in which the shooting sector is developing and implementing self-regulation. The report does not set out to list all legislation and regulation that applies to integrated moorland management, rather it aims to provide an understanding of the complexity of the laws, licences and regulations that landowners, their employees and their contractors have to contend with.

Along with habitat management and enhancement and activities designed to reduce disease, predator control is a key part of the job of a gamekeeper. Predator control has been subject to legislation for decades, with the Wildlife & Countryside Act 1981 (including its amendments) currently being the main legislation specifying which birds and animals can be controlled<sup>82</sup>. Although the principles are the same, there are important differences to Scottish and English/Welsh versions of the Act, and in the use of the Act in regulation.

One of the provisions of the Act allows the country conservation agencies to license the control of avian predators on moorland. In England for example: the Conservation licence GL34/GL40<sup>83</sup>; the Public health and safety licence GL35/GL42<sup>84</sup>; and the Serious damage licence GL36/GL42<sup>85</sup>. The General Licences (GLs: GL40, GL41 and GL42) came into effect throughout England on 1st January 2022 and are valid until 31st December 2023. They include significant changes to the previous GLs and are designed to be more legally robust and thus less likely to be the subject of legal challenges. The GLs are issued by the Secretary of State for the Environment.

Gamekeepers have to understand and comply with GLs and, in some cases, apply for specific licences: for example, GL40 only applies to control of crows and magpies in relation to the conservation of red- and amber-listed birds of conservation concern. Thus, crows and magpies can be controlled to protect hen harriers and curlews (red-listed) and red grouse (amber-listed) but not wild pheasants<sup>86</sup>. If a moorland keeper has wild pheasants on their land, they can only be protected from crows and magpies if an individual licence is applied for and granted. Rooks and jackdaws are not covered by the 2021 GL40, although both species do predate the eggs of red-listed birds<sup>87</sup>. The licences also contain some apparently odd clauses, for example jackdaws can be controlled under GL42 to prevent the spread of animal disease, but not under GL41 to prevent the spread of human disease. The new licences can be used in and around protected sites (SPAs and SACs)

although some additional conditions apply. Both the NGO<sup>88</sup>, the National Farmers Union have welcomed the new GLs, although the NGO has expressed some concerns about the possible delays in granting individual licences.

It should be noted that herring gulls and lesser black-backed gulls have been removed from GLs<sup>90</sup> although grouse moor gamekeepers and the MA claim they predate the nests and chicks of red- and amber-listed birds<sup>91</sup> and Grant et al (1999) found that lesser black-backed gulls predated curlew nests. Owing to their poor conservation status, these species were not included in the Department for Environment, Food and Rural Affairs’ (Defra’s) GLs. The breeding population of herring gull has fallen by 60% in recent decades, with lesser black-backed gulls declining by an estimated 48%. Licences for the control of these gulls remains with Natural England which has issued a class licence to permit any wild bird control necessary to preserve air safety which covers herring gulls and lesser black-backed gulls. Apart from air safety, Natural England licenses gull control through individual licences, which are prioritised. Natural England considers the strength of need in each licence application individually but generally protecting human life and health will be the overriding priority<sup>92</sup>. Any control undertaken under other purposes such as preventing serious damage and conserving wild birds and flora or fauna has to be targeted. In rural areas, such as moorland, Natural England has established a sustainable number of birds that could be killed or taken - equivalent to no more than 5% of the natural mortality total of each species - without harming their conservation status. By contrast, control levels of nests, eggs and chicks is not be limited in urban areas, where populations are thought to have better breeding success rates.

The licensing regime that is relevant to integrated moorland management will continue to evolve<sup>93</sup>.

In the UK nations, environmental schemes provide public financial incentives for farmers, woodland owners, foresters and land managers to look after and improve the environment<sup>94</sup>. The schemes (Agri Environment and Climate Change scheme in Scotland, Glastir in Wales and Countryside Stewardship/Environmental Land Management (ELM) scheme in England) vary considerably between the nations.

In England the Countryside Stewardship (CS) scheme aims to look after and improve the environment by:

- conserving and restoring wildlife habitats
- flood risk management
- woodland creation and management
- reducing widespread water pollution from agriculture

### References

<sup>79</sup> <https://www.moorlandassociation.org/what-we-do/>

<sup>80</sup> The regulation and licensing relevant to alternative uses of moorland such as forestry, alternative energy production, rewilding, tourism, etc, are not included, even though many landowners who practise integrated moorland management are involved in these activities and thus subject to the relevant legislation and regulation.

### References

<sup>81</sup> Legislation and regulation relevant to domesticated animals found on the moor, such as sheep and cattle, or to the laws relating to working dogs are not included in this report.

<sup>82</sup> The Act is covered further in section 6.2.3

<sup>83</sup> <https://www.gov.uk/government/publications/wild-birds-licence-to-kill-or-take-for-conservation-purposes-gl34>

<sup>84</sup> <https://www.gov.uk/government/publications/wild-birds-licence-to-kill-or-take-for-public-health-or-safety-gl35>

<sup>85</sup> <https://www.gov.uk/government/publications/wild-birds-licence-to-kill-or-take-to-prevent-serious-damage-gl36>

<sup>86</sup> Some moorland does have wild pheasant present, especially on the lowland/upland boundary zone.

<sup>87</sup> S Denny has watched lapwing nests being predated by rooks, as well as crows, on a farm in Bedfordshire each year since 2011. Lapwings commonly nest on moorland.

<sup>88</sup> <https://www.nationalgamekeepers.org.uk/articles/new-general-licences-for-england-2021>

<sup>89</sup> <https://www.fwi.co.uk/news/2021-general-licences-issued-for-shooting-pest-bird-species>

<sup>90</sup> <https://www.gov.uk/government/news/changes-to-licensing-of-the-lethal-control-of-herring-gull-and-lesser-black-backed-gull>

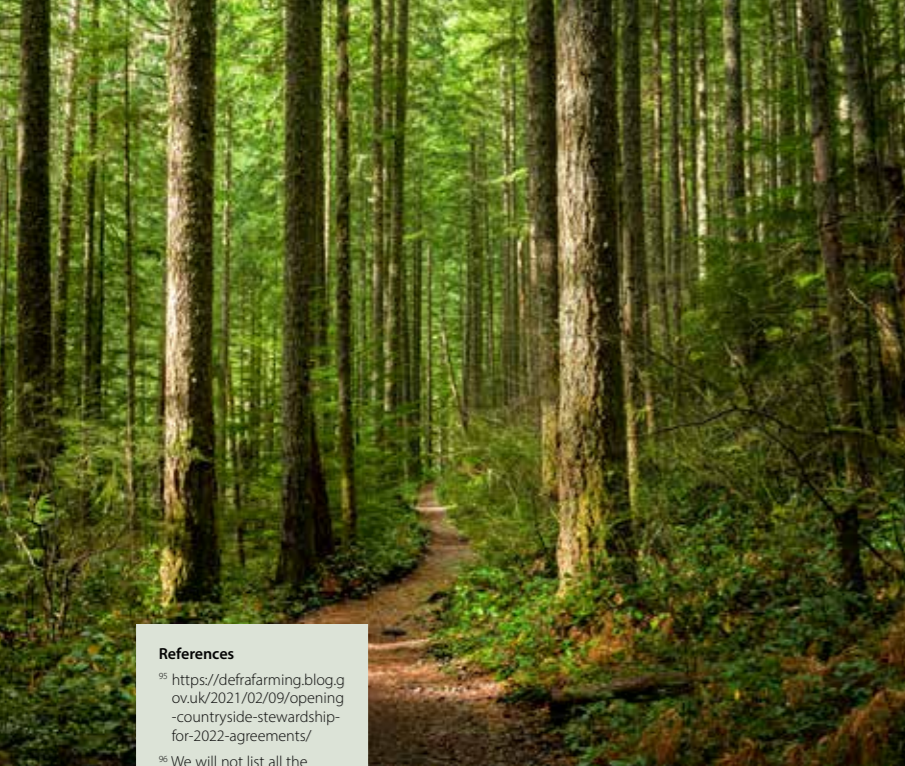
<sup>91</sup> <https://www.moorlandassociation.org/2020/01/moorland-association-respond-to-new-gull-licences/>

<sup>92</sup> See, <https://naturalengland.blog.gov.uk/2020/04/21/update-on-licences-for-the-control-of-herring-gull-and-lesser-black-backed-gull/>

<sup>93</sup> For example, NatureScot is able to withdraw General Licences from areas of Scotland where there is a civil burden of proof that raptors are being illegally killed. It would be surprising if this authority was not granted to English and Welsh authorities.

<sup>94</sup> For an overview of the scheme as it operated in 2020 see, [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/996741/Countryside\\_Stewardship\\_2020\\_Overview\\_leaflet\\_online.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/996741/Countryside_Stewardship_2020_Overview_leaflet_online.pdf)





#### References

- <sup>95</sup> <https://defrafarming.blog.gov.uk/2021/02/09/opening-country-side-stewardship-for-2022-agreements/>
- <sup>96</sup> We will not list all the relevant safety regulations covering machines and substances. However, as an example the regulations for the use of chainsaws mean that by law, chainsaw operators must have received adequate training relevant to the type of work they undertake. They are also required to wear appropriate chainsaw protective clothing whenever they use a chainsaw, see <https://www.hse.gov.uk/treework/safety-topics/chainsaw-operator.htm>
- <sup>97</sup> Substances hazardous to health are covered in detail by the control of substances hazardous to health regulations 2002 (COSHH)
- <sup>98</sup> <https://www.greensofhadlington.co.uk/about-us/>
- <sup>99</sup> [https://en.wikipedia.org/wiki/Birds\\_Directive](https://en.wikipedia.org/wiki/Birds_Directive)
- <sup>100</sup> [https://en.wikipedia.org/wiki/National\\_Parks\\_and\\_Access\\_to\\_the\\_Countryside\\_Act\\_1949](https://en.wikipedia.org/wiki/National_Parks_and_Access_to_the_Countryside_Act_1949)
- <sup>101</sup> <https://www.legislation.gov.uk/ukdsi/2019/9780111174722/contents>
- <sup>102</sup> <https://www.moorlandassociation.org/publications/>
- <sup>103</sup> <https://www.nationalgamekeepers.org.uk/training>
- <sup>104</sup> The Heather Trust <https://www.heathertrust.co.uk/heather-management> contains details of relevant moorland management regulations, including the <https://muirburncode.org.uk/>
- <sup>105</sup> <https://www.gov.uk/government/news/englands-national-rainforests-to-be-protected-by-new-rules>
- <sup>106</sup> The England Peat Action Plan claims, on p.22, that: "While there continues to be scientific debate over aspects of the environmental impact of managed burning, there is a large and increasing body of literature that provides evidence that overall managed burning is damaging to peatland. This claim is questioned."

- keeping the character of the countryside
- preserving historical features in the landscape
- encouraging educational access

The scheme has had five main elements: Mid-Tier, Wildlife Offers, Higher Tier, Capital grants, and Woodland support grants. It is open to eligible landowners and managers, including those operating in the English uplands. Landowners and their agents can apply for CS grants (taxpayer funded subsidies) through a competitive process managed by the Rural Payments Agency where applications are scored against local priority targets to maximise environmental benefits. As noted in section 5.2 of this report, many moorland landowners have been successful in applying for CS grants, both as individual units and as part of consortia of farmers and graziers, etc. Peat restoration and other measures aimed at improving biodiversity and natural capital that are undertaken on grouse moors are often part-funded by CS grants, again as noted in section 5.1.

In February 2021, the CS scheme opened for 2022 agreements<sup>95</sup>. The 2022 scheme was designed to be simpler than previous iterations of the scheme and provide more options for landowners. The changes that have been made to the scheme include:

- new options to help improve air quality, water quality and reduce ammonia emissions
- improving the capital grant offer, making 67 options available which can sit alongside a wildlife offer
- creating new wood pasture options in the uplands, at payment rates suitable for upland application, providing a mosaic habitat of grassland, scrub and trees
- making the capital offer available to Higher Level Stewardship (HLS) agreement holders, where the options are compatible

- improving woodland options, including bringing bracken control and stone wall options into woodland management and combining Woodland Creation and Woodland Maintenance grants
- increasing the number of capital items that farmers can apply for using the Rural Payments service, covering water capital, hedgerows and boundaries and air quality
- expanding eligibility criteria for the upland option UP2 (management of rough grazing for birds), enabling more land managers to access this option and further improve the upland offer.

Around the end of 2024 the CS scheme will be replaced with the new ELM scheme. As 1st March 2023 full details of the ELM had not been announced.

Like all other employers, upland landowners are subject to the Health & Safety at Work Act 1974, the primary piece of legislation covering occupational health and safety in Great Britain. The Act sets out the general duties which employers have towards employees and members of the public; employees have to themselves and to each other; and certain self-employed have towards themselves and others.

One of the key requirements for any employer is to have a Health & Safety Policy (H&SP), and employers and the self-employed must carry out risk assessments for effects on staff, and other people who might be affected. The most common areas of operation that require risk assessments are:

- Safety<sup>96</sup>
- Substances Hazardous to Health<sup>97</sup>
- Fire
- Personal Protective Equipment (PPE)
- Legionella
- Asbestos

If a landowner or tenant has five or more employees, the H&SP, risk assessments and subsequent arrangements for their implementation and management must be in a written form and must be provided to employees. Employers must also provide relevant health and safety information to persons other than their employees who might be affected by their operations, such as contractors. To assist them to comply with health and safety legislation and regulations, many landowners engage specialist consultancies, for example Green's of Haddington<sup>98</sup>.

In Scotland, Vicarious Liability is a major person management issue which imposes additional requirements on employers.

The largest piece of legislation relevant to the ways in which integrated moorland management impacts on wildlife is the Wildlife & Countryside Act 1981, including amendments to the Act and special

versions for Scotland and England & Wales. This Act was implemented to comply with European Council Directive 2009/147/EC on the conservation of wild birds<sup>99</sup> and amended to adopt the EU Habitats Directive. The Act gives protection to native species (especially those at threat), controls the release of non-native species, enhances the protection of SSSIs and builds upon the Rights of Way rules in the National Parks and Access to the Countryside Act 1949<sup>100</sup>. The Act is split into four parts covering 74 sections; it also includes 17 schedules. The legislation has strength; many amendments have been made to it, and it has acted as a foundation for later legislation to build upon. The compulsory five-year review of schedules 5 and 8 make it dynamic in terms of the species it protects. The Act guides the development of numerous regulations, such as The Humane Trapping Standards Regulations 2019<sup>101</sup>. Several organisations publish guidance and instructions and run training courses to ensure their members can understand and comply with the Act and its associated regulations, including BASC (<https://basc.org.uk/advice/>), GWCT (<https://www.gwct.org.uk/advisory/>), the MA<sup>102</sup> and the NGO<sup>103</sup>.

There are many other pieces of wildlife management legislation relevant to moorland, often UK country specific, which regulate almost every part of the moorland wildlife management portfolio among them the use spring traps, snares, humane cable restraints, middens, deer control and hare conservation.

A wealth of legislation and regulation relates to the management of moorland and the livestock that are an integral part of it, with recent developments being intended to enhance environmental natural capital and increase ecosystem services.

Perhaps the most high-profile regulations relate to controlled burning, with each of the countries of the UK, and the Isle of Man, having its own code<sup>104</sup>. Not all moorland is on deep peat. However, those that do have deep peat will have noted that in January 2021 the Westminster Government announced plans to bring forward legislation to prevent the burning of heather and other vegetation on protected blanket bog habitats in England<sup>105</sup>. The new regulations will prevent the burning of any specified vegetation on areas of deep peat (over 40cm depth) on a SSSI that is also a Special Area of Conservation or a Special Protection Area, unless a licence has been granted or the land is steep or rocky. It is interesting to note that the Westminster Government announcement claimed that there is a consensus that burning of vegetation on blanket bog is damaging to peatland formation and habitat condition as it makes it more difficult or impossible to restore these habitats to their natural state and to restore their hydrology.<sup>106</sup> This claim is disputed by some scientists, such as Heinemeyer & Ashby (2021) and is explored further

## The scheme has had five main elements: Mid-Tier, Wildlife Offers, Higher Tier, Capital grants, and Woodland support grants.

in section 5.3 of the report. The government did recognise that if moorland is unmanaged, there is a risk of wildfire and that this risk has increased due to climate change. Therefore, the government said that it intends to work with land owners and managers to develop local wildfire control plans<sup>107</sup>.

Interest groups such as the MA and Scotland's Moorland Forum have produced guides for landowners and contractors on best practice for managing blanket bog<sup>108</sup> and the burning and cutting of heather and moorland vegetation, an important option for moorland maintenance<sup>109</sup>. British Moorlands Ltd also provides advice on cutting compared with burning for grouse moor managers<sup>110</sup>.

The chemicals used to help control bracken are subject to specific regulation<sup>111</sup>, especially Asulam. An emergency authorisation to use Asulam for the control of bracken has been required since 2012, and it has been applied for annually by the Bracken Control Group<sup>112</sup>. It is worth noting the conditions that applied to the Emergency Authorisation to gain an understanding of the detail of the regulations that moorland owners and managers have to comply with. The conditions of use for Asulam include:

- Aerial application is approved subject to a 90-metre wide no-spray buffer zone against surface water bodies.
- Ground-based application is authorised but restricted to conservation areas only, and the use in these areas must be under the direction of the relevant conservation body. See the full details in the Authorisation document.
- Livestock must be removed from areas to be treated and must not be allowed to return until at least one month after treatment.

Livestock management is itself regulated to prevent over-grazing on designated sites, the pollution of watercourses by tick-killing acaricides or strongyle worm-killing wormers.

It is clear that owners and managers of moors where driven grouse shooting is carried out have a significant amount of legislation to be aware of, and regulation to comply with.

The great majority of those that do shoot game are members of organisations such as the BASC, CA, or GWCT. These organisations, often working together with such initiatives as Aim to Sustain<sup>113</sup> and the British Game Assurance (BGA)<sup>114</sup> have developed 'best practice' standards and are leading on the self-regulation of game shooting.

#### References

- <sup>107</sup> The Uplands Management Group was commissioned by Defra to develop guidance on preventing and managing wildfires which sets out the requirements for a risk assessment approach to planning and preparing for wildfire incidents and includes a wildfire management plan template and associated guidance. These recommendations include templates that are intended to help landowners and land managers develop a wildfire risk assessment and wildfire plans that will establish good upland management practices to protect people, businesses, land and property, sensitive habitats and the provision of ecosystem (natural) services. The target areas covered within the Uplands Management Group's report are upland habitats, including heathland, blanket bog, grass moorland, cotton grass moorland, rough grazing, bracken and scrub, including gorse, broom, juniper and pioneer trees. Defra has pointed out that there is current emphasis on the restoration of blanket bog but that it is important that it is recognised that wildfire risk needs to be addressed across the full range of upland habitats in different country's situations.
- <sup>108</sup> See, Blanket Bog Land Management Guidance <https://www.moorlandassociation.org/wp-content/uploads/2015/03/Blanket-Bog-Land-Mgmt-Guidance-FAQs.pdf>
- <sup>109</sup> See, <http://moorlandmanagement.org/guidance-2/>
- <sup>110</sup> See, <https://www.britishmoorlands.com/grouse-management/cutting-alternative/>
- <sup>111</sup> See, <https://www.brackencontrol.co.uk/>
- <sup>112</sup> As at 20th June 2023, authorisation has been issued for the use of Asulam during the 2023 season, starting on 1st July and concluding on 11th September, after which the herbicide can no longer be applied but storage and stocks can continue. All stocks of Asulam must be disposed of by 27th October 2023.
- <sup>113</sup> <https://aimtosustain.org.uk/>
- <sup>114</sup> <https://www.britishgameassurance.co.uk/>

The 'Principles of Sustainable Gamebird Management' developed by the GWCT<sup>115</sup> are designed to complement the Government's 25-year environmental plan. The principles are based on agreed UK industry codes of practice, such as the Code of Good Shooting Practice and British Game Assurance standards, the UK legislative framework, (eg. the Wildlife & Countryside Act, 1981, the Animal Welfare Act 2006 and the Wildlife & Natural Environment Act 2011) and align with international guidelines on sustainable use of natural resources, including the Bern Convention and the IUCN.

In October 2020, the leading shooting organisations, including the BASC, CA, the MA, the NGO, BGA, the Country Land & Business Association (CLA) and the Game Farmers' Association (GFA), urged the Government to support these Principles.<sup>116</sup> The Principles, if fully implemented, have potentially interesting and positive implications for biodiversity.

#### 4.6 The Situation In Scotland

In 2014 Scottish Natural Heritage (SNH) Scientific Advisory Committee commissioned a sub-group to review sustainable moorland management in Scotland (Werritty et al, 2015). The grouse moor sector, SNH (now NatureScot) and Scottish Government made some (albeit slow) progress addressing the recommendations of this report. However, by 2017 the perception in the Scottish Government was that there remained a significant problem with illegal raptor killing and with other aspects of moorland management. This perception seems to have been influenced by two factors: research reviews, based on what some commentators have suggested was historical data and, intense social media lobbying from individuals and groups opposed to driven grouse shooting.

In 2017 the Scottish Government commissioned a further review of the environmental impacts of grouse moor management practices in Scotland including illegal raptor persecution, managed heather burning (controlled burning), mountain hare culls, and the use of medicated grit. The purpose of the review was to advise on the need and benefit of licensing grouse shooting businesses in Scotland (Scottish Government, 2017a). The GMMRG included a range of members and advisers, with varied backgrounds, skills and experience (Scottish Government, 2017b).

The final report of the group, published in November 2019, recommended:

"That a licensing scheme be introduced for the shooting of grouse if, within five years from the Scottish Government publishing this report, there is no marked improvement in the ecological sustainability of grouse moor management, as evidenced by the populations of breeding Golden Eagles, Hen Harriers and Peregrines on or within the vicinity of grouse moors being in favourable condition."<sup>117</sup> (GMMRG, 2019, p.8)

The report noted that the recommendations reflected not only a review of the scientific data available, but also the opinions and values of the different members of the group and that any decision to license grouse shooting was ultimately a political decision. The Wildlife Management & Muirburn (Scotland) Bill was introduced on 21st March 2023. If the Bill passes, people will need a licence to undertake muirburn at any point in the year. There would be different requirements depending on the time of year and whether the muirburn is taking place on peatland or not.

The report's Executive Summary noted several other key recommendations which were not linked to the licensed shooting of grouse. These include working with landowners and managers to minimise any negative impacts, and ensure good practice while penalising poor practice, including additional regulation in the form of licensing for controlled burning, increased regulation of mountain hare management and a voluntary code of practice for the use of medicated grit. It was noted that mountain hare management and medicated grit use should be licensed if the regulatory changes suggested fail to be effective.

In June 2020 the Scottish Government took a political decision to protect mountain hares, something not recommended in the report and in November 2020 the Scottish government took another political decision to not follow the recommendations of the GMMRG. It announced its intention to introduce a licensing system in Scotland within the next parliamentary term noting:

"The Scottish Government agrees that a licensing scheme should be introduced. However, we believe that it should be implemented earlier than the five-year timeframe suggested by the review group... We intend to bring forward the legislation to license grouse moor management during the next parliamentary term. This will be preceded by a full public and stakeholder consultation. The legislation will be accompanied by a new Code of Practice on grouse shooting."

(Scottish Government, 2020, paras 36, 41, 42)

Since 1st March 2021, it is illegal to intentionally kill, injure or take mountain hares at any time unless a licence is obtained. As in the rest of the UK, grouse moor management and grouse shooting in Scotland is extensively regulated. Licences, regulations and codes of practice apply in a range of areas including (but not exclusively) GLs for predator control, controlled burning regulation, medicated grit controls, the operation of machinery and power tools, the use of chemicals, the operation of snares, the welfare of livestock, as well as the regulation of the use of shotguns and firearms. Estates and landowners are subject to visits from the Health and Safety Executive and commission specialist companies to help them ensure they are complying with legislation<sup>118</sup>. This allowed the GMMRG's report to suggest ways in which the oversight of grouse moor management could be improved, through utilising and adapting the current regulatory frameworks and codes of practice, as noted in section 6.3.1 above.

In Scotland, GLs to control certain predator species are issued by NatureScot (formerly Scottish Natural Heritage) who can licence, for certain specific purposes, actions that would otherwise constitute an offence against a protected species (NatureScot,

2021c). As at February 2020, the most pertinent licences relating to grouse moor management in Scotland are:

- GL01/2020 - To kill or take birds for the conservation of wild birds - 1st April to 31st December
- GL02/2020 - To kill or take certain birds for the prevention of serious damage - 1st April to 31st December
- GL04/2020 - To take red grouse using certain methods in order to administer medication or collect samples - 1st April to 31st December
- GL14/2021 - To use certain traps to kill stoats for the conservation of wild birds or for prevention of serious damage to livestock

(NatureScot, 2021b)

Specific licences may be applied for from NatureScot for many activities, for example to take ravens, deer out of season, and gulls.

From 2011 until March 2021, the killing of both mountain and brown hares was regulated through closed seasons for each species (brown hare: 1st February to 30th September and mountain hare: 1st March to 31st July). From 1st April 2021 the mountain hare open season was rescinded making it illegal to take mountain hares at any time of the year without a specific licence. Licences to cull mountain hares at any time and brown hares during the closed season may be granted by NatureScot for specific purposes, including to prevent the spread of disease, to prevent serious crop damage and for social, economic or environmental purposes. Applicants must prove why alternatives such as fencing woodland or taking brown hares in the open season would not resolve the problem prior to a licence being granted (NatureScot, 2021a).

Controlled burning (planned burning of heath, grass and whins) in Scotland is currently regulated by the Controlled Burning Code, which sets out a controlled burning best practice for land managers. The controlled burning season runs from 1st October to 15th April inclusive in Scotland at all altitudes. The standard season can be extended to 30th April at the landowner's discretion. NatureScot can also license out-of-season controlled burning where it is necessary to "conserve, restore, enhance or manage the natural environment, conduct research or protect public safety" (NatureScot, 2021c, para.6). The GMMRG noted that controlled burning has been a preferred management tool in Scotland for centuries and that the role of the code is to promote best practice and minimise the likelihood of detrimental impacts. However, the report also noted the lack of a robust system of compliance monitoring and few statutory provisions within the code, which meant the panel was unable to assess its effectiveness at the time

#### References

<sup>115</sup> See, <https://www.gwct.org.uk/principles>

<sup>116</sup> See, <https://www.nationalgamekeepers.org.uk/articles/shooting-blueprint>

<sup>117</sup> As mentioned elsewhere in this report, Santangeli & Girardello (2021) noted that raptors are poor indicators of eco-system sustainability. Their work was, of course, published after the GMMRG report.

#### References

<sup>118</sup> For example, Green's of Haddington [www.greensofhaddington.co.uk/](http://www.greensofhaddington.co.uk/)





## References

<sup>119</sup> Brood management involves taking the eggs or chicks of some hen harriers nesting on grouse moors into captivity, rearing them to fledging age, and releasing them back into suitable habitat in the wild.

<sup>120</sup> See Santangeli & Girardello (2021).

<sup>121</sup> <https://www.gov.scot/publications/wildlife-management-scotland-consultation/pages/4/#:~:text=A%20licence%20will%20be%20required,on%20payment%20of%20a%20fee.>

of the review. Licensing of controlled burning in Scotland was suggested by the GMMRG.

As in the rest of the UK, medicated grit use is controlled by the Veterinary Medicines Regulations 2013 with Guidance Note 13 on 'The Use of Cascade' and the Wildlife & Countryside Act 1981 as amended. (GMMRG, 2019). In Scotland grouse moor managers wishing to enhance the effect of medicated grit or monitor its effect can use the general licence, GL04/2021, to take red grouse using certain methods in order to administer medication or collect samples. A voluntary code of practice, as already exists, was recommended by the GMMRG.

The use of snares is regulated by the Wildlife & Countryside Act 1981, as amended by the Nature Conservation (Scotland) Act 2004, the Snares (Scotland) Order 2010, and the Wildlife & Natural Environment (Scotland) Act 2011.

Annually renewable licences are required for the use of Larsen traps, Larsen mate traps, Larsen pod traps and multi-catch crow traps use, as regulated by GLs detailed above, issued under section 16 of the Wildlife & Countryside Act, 1981. Separate licences are issued annually by NatureScot. All trap operators must be registered in advance with NatureScot to use traps under GLs. The use of Larsen traps, Larsen mates and Larsen pod traps is restricted to 'authorised persons', individuals rather than properties, who must understand and comply with their conditions. The licences only cover situations where NatureScot is satisfied that there is no other satisfactory solution in respect of the species to which they relate and the circumstances in which the licensed action may be taken. GWCT provide a best practice guide on the use of Larsen traps (GWCT, 2021d; NatureScot, 2021d).

There has been concern within the shooting community that new grouse shooting or wildlife management licensing schemes could be used vexatiously to disrupt the work of legitimate, law-abiding grouse moor management estates in a similar way that Wild Justice used the legislative review process to question the operation of GLs in England and Wales. The suspension of GLs is claimed to have caused damage and disruption to communities, businesses and wildlife, as detailed in Section 5.2.

Concerns regarding both gamekeeper abuse and harassment, along with the potential vexatious use of unfounded complaints to hinder lawful grouse moor management practices, have been expressed by the MSP Ben Macpherson, Minister for Rural Affairs and the Natural Environment and his colleague, Conservative MSP Oliver Mundell, as detailed in section 6.1 of this report. (BASC, 2021).

It is not just the introduction of new regulation that is of concern to shooting organisations such as the

BASC, but the lack of the use of current regulatory options, something reflected in recommendations 4 and 5 of the GMMRG report:

"4. That where particular species are perceived to be limiting the populations of red- and or amber-listed ground-nesting birds, including Red Grouse, greater use should be made of the Wildlife & Countryside Act 1981 s16. This existing licensing legislation allows SNH to permit under licence a range of lethal and non-lethal management options.

5. That the brood management programme for Hen Harriers in England should be monitored, and if it is deemed successful in producing an increase in the breeding numbers and distribution of Hen Harriers, then consideration should be given to introducing a similar programme in Scotland." (GMMRG, 2019)

The GWCT has raised concerns around the failure to adopt conservation programmes such as hen harrier brood management scheme in Scotland, noting that the Scottish Government "bypassed both the recommendations of the expert group it commissioned to investigate licensing, and the 20 years of trials on Langholm Moor" (GWCT, 2020c). Brood management<sup>119</sup> is part of the Hen Harrier Action Plan in England, involving partners from a range of shooting and conservation organisations (Defra, 2016), as detailed in Section 6.1 of this report. The Action Plan has resulted in an increase in breeding pairs and successful fledging of young in England, largely through brood management.

Although the GMMRG considered a number of moorland management practices, its focus on linking the illegal killing of raptors (birds of prey) to the licensing of grouse shooting was evident. This focus may be considered a very narrow view of conservation status, if national or even regionally resilient populations of raptors is the aim.<sup>120</sup> By focusing on success of raptors solely "on or within the vicinity of grouse moors" the Scottish Government would appear not to be considering all of the factors in hen harrier and other raptor success across the UK, and the parameters for a sustainable recovery discussed in Section 6.1 of this report.

A public consultation was launched by the Scottish Government in October 2022. It is "consulting on proposals relating to: introducing a licensing scheme for grouse shooting; increased regulation for muirburn (the burning of vegetation to maintain moorland); banning the use of glue traps; and increased regulation of other wildlife traps... the main purpose of the proposals to license grouse shooting is to address the on-going issue of wildlife crime and in particular persecution of raptors on grouse moors. It will do this by enabling the application of a meaningful civil sanction regime for offences against wild birds and other specified wildlife crimes."<sup>121</sup> The consultation document sets conditions for

the standard of proof of wildlife crime that have potentially worrying implications for landowners and managers providing driven grouse shooting: "where Police Scotland have evidence which leads them to believe that a specified wildlife crime may have taken place on the land in question, the licensing authority (NatureScot) would consider the evidence and decide whether they believe that the licence holder has not been acting in accordance with licence conditions, or where the licence holder is suspected to have committed, or been convicted of, an offence. NatureScot will base their decision on the civil standard of proof, ie. they would have to be satisfied that on 'the balance of probabilities' that the offence had taken place (as opposed to the criminal standard of proof of 'beyond reasonable doubt'). Once this determination had been made, a decision on the appropriate further action to take could be made (for instance by suspending or revoking a licence).<sup>122</sup> This provision is clearly open to abuse by individuals and groups opposed to driven grouse shooting.

## 4.7 Land Reform Issues In Scotland

Land Reform in Scotland is an ongoing and often emotive issue. Arguments have been made against ownership of large areas of Scotland by very few individuals. Supporters of land reform argue that this land was gained through the claiming of common land during the periods of enclosures in the 18th and 19th centuries, resulting in clearance of the Highland areas of Scotland (Wightman, Callander & Boyd, 2003). The Land Reform Act (2016) was brought in by the Scottish Government including a Community Right to Buy for Sustainable Development. This legislation permits Scottish ministers to approve the purchase of privately-owned land by a community body with a registered interest and does not require the current landowner to agree to the land sale. Ministers are empowered to compel landowners to sell if they decide that the sale will further sustainable development in the area (Land Reform (Scotland) Act 2016), and both financial and administrative government support are available for organisations who wish to utilise the 'Community Right to Buy' for sustainable development (The Scottish Government, 2021a, b).

The Scottish Land Commission and Scotland's Rural College published its report entitled 'Investigation into the Issues Associated with Large Scale & Concentrated Landownership in Scotland' (Glenn et al, 2019). This report led to the Scottish Land Commission making further recommendations to change land ownership laws in Scotland, including a legally enforceable public interest test. The test is designed to ensure the sale of estates of over 10,000 hectares (24,710 acres) has wider social or environmental benefits, as well as sales of land of economic or ecological significance, such as entire

islands. Failure of the public interest test suggested would result in a number of outcomes including a complete block of the sale or, in less serious cases, the sale could be allowed to go ahead with conditions attached (such as selling off land for housing or a legally enforceable management plan). The commission argues that significant landholdings by only a few individuals or organisations means that they have a high level of power that can stifle development and economic opportunities in an areas (Scottish Land Commission, 2019).

Alternative land uses to sporting management that offer the same or better biodiversity return with as good or better socio-economic activity and which do not rely on public subsidy are very hard to find, as both the Werritty review of 2015 and the SRUC/JHI reviews of 2019/20 identified. Alternative uses are explored in section 6.5.

## 4.8 Driven Grouse Shooting: Conclusions

Landowners and their employees are not allowed to do what they like with and on their moorland. All aspects of integrated moorland management, including driven grouse shooting, are tightly regulated and licensed. There are active audit regimes that have to be complied with, particularly if an area of moorland is part of a subsidised stewardship scheme. Moor owners, gamekeepers and contractors must do a great deal of paperwork before they get out onto the moors, and they have to keep detailed records of their activities. The key point derived from this section is that driven grouse shooting operates within an extensive and comprehensive legal framework. Indeed, the amount of compliance necessary is greater than for many non-rural businesses.

## References

<sup>122</sup> Ibid.





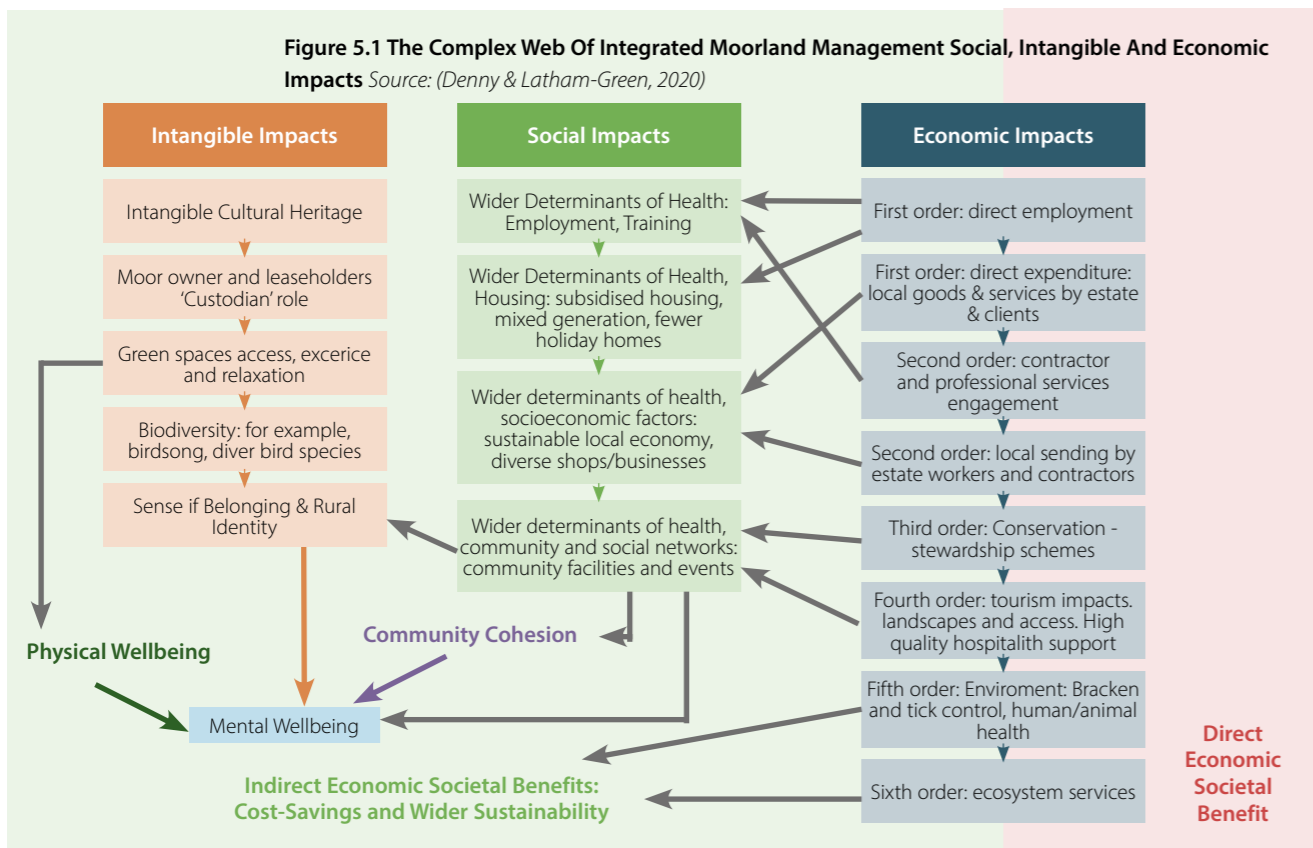
# 5.0 Sustainable Driven Grouse Shooting? The Evidence

## 5.1.1 The Complex Web Of Grouse Moor Management

A 2020 study considering the impact of management of land for grouse on communities found that, rather than being a stand-alone activity, grouse moor management was part of a complex web of economic, social and intangible impacts, as illustrated by Figure 5.1 below (Denny & Latham-

Green, 2020) which refers to the IUCN's social and economic dimensions of sustainability. These impacts are integrated with the many ecological and environmental impacts, including the biodiversity impacts of integrated moorland management, explored in section 5.2 of this report. Economic impacts are considered in section 5.2 and social and intangible impacts are considered in section 5.4.

**Figure 5.1 The Complex Web Of Integrated Moorland Management Social, Intangible And Economic Impacts** Source: (Denny & Latham-Green, 2020)



## 5.1.1 The Economics Of Driven Grouse Shooting

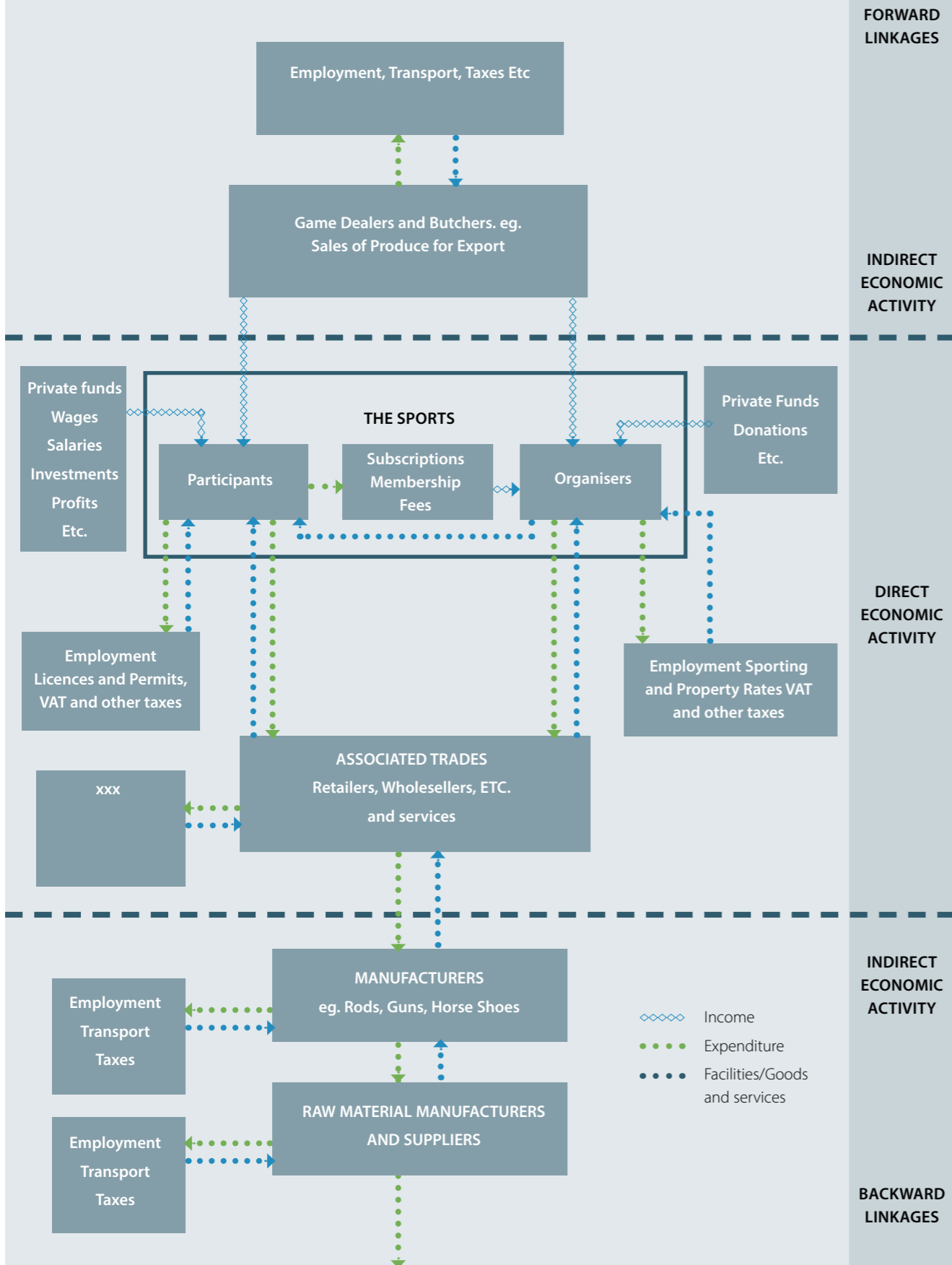
There have been many articles published, some based on research, into the impacts of grouse shooting on the ecology and environment of moorland areas. However, Thomson et al (2018) noted that the existing evidence base for the socio-economic impacts of grouse shooting is relatively limited and dated. Therefore, industry collated and reported data is often cited when discussing the economic impacts of grouse moor management in general and driven grouse shooting in particular. Cobham Resource Consultants (1992) produced a schematic way of portraying the economic impacts of some country sports, see Figure 5.2. The scheme is a useful reference point for this study and can be compared with a more recent schematic produced by McMorran et al (2020) that specifically identified expenditure incurred in a Scottish grouse estate, see Figure 5.3. This latter figure is interesting as it uses a case study approach to identify the recurring costs of driven grouse shooting. It hints at a key point that policy makers, practitioners and interest groups should note: driven grouse shooting does not take place in isolation from other land management activities.

However, the Cobham and McMorran schemes do not attempt to identify the social impacts and the value that some of these might have; these aspects were outside the terms of reference of these studies. In addition, the schematics do not consider all the economic factors that can result from driven grouse shooting identified by Denny & Latham-Green (2020). Therefore, this report has wider-ranging criteria for investigation. It is only by examining all the economic impacts of driven grouse shooting that it is possible to identify whether it is sustainable. In this section of the report the economic sustainability of driven grouse shooting is examined. Evidence regarding the environmental, ecological and social sustainability of driven grouse shooting are examined in the following sections.

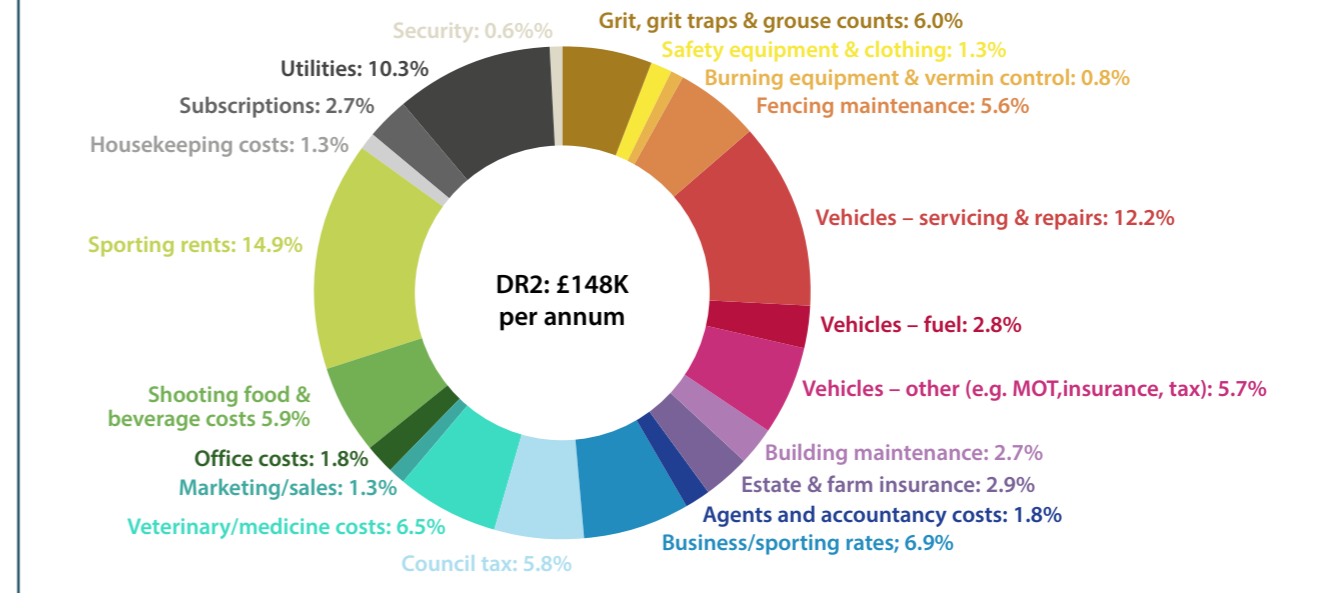
Driven grouse shooting takes place in rural, often remote, areas of moorland. Therefore, any consideration of the economic impacts of driven grouse shooting must consider the economic situation of moorland communities. Asking whether driven grouse shooting contributes to the sustainability of remote, rural communities is a valid question. Rural out-migration of youth and in-migration of retirees and resultant demographic changes represent a potential threat to the sustainability of rural economies in many rural areas across Scotland (Thomson, 2012) and moorland areas in England. There is often a shortage in affordable housing to buy, and in some moorland communities landowners provide significant numbers of housing units. Pressures on the land resource, and the very wide set of stakeholder interests in land, can also lead to conflict, illustrated for example by regular contentious debates around windfarm proposals at local, regional and national levels (Warren et al, 2005). However, as noted above, comprehensive assessments of the economic and social circumstances of rural moorland communities are few in number.

A 2009 report by BASC into the impact of grouse shooting on the ecosystem reviewed existing research and suggested that there were positive economic and social impacts on communities. However, these impacts were unspecified and unquantified, and no attempt was made to compare individual communities. It concluded that landowners and managers of grouse moors invested time and money into their moorland and that this investment 'has many benefits, including socio-economic support for upland communities, decreasing the likelihood of rural depopulation and helping the UK reach and maintain its conservation objective' (BASC 2009, p.2). However, BASC has the mission of promoting and protecting sporting shooting and advocating its conservation role throughout the UK. Therefore, its reports are open to allegations of bias by those opposed to game shooting.

**Figure 5.1 Simplified Structure Of Relationships Between The Interests Involved And The Provision And Pursuit Of Country Sports, Illustrating The Types Of Economic Activity Generated** Source: (Cobham Resource Consultants, 1992)



**Figure 5.1 Detailed Breakdown Of Recurrent Expenditure Directly Related To Grouse Shooting On A Scottish Estate** Source: ((MCMORRAN, THOMSON & GLASS, 2020)



McCann (2018) points out that in searching for economically viable alternatives to driven grouse shooting in the UK uplands, results were limited. Suggestions include forestry<sup>123</sup> and ecotourism. When looking into the revenue generated from alternatives such as snow sports, water sports, nature tourism and horse riding, it was found that country sports (ie. shooting and fishing) contributed more to the economy than all of these other uses (Bryden et al, 2010; Public and Corporate Economic Consultants (PACCE), 2015). However, this study did not aim to identify the impacts of country sports at the community level but made national comparisons.

There have been several recent reports investigating the overall importance of grouse shooting in Scotland.

The GMMRG in Scotland, chaired by Professor A Werritty and reporting in 2019, identified that the most recent and detailed summary of past research to date was the Scottish Government's report *Socioeconomic and biodiversity impacts of driven grouse moors in Scotland* (Thomson, McMorran & Glass, 2018). Werritty recorded that, with some qualifications, the report states that, on the basis of the existing database, in 2009 the grouse moor sector supported around 2,640 FTE jobs (both direct and indirect) with £14.5 million equivalent to £32.9 million in 2022 spent on wages, grouse moor management and support services. This yields a total Gross Value Added £23 million contribution (equivalent to £52 million in 2022) to the Scottish economy annually, concentrated in rural areas where there are considered to be few other economic opportunities. It is interesting to note that, in 2010, the then Scottish Environment Secretary argued that: "Tourism is vital to Scotland's economic recovery. As one of Europe's leading year-round

wildlife destinations with a world famous reputation for natural heritage, Scotland has a great deal to offer."<sup>124</sup> More recent data collected by the Scottish Moorland Group suggests that more intensively-managed estates have an average annual wage bill of £210,000 and support suppliers (often rurally located) with around £515,000 of annual expenditure (GMMRG, 2019).

In contrast with the overview, large-scale, reports of Werritty, BASC and the MA<sup>125</sup>, McMorran has conducted two detailed primary research studies of the benefits and impacts of grouse shooting on community residents. McMorran (2009) studied in detail a community located in an area of Scotland where grouse shooting is a key local industry, to examine the impacts of the activity on community residents. While the study did not compare the case study community with other communities not involved with grouse shooting, it demonstrated that there were often substantial socio-economic benefits resulting from the activity at the local community level. McMorran concluded that grouse shooting made a significant contribution to the local economy, in terms of employment and benefit for local businesses.

McMorran (2009) surveyed 252 households, containing around 560 people. He had 113 responses to his survey, equating to 20% of the total population and 37% of households. As grouse shooting was a major activity in his case study area, 51% of respondents lived on estates involved in shooting, whereas 49% did not. Of the respondents, 10% were employed in the game industry. However, 18% said their livelihood depended on the grouse shooting. The analysis of survey responses enabled him to identify both individual and community impacts of

**References**  
<sup>123</sup> The report of the GMMRG pointed out that at present (2019), 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 <https://www.gov.scot/publications/grouse-moor-management-group-report-scottish-government/pages/3/>  
<sup>124</sup> 'The Value of Wildlife Tourism', Scottish Government news release, Scottish Government website, 16th June 2010.  
<sup>125</sup> The GMMRG report, BASC and the MA reports are all summaries of existing research. They did not involve primary research.

grouse shooting, which can be summarised as follows:

- 40% of respondents said they received positive impacts as individuals such as employment, income for business, rural in-migration, and attractive landscape.
- 18% of respondents said they received negative impacts as individuals such as impact on some wildlife, restricted access, noise and smoke at certain times of the year.
- 81% of respondents said the community received positive impacts such as employment, income for businesses and the local economy, rural in-migration, and environmental improvements.
- 17% of respondents said the community received negative impacts such as impact on some wildlife, risks to public safety, disturbance (when shooting or controlled burning was in progress) and an unquantified negative impact of having absentee landowners.

Interestingly, none of the negative impacts claimed for individuals or the community were economic or social (with the possible exception of some aspects of having absentee landowners). However, the positive benefits cited by respondents were heavily weighted on the economic and social impacts of grouse shooting. All the businesses surveyed by McMorran felt that they benefited to some degree from grouse shooting, with shooting parties being an important seasonal source of revenue. However, more important than the shooting parties were the gamekeepers employed on grouse moors (and their families) as they were customers of local businesses throughout the year. People living and working in the community spent more money locally than those working outside the community. Grouse shooting was also regarded by respondents as a vehicle to counter the

out-migration of young community members and their replacement by older people retiring to the area.

McMorran (2009) identified that although other activities such as tenant farming, tourism businesses, forestry, fishing and deer stalking were present on some of the estates in his case study area, on almost all of these estates grouse shooting and grouse moor management constituted the single most important estate activity and management objective.

In the second study, McMorran et al (2013) studied two areas of northern Scotland where grouse shooting was carried out, the north-eastern Monadhliath Mountains and the Angus Glens. As in his 2009 study, the survey results revealed that community respondents perceived individual and community positive and, many fewer, negative impacts resulting from grouse shooting. The employment generated by grouse shooting, and income for local businesses, were highly valued. Other direct and indirect impacts of the grouse shooting industry on local businesses were evident in both his study areas, including use of local accommodation. Additional examples included spend by estates, estate staff and/or estate customers in garages, vehicle dealerships, sporting goods suppliers, butchers and on local tradesmen. The year-round presence of gamekeepers and their families was regarded as economically important to the communities, and had social impacts including the contribution of children to school rolls. The continued presence of workers directly employed in grouse shooting was particularly important in years when grouse numbers were low, and shooting was consequently limited. In addition, many respondents said that that grouse shooting brought about the long-term provision, improvement and maintenance of infrastructure. This included housing, roads, buildings, fences and walls, as well as the development and maintenance of hill track networks which can be used by locals and visitors (Glass, Bryce & McMorran, 2015).

The findings of this 2015 study demonstrate a wide range of direct and indirect socio-economic impacts. Both of the study areas were, like many moorland communities, remote from cities and large towns. The impacts of grouse shooting are likely to be disproportionately significant in such areas. However, in neither the 2009 nor the 2015 study did McMorran and his co-researchers attempt to compare shooting and non-shooting communities, nor was any judgement made on the sustainability of driven grouse shooting<sup>126</sup>.

McMorran et al (2013) studied the economic activities that landowners in the Cairngorms National Park (Scotland) carried out on their land. Table 5.1 summarises the economic activities reported, together with details of income and expenditure provided by respondents.

**Table 5.1: Economic activities, income and expenditure, in cairngorms national park**

Economic Activity	No. of landholdings involved	Income £	Expenditure £	Remarks
<b>In-hand agriculture</b>	28	6 million +	3.9 million	44% of income from public support payments and grants
<b>Tenanted agriculture</b>	30	1.3 million	1.35 million	1.1 million of this income was from farm rents
<b>Forestry and woodland management</b>	44	2.3 million	2.6 million	39% of income from planting and management grants
<b>Sporting land uses</b>	41	4.4 million +	6 million	No subsidies or grants received
<b>Conservation management</b>	30	1.1 million	1.9 million	£713,250 income sourced from public grants
<b>Residential property</b>	38	1.6 million	2.1 million	Barriers to further development included lack of grants to refurbish properties
<b>Commercial property</b>	11	533,000	137,000	High income to expenditure ratio. 66 business tenants on the 11 land-holdings
<b>Tourism or leisure, including retail</b>	32	9 million	5.7 million	Retail income from seven land-holdings produced 3.1 million income

McMorran et al (2013) showed that landowners (individuals rather than communities) can generate profits from commercial property rents, and from some tourism and leisure activities, especially if income from retail units is included. However, other economic activities in the Cairngorms were either carried out at a loss to the landowner or, in the case of in-hand agriculture, only generated a surplus due to public support payments and grants. In-hand agriculture, forestry and woodland management, and conservation management were economic activities that required significant payments of tax-payers money. In contrast using land for sporting purposes did not attract grants but, despite being a loss-making activity, was practised on 41 landholdings. As Thirgood et al (2000) pointed out, grouse shooting is one of the few uplands land uses which is not directly subsidised by the government.

### 5.1.2 Economic Impacts: The Six Order Model

*"Grouse moor owners put a lot of money into their estates, and most don't run at a profit. There is a well-known phrase: 'How do you get £1 million by running a grouse moor? Start with £2 million! That sums it up.'" (Andrew Green, Managing Director, Green's of Haddington, 25th May 2020<sup>127</sup>)*

*"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." (GMMRG, 2019)*

A number of claims are made about the economic impact of grouse moors. The GWCT<sup>128</sup> cites the report 'The Value of Grouse Moor Management' which indicated that grouse moor owners in England spend £52.5 million every year on grouse moor management. The report also indicated that businesses associated with grouse shooting benefit by £15.2 million every year. These include game dealers, accommodation providers, equipment suppliers, catering establishments and transport operators. The GWCT points out that many of these businesses are in economically 'Less Favoured Areas' (LFAs) in remote rural locations which depend on grouse shooting as the main economic driver outside the tourist season. It is claimed that grouse moors in England support 1,520 FTE jobs, 700 of these are directly involved in grouse moor management, and a further 820 jobs are in related services and industries. As noted above, the MA's website, citing the same report, suggests that the owners and sporting tenants of its 175 member grouse moors in England and Wales spend a combined total of £52.5 million on land management a year, of which 90% is privately invested<sup>129</sup>. All of these organisations are, of course,

#### References

<sup>126</sup> Such a judgement was outside of the terms of reference of McMorran's study.

#### References

<sup>127</sup> Name of interviewee given with his permission.  
<sup>128</sup> See p.42 in 'Moorland Conservationists: The Untold Story' GWCT (2020)  
<sup>129</sup> <https://www.moorlandassociation.org/grouse-shooting-economics/>





regarded as supporters of well-managed and legal shooting, and consequently their claims are dismissed by some groups and individuals.

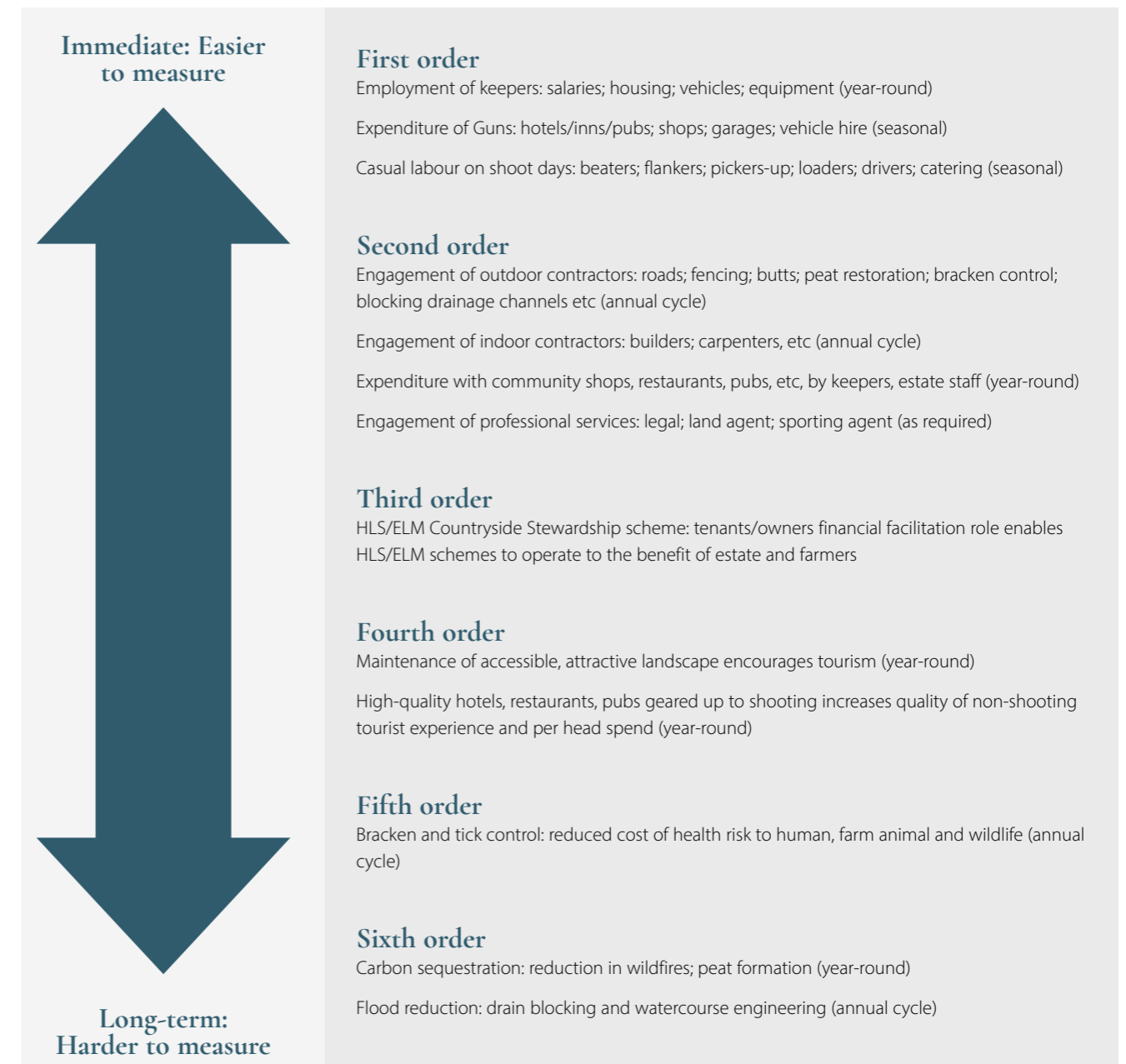
In August 2020 the Uplands Partnership published a report entitled *What impacts does integrated moorland management*, including grouse shooting, have on moorland communities (Denny & Latham-Green, 2020). This study gathered primary data by carrying out 61 semi-structured interviews with people involved, directly or indirectly, with driven grouse shooting; and, importantly, people who lived in areas where driven grouse shooting took place, but who were not involved in the activity. This dataset differs from that of McMorran et al (2020) and other studies by including people who had nothing to do with grouse shooting<sup>130</sup>.

As part of the analysis of the data gathered from interviewees (n = 61) for the 2020 report, the authors isolated examples of economic impact that were described by the interviewees. It is fair to say they were surprised by the range and depth of the economic impacts described. The economic impacts identified are, inevitably, linked and part of a holistic whole. However, they were able to identify six different economic impacts, only two of which are cited by the GWCT and the MA. Therefore, it is suggested that this economic impact model is more complete than that developed by previous studies.

To illustrate the range of economic impacts described, they were divided into several levels, or orders, based on how immediately they were delivered, and how easy they were to measure. The schematic shown at Figure 5.4 was developed to display the impacts. The lower order (fourth, fifth and sixth level) are not simple to measure, but they need to be included to reflect the symbiotic and integrated nature of the economic effects of managing a moor for grouse. The schematic highlights a key point: economic impacts and sustainability are not capable of being reduced to a single, simple figure. Simply comparing the money spent by an estate on providing driven grouse shooting with the income it gets from Guns paying to shoot grouse does not measure economic impact, and certainly does not measure sustainability. It is also important to highlight that some of the economic orders identified overlap with environmental and ecological benefits. This overlap is explored further in sections 5.2 and 5.3.

To illustrate the range of economic impacts described, they were divided into several levels

Figure 5.4 Schematic Showing Economic Impacts Of Integrated Moorland Management, Including Grouse Shooting.



**FIRST ORDER**

*"I cannot think of any activity that could take place on the moors that generates anything like the income that grouse shooting does. Walkers, bird-watchers, cyclists are welcome to use the moor, but they all do so for free. When they go into the local villages, they buy some meals and normal tourist stuff, but don't spend heavily like the shooting parties."* Land Agent

The first order economic impacts are those directly resulting from the activities involved in the shooting of grouse; the employment of keepers (the great majority of which are employed full time) and the engagement of casual labour in the form of beaters, loaders, pickers-up, drivers, caterers, etc. Included in this first order impact is the money spent by people

shooting (the Guns), both the money they pay to the estate, and the money spent with local hotels and businesses during the season. This report does not set out to estimate the total value of this first order economic impact in the UK<sup>131</sup>; we do not intend to replicate the work of earlier studies. However, we will examine a few case studies that illustrate the scale and importance of first order economic impacts to remote moorland communities.

As noted elsewhere in this report, and by Thompson et al (2018) and McMorran et al (2020), estates do not solely depend on grouse shooting for their income. They have a number of income-generating activities, integrated with each other and often co-dependent, which combine to produce the classic moorland flora

**References**

<sup>130</sup> McMorran et al (2020) conclude that: "Grouse shooting can generate significant economic impacts for communities, with impacts localised and disproportionately important in regions where grouse shooting is most prevalent."

**References**

<sup>131</sup> Given that driven grouse shooting does not take place every year due to fluctuations in the grouse population, there is no such thing as a typical year's expenditure.



and fauna. Most of these activities attract subsidies, with the exception of grouse shooting, and the income from grouse shooting is vital to many estates. In 2020 a farming estate owner in North Yorkshire provided an interesting case study,

*"If we look at the economics of my moorland, each ewe will have on average 1.5 lambs, worth £40 each in the market. So, each ewe can produce £60<sup>132</sup> income. You can have one sheep on four acres of moor without doing damage to the land. You can have a pair of grouse on four acres, and they average six or seven young. Their value is £80 to £100 a bird each. For a 1,000 acres of moorland, you can earn c. £15,000 from sheep, or c. £120,000 from grouse. On a well farmed moor grouse provide a much better return. In addition, whereas for every 1,000 ewes you need one full-time worker; you need a full-time worker for every 500 brace of grouse. Because grouse produce a good return, you employ more staff, and they have families and live locally. Cattle are less profitable than sheep due to overheads such as silage, sheds, machinery, etc. However, cattle improve the land for ground-nesting birds including curlew, lapwing, woodcock. Cattle work brilliantly as part of an integrated system."* Farmer and estate owner, North Yorkshire

The amount of money estates earn from grouse depends on the numbers of grouse available to shoot (and in some years there may not be any), and how much they charge the Guns. Most of the money charged for shooting goes to pay the wages of the gamekeepers and the costs of their housing,

vehicles and equipment. As we describe elsewhere in this report, most estates do not set out to make a profit from shooting grouse and the owners or tenants are investing their own capital into the activity, a point confirmed by the report of the Grouse Moor Management Group. This Group surveyed the economic impact of grouse shooting based on detailed information from 16 Scottish estates (three walked-up and 13 driven). The key findings were:

- Only one grouse enterprise made a small profit; all the rest were loss-making and reliant on substantial private investment;
- The average investment (revenue and capital) was £183 per hectare across the estates. This compares with a typical sheep farming business of £50 per hectare, but which includes approximately £25 per hectare of public subsidy;
- On the 16 grouse moor estates that provided information, the average labour unit was one FTE gamekeeper per 704 hectares, compared one FTE shepherd per 4,046 hectares;
- Capital expenditure, often high in the first five to 10 years, can make significant contributions to the local economy;

- On driven grouse moors, the employment of casual labour to help with the shooting activities can be significant to the local economy, with shoots often employing up to 100 casual staff over the whole season with approximately 30 employed on each day of shooting throughout an average season<sup>133</sup>.

McMorran et al (2020) reported the results of detailed case studies of four Scottish moors where driven grouse shooting takes place, when grouse numbers permit. The average capital investment specifically related to grouse shooting was £59,096, and the four estates spent £418,000 on running costs for their collective grouse enterprises, excluding staff costs. Across the four estates the average cost of running sporting enterprises was £45 per hectare. However, the average earned revenue only covered 58% of running costs and in all cases sporting activities were loss making, with an average net business cost of £19 per hectare that other estate enterprises or owners needed to fund. Importantly, over a five-year period, 95% of capital expenditure by the four estates was local or regional; and annual grouse-specific recurrent spending was on average 71% local or regional.

People who want to shoot grouse spend money not only with estates, but also with local businesses. In many cases their expenditure is vital to the local community. A moor owner in Northumberland described how on a shooting day he has nine Guns, who come from throughout the UK as well as the USA, Germany and Italy. The Guns typically stay in six or seven local hotels.

*"The (Name of Hotel) in (Name of village) is a key local hotel for shooting. It is owned by a charity which lets it to a firm that runs a number of hotels aimed at shooting parties."*

This hotel is also used by Guns shooting with another estate owner who said:

*"Guns stay in local hotels, such as the (Name of Hotel). Without shooting the local hotels would struggle. They are normally completely booked by shooting parties from 11th August to October. (Name of village) is small and quiet. It is a much more social place during the season. Shooting is a key part of social life for many locals. There is no local hostility to shooting, it is absolutely integral to the area."*

Other hotels and inns earn substantial income from shooting. A farmer in North Yorkshire said:

*"There are nine Guns shooting on a day on my moor. One or two teams come from abroad each year. The Guns stay in the local pub, the (Name of Pub) at (Name of village), which is a big shooting pub."*

When interviewed, the landlord of this pub explained how important shooting parties were to his business.

*"I set out to run the inn so it would be used by the shooting community. When I took the pub over there were six bedrooms; there are now 15. The cost is £90 per night, plus food. There is an extensive evening menu designed for parties of 10 to 12. As well as me and my wife, I employ six chefs and up to 30 other staff at the height of the shooting season. I try to employ locals wherever possible. In a typical year 30% of my business from August to September is shooting parties, and it is at least 20% of the business from October to January. Keepers use the pub all year round. I am the biggest employer in (Name of village) and the biggest hotel or inn for 10 miles in any direction. (Name of village) has about 500 people; apart from the (Name of pub), there is a shop-cum-Post Office, but it is only open part time. I work with a number of shoots. The (Name of pub) is a destination inn for shooters, and is geared to up help people have a great time shooting. The staff understand the needs of teams of Guns; it gets them away in the morning; half the rooms allow dogs and I liaise with team organisers. If there was no shooting, life would be tough. There are walkers and tourists, but they don't spend as much as shooting people. Without shooting or tourism, there is no point in (Name of village). 2018 was a tough year because of the low grouse numbers, I took on many fewer staff."*

Grouse shooting is expensive. Many people who want to shoot grouse also want to indulge themselves by booking luxury accommodation. Two owners of luxury-country house hotels in North Yorkshire gain significant income from shooting parties. One owner explained,

*"I have six or seven let days on the moor a year, and typically for each of these days nine Guns will stay in the hotel for two to three nights. Shooting accounts for c. 140 bed nights a year<sup>134</sup> in the castle, and another 50 to 60 room nights in other hotels and inns. I also provide catering on the moor for the Guns and beaters. The overseas grouse teams are especially big spenders. It is very high-end tourism." The other country house-hotel owner remarked: "I am in the sales and marketing profession. I charge a team of Guns (normally eight people) a price for the house of £3,500 + VAT per day. Many teams also bring wives, partners, etc. In a good year I will sell 35 to 40 days, in a moderate year perhaps only 32. In 2018, a bad year for grouse, I only sold 25 days."*

To operate these two enterprises, over 150 full-time staff are employed in a normal year. Both of these country house hotels are in locations that have no major industry or employers and are thus very important to the economy of their moorland area.

Grouse shooting attracts many Guns from overseas whose expenditure is equivalent to export earnings. The second of the country house-hotel owners cited in the previous paragraph points out:

*"Overseas guests account for about 60% of my business in August, and at least 50% of it in September. They bring big money into the UK as they also spend lots of money locally. In the North York Moors and the North Pennines, foreign clients account for about 80% of the Guns in August and about 70% in September. The amount of tourist dollars spent is massive. Teesside Airport is probably only open because of private jets coming in for the shooting season."*

A moor owner in Northumberland also mentioned Teesside Airport:

*"Guns fly into Teesside Airport in private jets, they hire vehicles and drivers, they stay at local inns and hotels for two or three nights. Many of them bring wives or partners who go and spend money locally in Durham or places like Bowes Museum. A vast amount of money is spent."*

The owner of a very large estate in Scotland agreed that overseas clients are important:

*"A lot of teams of Guns come to Inverness Airport each season. They spend money with taxi firms, car hire*

**If we look at the economics of my moorland, each ewe will have on average 1.5 lambs, worth £40 each in the market. So, each ewe can produce £60...**

#### References

<sup>132</sup> All values are based on 2020 figures.

<sup>133</sup> The numbers of people taking part in a day's driven grouse shooting does, of course, vary. On some shoots the number of people employed could be more than 100 on a single day.

#### References

<sup>134</sup> At a cost of c. £250 per head per night, plus food.

firms, caterers, laundries and contractors. The Guns are international." He made the point that: "The red grouse is one of the few animals that is indigenous to the UK and the UK alone. We need to look after them. The UK is unique for the volume and quality of its gamebird shooting. We do it in a much more professional and smarter way than the USA, Spain, France or Germany. They don't have the tradition of gamebird shooting we do. It is a great story and it is undersold. We are the Rolls Royce of game shooting. The Americans are over-awed by the formality and professionalism of our moors. Of course, there are some poor shoots, but good ones are excellent and it is not found anywhere else. We have something here that is not replicable."

A sporting agent described the impact made by one US citizen that rented the shooting on a North York Moor for 20 years.

"Each year the client and his invited Guns stayed in (Name of village), in the (Name of hotel). The hotel provides top class service. Earlier in the season the Guns would be mainly US citizens, and UK teams would be on the moor in September and October. The client took over the (Name of hotel), he had a suite there for his personal use for much of the year. There would typically be nine Guns staying for six days at a time, then another team would come in the next week. Guns would be collected from airports in locally-hired Range Rovers driven by people from the village. (Name of the shop) a sporting clothing and tailors in (Name of village) did very well from the invited Guns. Many of the Guns got very enthusiastic about the grouse shooting experience. They would not dream of appearing on the moor without appropriate clothing. Many of them ordered bespoke tweed shooting suits from (Name of shop). They spent vast amounts of money in (Name of shop)."

The estimated spend on hotel accommodation alone each year, in just one hotel, was over £75,000.

Some overseas nationals do not lease moors, but own them. A land agent gave the example of a moor that was bought over 35 years ago by an international buyer. He said:

"He (the owner) employs over 20 full-time staff, mainly keepers. He also employs lots of staff in the shooting lodge. It is only the family that shoot, there are no let days. On a shoot day there will be over 50 local staff beating, loading, picking-up, driving, etc. There are normally 10 to 12 shoot days a year. He pays for 600 to 700 man-days employment a year, as well as the 20 full-time keepers and the house staff."

The moor is in a remote area of Northumberland.

A day's driven grouse shooting involves more people than the Guns. As noted in section 4.3, on a typical driven day there will be people employed as beaters, flankers, pickers-up, loaders, drivers, and caterers.

The numbers of these casually employed staff may vary by estate and by the time of year. Many moors maintain the same number of beaters through the season; others decide they need more beaters in August than they do later in the season. The amount of money spent over a season on casually-employed staff varies; we were given examples ranging from £60,000 to over £100,000. The ages of those involved in a day's shooting ranges from teenagers to (very) old-age pensioners. Most casually-employed staff are local (within an hours' drive, which in moorland areas is less than 30 miles) although people come from some urban areas such as Middlesbrough, Tyneside and Ashington in Northumberland (which was mentioned by several interviewees as a town with a long tradition of supplying beaters to estates up to 60 miles away). A sporting agent gave an account of the numbers of casually-employed staff on one moor in the North York Moors National Park:

"During the grouse season the number of people out on a shooting day, excluding the Guns, was 60 to 70. There were about 20 days shooting a year if grouse numbers permitted. There would be about 50 beaters, each getting £50 a day and 10 pickers-up each getting £100 a day. Lunches were done by a local farmer's wife who charged £500 a day. The Guns had their personal loaders who would stay in a local pub for six to eight weeks during the season. The client paid for everything, apart from beer. The bill for loaders was another £8,000 to £9,000 a year."

A hotel owner described the impact that the grouse shooting season has on the Yorkshire Dales:

"Tourism in the Dales is seasonal. Out of season there is a very slow pace of life. All the estates have keepers and they are up and about all year on the moors; it is an isolated life. Prior to the season the entire community gets excited; young lads look forward to going beating; pubs, hotels and shops are all gearing up for business; the whole place looks forward to getting involved with and benefiting from shooting."

The money earned from casual employment on the moors can be very important to local residents. A chartered surveyor<sup>135</sup> described how he met a man working his dogs on the moor and recognised him as the person who had run the outdoor clothing shop in Appleby<sup>136</sup> for years. The man said how his shop closed due to online competition. He now works his dogs and gets the same income (around £20,000 per annum) as he had when he was running the shop as he now has no overheads. The ex-shopkeeper claimed that without his income from working his dogs on shoots, he would either have to take a job in a supermarket or move for work. The chartered surveyor then observed:

"If you think about it, golf gives nothing to the community. You go to the course, play a round, drink in the bar and go home. It doesn't involve lots of locals, it

doesn't spend big money in the local shops<sup>137</sup>. Shooting is different, it gives a lot to communities."

It is very obvious that the first order economic impacts are large and, we suggest, under-estimated by previous studies. Moreover, the cash and employment generated by these impacts can have a very great importance to remote communities where there is limited alternative employment.

## SECOND ORDER

"If there was no grouse shooting lots of local businesses would go bust; contractors, carpenters, caterers and garages for a start. There would be a very big impact on the rural economy." Managing Director, bracken control business

The grouse shooting season normally lasts no more than two and a half months. However, managing a moor so that shooting can take place is a year-round activity. Estates are significant economic entities that do not only run grouse moors (McMorran et al 2020). They also generate income from other activities including agriculture, forestry, alternative energy, property and land rental. An owner of one estate in North Yorkshire installed a small hydro-electric power (HEP) plant on one of his water courses which generates electricity sold for around £40,000 per annum.<sup>138</sup> Interestingly, this sum is almost exactly the same as the income he gets from 1,200 sheep. However, the forestry on the estate generates no profit. He pointed out that,

"Like all farmers, I can get subsidies for most of my activities, farming, HEP, and so on, but there are no subsidies or grants for shooting, which is the only income-generating activity in moorlands that is not subsidised. Shooting is 'one of the legs on the chair' that keep this estate going and allows me to employ local contractors."<sup>139</sup>

Similar to the farmer quoted in the preceding paragraph, most estates employ local contractors all year-round, for both outdoors and indoors work. An estate owner in North Yorkshire said:

"The estate is a big user of local contractors, for both inside and outdoors tasks, so indirectly it is a big employer." A Scottish landowner added: "The (name of) estate is a big local purchaser from contractors and suppliers of all sorts."

The money spent on contractors can be considerable. The owner of a moor in Scotland, which has been in his family since 1919, said:

"I do my accounts each year. My estimate is that I put about £800,000 per annum into the local economy because of the estate. This sum includes money spent on moorland roads, the keepers, their houses, vehicles, the sheep (which have to be wintered on lowland in Fife, miles away from the moor), contractors and so on. The

money paid to beaters, etc, would only be about £80,000 of the total investment, about 10%. Money is spent throughout the year, not just in the shooting season."

The CEO of an estate in Durham offered a similar example when he commented:

"The family, and the tenant, put a lot of money into the management of the moor. The tenant has just spent hundreds of thousands of pounds to renovate properties for the keepers. The owners and sporting tenants (on this estate) are very high net worth people<sup>140</sup>. The moors are their passion, they invest and local people benefit."

Grouse moors also attract significant annual investment from rich foreigners<sup>141</sup>. An agent that had managed an estate on the North York Moors for 20 years, on behalf of an American tenant pointed out:

"The client was very wealthy and he wanted the moor to be right. I reckon he spent £40,000 per annum on road building, and £50,000 per annum on casual labour for the other tasks, excluding beaters. In addition, vehicles were hired from local companies all year round."

The work done by agricultural and moorland contractors is extensive. In spring and early summer, roads are upgraded. The North York Moors estate managed by the agent (cited in the quote immediately above) is on a sandstone bedrock and needed to be continually resurfaced at a rate of about 25% of total road length each year. The contracting work on roads involved four or five people, five days a week, for about six weeks. Interestingly, much of this work was carried out by local farmers after the lambing season, providing important extra income to them. In early summer the butts have to be maintained or built. Modern wooden butts are made in sections off-site by a carpenter, and then assembled in place on the moor by a construction team consisting of a carpenter, driver, fork-lift driver and two others. They would work under the guidance of four keepers. To complete the annual outdoor cycle, from October to April, three or four farmers would be employed (when conditions were right for controlled burning) to work with the keepers to burn the heather to ensure it could regenerate both for sheep and grouse. As health and safety has become more important, more people are required to manage the burning, and more machinery is used.

The operations manager of an agricultural contractor described her company's work:

"The company's customers are North Pennines AONB, Natural England<sup>142</sup>, and estates. The estates are by far the biggest customers. Shooting estates are essential clients; they are a huge part of the company's revenue. The work the company does includes access track maintenance, stone butt repairs and building, wooden butt repairs and building, fencing, bracken control, heather maintenance, moorland restoration, drainage, spring-head clearance.

## References

<sup>135</sup> Interviewed on 21st May 2020

<sup>136</sup> A town in Cumbria

## References

<sup>137</sup> However, most people who play golf live in the locality of the club, so they will spend money in shops, etc. What driven grouse shooting can do is provide significant external income to an (often remote) community.

<sup>138</sup> McMorran et al (2020) report that three of the four estates they studied where driven grouse shooting took place had installed renewable energy schemes (five hydro and one wind farm). The income from these schemes was used to offset losses incurred from other estate activities.

<sup>139</sup> All quotations are taken from Denny & Latham-Green (2020)

<sup>140</sup> Not all moor owners are equally wealthy.

<sup>141</sup> Money spent by foreign tenants is equivalent to export earnings in that foreign money enters the UK economy.

<sup>142</sup> There is a National Nature Reserve at Moor House, see <http://www.exploreteesdale.uk/national-nature-reserve>

# The parish has a charity shoot every year that raises between £40,000 and £65,000.

*The main income generator is bare peat restoration<sup>143</sup>.*

Nearly all estates use health and safety advisers to ensure the work carried out through the year complies with relevant legislation. The managing director of a health and safety advisory business which works with shooting estates from the North of Scotland to East Anglia, as well as hundreds of non-shooting businesses, stated:

*"On a grouse moor we will look at all land management practices, including road maintenance and condition, butt construction and use, burning, fencing, bracken control, management of wildlife, worming and gritting of birds, personal safety for staff with ticks, sheep dipping, forestry and so on."*

There is a strong market for grouse. Whereas some pheasant and partridge shoots struggle to find a market for the birds, grouse command a premium price<sup>144</sup>. To meet the demand for grouse, game dealers operate substantial businesses, normally in remote areas. A dealer from North Yorkshire explained:

*"I employ eight staff from August to March; some are local but three Poles have been coming over for years. They live in static caravans on the site and can earn £15,000 over six months, much more than they can earn in Poland. I collect birds from over 60 moors, on the day they are shot. I have four vans and each one will do over 30,000 miles over the six months of the shooting season. My waste disposal bill alone is £1,000 a week during the season and I buy in over 10,000 plastic boxes each year for packaging the birds. In a good grouse season, I spend over £100,000 on couriers to get birds to UK customers. In addition, grouse are exported to France where there is a strong demand. (Name of company) is one of only two businesses in this Dale. If I closed, people would be able to find work, but they would have to travel a lot further. The money generated by grouse shooting is important. Most owners do a lot to maintain their property, the moor and the houses, etc, for the keepers. The money pumped into estate infrastructure is huge, and lots of people in the community are employed."*

An important element of the second order economic impact results from the staff that estates employ. The 15 estate owners based in North Yorkshire, Northumberland and Scotland that were interviewed for this study employ between them around 80 keepers and 175 other full-time staff<sup>145</sup>. All of these people live, many with their families, in remote (in some cases very remote) areas. A land agent pointed out:

*"The keepers are in the community all year round. They spend money there, their children go to school locally. In an estate I know well, the keepers run charity events, cut the grass in the public areas of the village, and organise social gatherings before and after the shooting season. The shoot Christmas dinner is the biggest social event the village has with over 80 people attending. The estate employees keep this village going."*

A retired vicar also highlighted the importance of the year-round presence of estate staff to the community in Northumberland that he had just (in May 2020) retired from.

*"The parish has a charity shoot every year that raises between £40,000 and £65,000. A lot of the money goes to local causes like the maintenance of the village hall and the church. (Name of village) is quite feudal, it is an estate village so the doors and window frames are the same colour. Rents are very low so it still has affordable homes. Therefore, young people can stay in the village. The (estate owning) family take their responsibilities very seriously. The village school is kept going because estate staff and young people can afford to live there and their children go to the school."*

The vicar commented on how the economic and social impacts of the estate were inter-twined:

*"Everybody in the village knows everybody else. When coronavirus started, I set up a 'buddy system' through the church. In the village everybody was included, whether they went to church or not. It is paternalistic, but it works. It is a fantastic community. People are resilient and resourceful. Because it is remote, people just cope with problems; if you lose your job, you get another, people help each other. If you can't get food, somebody will deliver it. There are lots of upland farms, but these are small and are really only run by the families that live in them. The major economic activity in the area is estate farming, including shooting, forestry and so on."*

Estates are also purchasers of professional services. As well as employing land and sporting agents, many of them use lawyers. Although professional service providers are seldom local, they are an element of the economic impact of grouse moorlands. A lawyer (who does not shoot) specialising in land disputes said:

*"My clients range from large estates, to family farms, trust funds, institutional landowners such as the National Trust, and tenant farmers. Common areas of dispute are where parties have competing interests on the land. I have not come across disputes between communities and shoots, it tends to be specific groups that take action against shoots."*

Pointing out the economic impact of grouse shooting to remote communities he observed:



*"If there was no grouse shooting, the impact would depend on the location. In many places, if there was no shooting, the land would not or could not be used for anything else as it is so poor. The North Pennines is pretty desolate; if there was no shooting, nothing would happen."*

The data gathered by the Denny & Latham-Green (2020) study, and the work done in 2021 for the first edition of this report supports the contention of the GWCT and the MA that the economic impact of driven grouse shooting results not only direct (first order) effects, but in indirect (second order) impacts. A rule of thumb might be the more remote the area, the greater the economic importance of the estate owners and sporting tenants (McMorran et al, 2020). The first and second order economic impacts are important to individuals, businesses and communities. Driven grouse shooting, and the management regimes required to sustain it, do not exist in isolation (Thompson et al, 2018). A range of activities take place on moors where grouse live which overlap, compliment and (occasionally) conflict with each other. Contractors and providers of professional services benefit as a result. Any discussion or decision about the sustainability of driven grouse shooting must ensure it takes into account the economic benefits that result to people, businesses and communities as a result of integrated moorland management.

### THIRD ORDER

*"It is the sporting tenant that puts the money into the initial phases of the Higher Level Stewardship scheme that makes it viable and enables farms to keep going."* Retired Academic. (Visiting Professor)

Third order economic impacts result from the part that some sporting tenants and estate owners have played in enabling government-funded agri-environment schemes such as the HLS and CS schemes to operate<sup>146</sup>. Interestingly, this aspect of the operation of the schemes is little explored in

academic literature. The great majority of literature about such schemes focuses on the ecological and environmental impacts, not the mechanisms that enable the schemes to operate in different areas.

The aim of HLS has been for farmers and land managers to undertake environmental management schemes that offer "significant benefits" to high-priority areas. Its primary objectives are wildlife conservation, maintenance and enhancement of landscape quality and character, natural resource protection, protection of the historic environment, and promotion of public access and understanding of the countryside<sup>147</sup>. In other words, HLS provides funding to farmers and other land managers in England in return for delivering environmental management on their land. The situation in Scotland is slightly different. The Grouse Moor Management Group noted that pre-Brexit EU support for farming, state financial aid for agriculture and forestry was both extensive and well established. However, the Group pointed out that moorland estates have recently had only limited support for their farming activities via agricultural subsidies and agri-environment schemes<sup>148</sup>.

The HLS scheme has been very detailed, spelling out both possible payments and also the land-management regime required for eligibility. For example, the Option Directory for HLS and Capital Items (2012) published by Natural England<sup>149</sup> indicated payment for maintenance of rough grazing for birds at £80 per hectare, and restoration of rough grassland habitat for birds at (again) £80 per hectare. These payments were for management practices used to provide rough grassland habitat for upland birds (particularly breeding waders) and other target species. They were targeted at land parcels above the Moorland Line, and that either supported populations of upland birds currently or had the potential to do so. The detailed nature of the scheme can be seen by the fact that it specified that management would normally include "grazing with cattle and/or sheep at an agreed stocking density (between 0.4 and

### References

<sup>143</sup> See the Sixth Order of economic impact below.

<sup>144</sup> The claim made in an email Wild Justice sent on 18th June 2021 (urging its supporters to contact their MPs in advance of a debate by the Petitions Committee on whether driven grouse shooting should be banned) that: "About half a million red grouse are shot in a typical year – few of them are eaten – it's just shooting for fun," is bizarre given the market for grouse.

<sup>145</sup> These estates employ more than the average number of staff. They are cited as examples as they illustrate the size of some estates. Estates can be very significant economic entities in remote, upland areas.

### References

<sup>146</sup> It will be interesting to see how the ELM scheme operates and how tenants and owners become involved with it. We briefly discuss this point in section 5.4

<sup>147</sup> Farmers Weekly website <https://www.fwi.co.uk/able/all-you-need-to-know-about-higher-level-stewardship#:~:text=The%20aim%20of%20Higher%20Level,of%20landscape%20quality%20and%20character> accessed 23rd April 2021

<sup>148</sup> <https://www.gov.scot/publications/grouse-moor-management-group-report-scottish-government/pages/3/>

<sup>149</sup> <http://publications.naturalengland.org.uk/publication/2827091?category=45001>



1.0 Livestock Units per hectare depending on site conditions and objective) between 31st March and 20th June. At other times, stocking densities must be managed to achieve the desired sward height. Restoration will be individually tailored to the site, but may include blocking existing surface drains, ditches and grips<sup>150</sup> to create or extend areas of wet, marshy grassland vegetation.”

In their 2020 study, Denny and Latham-Green conducted semi-structured interviews with 61 respondents, 21 of whom were farmers, landowners, or land managers. Examples taken from interviews with respondents based in the North Yorkshire Moors serve to illustrate the importance of HLS to the economic viability of the area.

There are about 27 shooting estates, each with at least one full-time gamekeeper, in the North York Moors National Park area. Analysis of interview data suggests that perhaps half a dozen of these estates cover their costs, whereas the rest run at a loss and are subsidised either by their owner or the sporting tenant. One example of the level of subsidy involved was provided by an interviewee<sup>151</sup> who acted as agent for an estate in the North York Moors that was leased by a US citizen from 1997 to 2017. The agent estimates that, over the 20-year tenancy, the moor had cost the US citizen an average of £600,000 a year.

An interviewee who works in a Further Education College (and who does not shoot) described how he had been heavily involved in a HLS scheme operated by an estate and local farmers:

*“The Scheme was interesting as very little money went into the estate. The funding went to around a dozen or so individual shepherds and graziers who had their flocks on the moor. . . the landowners were very much adding value to the landscape as a whole, not just their estates. . . they had the attitude that they wanted to put something in place that was better than when they started.”*

Another interviewee<sup>152</sup> pointed out that the ability to enter HLS and Countryside Stewardship in many upland areas depends on grouse shooting, as it would not be possible to deliver a scheme where any capital works are involved without an active, and wealthy, sporting manager. He gave a detailed account of how the post-Brexit stewardship scheme might work (as at February 2023 the details of the new ELM scheme are yet to be announced). The interviewee had been working on the application for the stewardship scheme for Bransdale on behalf of the estate owner, the sporting tenant and graziers. The new scheme started in 2021 and is estimated to be worth £6 million to £8 million over 10 years. The scheme includes capital and revenue grants in return for specified outcomes. The capital grant is paid in full (100%) *after the work has been done*,<sup>153</sup> so without significant investment up-front of around £450,000, he claimed the stewardship scheme could not operate. Moreover, until the capital work has been done, no revenue payments are made. The capital work is for renovation of buildings and roads, etc, and is used to employ mainly local contractors. In the case of Bransdale, it is only the sporting tenant who has the cash available to finance the capital work, so the whole stewardship scheme depended on the shooting interest. Although the capital projects mainly benefit the estate, the revenue payments are essential to the farmers and graziers. It is reasonable to say there would be no farming in its current form on the North York Moors without the stewardship revenue payments. McMorran et al (2020) suggest a similar situation exists on some Scottish moors. None of the four estates studied in detail had farming that was profitable, indeed: “Farming activities on all four estates either broke even or were loss making.”

Moreover, although farmers can get a high percentage of their annual income from moorland stewardship schemes (one farm in Bransdale gets 22% of its total income from stewardship, another gets 33%), there is a time-lag between claiming a revenue grant (normally claims are made in the spring) and the receipt of the payment (payments are normally made in the winter). This ‘income gap’ between the spring claim and the winter payment means most farmers need to have part-time or second jobs, and many of the farmers and their families earn additional income as contractors, beaters, caterers, etc, on shooting days<sup>154</sup>. The Bransdale estate operates as a partnership: the estate owns the land, the sporting tenant has the shooting, the graziers put sheep and cattle on the land<sup>155</sup>. All three parties work together and all benefit from the stewardship scheme, as do contractors and – as a result of shooting - the casual labour. The Bransdale case is far from unique; a similar situation exists on many other estates in the North York Moors. The shooting interest plays a key role in financial facilitation.

#### FOURTH ORDER

*“Over a five-year period, you might not get any shooting in two years, but the expenditure is constant. You spend a lot of money for something that might not happen and, as a result, you get a landscape that people value, the heather moorland. Tourists come to see the heather moorland and bring money into the communities. Grouse shooting makes communities sustainable.”* Assistant Land Manager

As noted above, the grouse shooting season normally lasts no more than two and a half months. However, maintaining a moor so that shooting can take place is a year-round activity. These management activities result in an accessible landscape that many people find attractive, resulting in year-round tourism and leisure activities. A retired local government official observed:

*“People do use the moors for other leisure activities such as mountain biking, walking, bird watching, etc. However, they don’t pay anything to the estates when they do these activities and if the estates did not manage the moors, there would be no paths and very few birds.”*

A qualified ecologist that has managed nature reserves in the past and now works for a shooting and conservation organisation, pointed out that:

*“The North York Moors National Park has to be managed to remain moorland, or it will revert to woodland. The great majority (80% to 85%) of the North York Moors National Park is managed because the estates have grouse shooting as part of their integrated economic activities.”*

Furthermore, he claimed: “Tourism in the North York Moors is largely dependent on the heather landscape so, without management for shooting there would be less tourism. For example, in the Tour of Yorkshire, the cyclists ride through the iconic moorland, it has a real quality to it. People go to the North York Moors in July and August to look at the heather on the hills. The keepers and the way they manage the heather are key to the appearance of the heather.”

As a director of a charity points out:

*“[apart from shooting], the only other economic games in town are agriculture and tourism, and agriculture depends on subsidies. Tourists like heather moors, and they exist largely because of management for grouse. I am not sure the alternative landscape would be as attractive.”*

The GMMRG (2019) highlighted that the Scottish moorlands were equally dependent on long-established management practices. The report said: “Heather moorland – admired by tourists in high summer when the hills appear to be covered in a purple haze – is not the natural vegetation on much of Scotland’s hill country. Within the climatic ‘forest zone’, much of Scotland’s heather moorland

is the product of centuries of burning and other management, initially through deforestation and fire (some of it natural), and then for the grazing of livestock (sheep, cattle and goats) and, since the mid-19th century, also for the shooting of grouse. Relaxation of this active management, allowing the vegetation to revert to natural forest would likely yield a different landscape over much of Scotland from that of today’s open moorland. In some locations, natural regeneration of the native woodland up to the former tree line is already well under way with consequent gains and losses for species diversity dependent on different habitats. The moorland landscape associated with grouse shooting is thus largely a ‘cultural’ landscape in which controlled burning alongside other management activities are essential for its perpetuation.”

As well as the overall appearance of an attractive landscape, integrated moorland management also provides tourists with increased access opportunities. A gamekeeper in the North York Moors pointed out that:

*“The shoot maintains lanes and tracks (at a cost of £30,000 to £50,000 per annum), which provide access for the public all year round at no cost. All the keepers enjoy engaging with walkers on the moors. People can learn about the moors when they come here walking.”*

It is not only in the North York Moors that tourists make use of the landscape created by moorland management. A gamekeeper in the North Pennines observed that:

*“People come to see the fells and walk on them all the time.”*

An estate owner in the Peak District agreed, saying: *“Heather moorland is very valuable to the Peak District; people come to look at it.”*

The chief executive of an estate in Durham believes that: *“Moors are beautiful and emotive places; people relate to them.”*

The managing director of a bracken control business observed:

*“I didn’t know about grouse moors before I started bracken spraying. I was a farmer in lowland Scotland and did not understand what estates did. I’ve learned that estates have a 90% positive impact on their areas and communities. In Scotland you can walk where you want and owners have spent huge money creating an environment that everybody can enjoy, for free.”*

People who are not involved in shooting also described how they liked visiting the moors. A lecturer in a FE College in Yorkshire said he visits the moorlands a couple of times a month as he likes birdwatching, a hobby shared with a retired policeman from North Yorkshire who pointed out that: “There are lots of species on the moors.” The Head Teacher of a primary school in Northumberland said:

#### References

<sup>150</sup> It is interesting to note that in 2012 Natural England was paying moorland landowners and farmers in the HLS to block drains, ditches and grips. Many of these moors will have grouse shooting taking place upon them. Chris Packham’s claim in 2017 that driven grouse moorland management “is ecologically disastrous”, partly because of draining, took no account of the operation of HLS. More worryingly, the Labour Party issued a demand for a review of driven grouse shooting on 11th

<sup>151</sup> Interviewed on 22nd May 2020

<sup>152</sup> Interviewed 22nd May 2020

<sup>153</sup> <https://www.gov.uk/government/collections/countryside-stewardship-information-for-agreement-holders>

<sup>154</sup> A shooting day on Bransdale involves about 45 people employed as casual labour ie. not the Guns, gamekeepers or full-time employed estate staff.

<sup>155</sup> We discuss the issues involved with multiple stakeholders working together in section 5.3.12



*"I enjoy the moorland landscape and the vastness of it. It's good to get away to some peace and tranquillity and admire nature. It's also good to take children there and teach them about the environment and the importance of caring for it for future generations as well as appreciate how lucky they are to have this on their doorstep."*

A Parish Councillor (and retired truck driver) from the North York Moors area said:

*"I visit the moorland daily. I like to see the little grouse chicks being raised, the variety of species including buzzards and kites. There is a balance and variety here, lots of small birds, skylarks, wheatears, various other larks, as well as buzzards and kites."*

As well as encouraging and enabling year-round tourism, it is suggested that grouse shooting can increase the expenditure of the non-shooting tourist. The Managing Director of a shooting business used the example of the village of Reeth in the Yorkshire Dales to illustrate this point:

*"Reeth has been greatly influenced by shooting. It has a high-end restaurant, two pubs and a hotel. The restaurants, pubs and hotels in the area are high-quality because they want to appeal to shooting people. As a result, other tourists can go to great pubs and restaurants, etc, all year round. They are smart and high quality because of the money going into the area from shooting. The high-quality facilities increase tourist spend. In addition, because of the way they are managed and the wildlife they contain, the moors are attractive to tourists and birdwatchers, etc."*

The evidence, both from people who are involved in shooting and those that are not, indicates that the existence of heather moorlands, with good levels of biodiversity and year-round access, is attractive to tourists. Tourism and biodiversity are intimately related, the prosperity of the tourism industry is directly dependent upon healthy ecosystems which in many areas, including National Parks, are the product of nearly 200 years of field sports, especially deer and grouse shooting. Most tourist activities are also directly based on the many services provided by ecosystems<sup>156</sup>. The presence of some high-quality facilities (hotels, restaurants, etc) means that many levels of tourists can be catered for, from

the day-trippers going walking or birdwatching and taking their own sandwiches, to those wanting a holiday in a privately run, luxury hotel. Moreover, an area with integrated moorland management, including grouse shooting, results in a year-round living landscape with economically-resilient communities. Urquhart & Acott (2014) in their study of the social identity of Cornish fishing communities illustrate the importance of 'real' communities with a quote from a Visit Cornwall tourism manager: "Being in a place where there are real live people who you can talk to in the pub or on the harbour-side does bring things to life. I think again it adds another dimension to people's holiday the fact that they're not living in some museum."

And people do like visiting areas of moorland. The Staffordshire Moorlands Tourism Study (2011)<sup>157</sup> reported that in 2009 there had been 3.35 million trips to the area, of which 39,500 were overnight trips (thus 93% were day trips). These tourists were estimated to have contributed £158 million directly to the local economy and supported 3,495 FTE jobs. The North York Moors National Park website<sup>158</sup> states that: "Tourism is vital to the North York Moors National Park. We currently have 8.38 million visitors annually, generating spend of £730 million and supporting 11,290 FTE jobs. Half of our visitors say that National Park status is an important influence in their decision to visit... The National Park Authority recognises the significant role that tourism plays in the economy of the area and we're keen to work with local businesses to encourage visitors to stay longer and spend more, sustainably, while raising the profile of the North York Moors." The 2018 survey<sup>159</sup> of visitors to the North York Moors identified that 99% rated the moors good or very good, and 75% were very likely to return. In the Scottish Highlands, 2019 was "a very good year for tourism"<sup>160</sup>. There were 2.9 million overnight visits, resulting in an overnight spend of £777 million. Figures also indicated a large increase in domestic day tourism spend in the region, to about £571 million. These figures, it must be stressed, do not include the value of the health and well-being benefits (described in section 5.4) tourists gain from their trip to moorlands as a result of exercise, etc. The value of these social impacts is not possible to estimate, let alone calculate, but it is assumed it is very large.

The exact value of this fourth order economic impact is not possible to calculate; figures comparing tourism between areas where grouse shooting takes place and those where it does not are not available. As noted above, in some areas of moorland the amount of land that is managed for activities including driven grouse shooting is significant, between 80% and 85% in the North York Moors. It is evident that the moorland landscape that results from integrated moorland management, delivers very significant economic benefits as a result of tourism.



Above image source: <https://wadertales.wordpress.com/2019/06/04/chicks-and-ticks/>

#### References

- <sup>156</sup> [www.iucn.org](http://www.iucn.org)
- <sup>157</sup> [https://www.staffs Moorlands.gov.uk/media/1687/STAFFS\\_MOORLANDS\\_TOURISM\\_STUDY\\_FINAL\\_REPORT\\_\\_16\\_May\\_2011\\_/pdf/STAFFS\\_MOORLANDS\\_TOURISM\\_STUDY\\_FINAL\\_REPORT\\_\\_16\\_May\\_2011\\_.pdf?m=1482422146543](https://www.staffs Moorlands.gov.uk/media/1687/STAFFS_MOORLANDS_TOURISM_STUDY_FINAL_REPORT__16_May_2011_/pdf/STAFFS_MOORLANDS_TOURISM_STUDY_FINAL_REPORT__16_May_2011_.pdf?m=1482422146543)
- <sup>158</sup> <https://www.northyorkmoors.org.uk/looking-after/advice-and-grants/tourism> accessed 18th April 2021
- <sup>159</sup> <https://www.northyorkmoors.org.uk/looking-after/advice-and-grants/tourism/North-York-Moors-Visitor-Survey-2017-and-2018-infographic.pdf>
- <sup>160</sup> <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/regional-factsheets/highland-factsheet-2019.pdf>

As well as encouraging and enabling year-round tourism, it is suggested that grouse shooting can increase the expenditure of the non-shooting tourist.

#### FIFTH ORDER

*"You really don't want to get Lyme disease. I caught it from a tick in 2017 and I was really unwell. I don't think I have fully recovered yet to be honest."*<sup>161</sup> Ecologist <sup>162</sup>

The fifth order economic impact is derived from the land management practices employed on grouse moors that result in a reduction of the threat of diseases to both human and other animals. Gamekeeping practices reduce bracken coverage and tick numbers, both through direct bracken control and through use of sheep to act as tick 'mops'. Controlling bracken and ticks is important for human and animal health, both of which have economic impacts<sup>163</sup>.

Dense bracken covers about 900,000 hectares in the UK and is increasing by between 1% and 2% per annum. Bracken is present and increasing on a further 700,000 hectares. The four main health impacts caused by bracken are:

- Direct toxicity to animals and humans due to a number of poisoning and growth impacting chemical groups within the spores, frond, rhizome and true root systems.
- Impacts through the action of the living plant and litter on the soil and water systems in the habitat, including direct toxicity in drinking water.
- Creation of an environment which encourages the concentration of some of the animal hosts, such as deer, sheep and Microtine rodents on which the four stages of the tick life-cycle depend. The hosts are frequently the 'carriers' of pathogens that have the potential to cause tick-borne diseases (TBDs) in other animals (and people) which have no immune tolerance to them.
- Related to the point above, the encouragement of disease-spreading parasites through the creation of favourable conditions to complete life-cycles and sustain high populations. Dense bracken and the litter it creates provide ideal 'questing' conditions for ticks and the environment for the different tick

life stages to rest and metamorphose (ecdysis) between blood feeds. It also encourages hosts that are the source of the TBD pathogens.

A bracken control company director questioned by Denny & Latham-Green (2020) pointed out that bracken: "Holds c 70% of the tick load on a moor."

Moreover, in the UK changes in land use policy and the climatic gradient have encouraged bracken growth over the last 30 years and not only does the plant hold the majority of the ticks on a moor, but tick numbers are increasing rapidly. Moor owners and gamekeepers in England and, especially, North Wales and Scotland reported ticks as being a "massive problem". In Scotland ticks were described by one moor owner as endemic.

The risks to health from tick-borne diseases are serious, and under-estimated<sup>164</sup> and they are the most important vector of human pathogens, leading to increased public health burdens worldwide (Rochlin & Toledo, 2020).

Professor Roy Brown writes:

*"The number of tick-borne diseases is increasing dramatically (seven diseases currently pose serious health risks to birds, mammals and people in the UK). The rates of infection in ticks and multiple pathogen loads are also increasing. New pathogen strains (eg. the Flavivirus causing tick-borne encephalitis) have become 'native' in the UK in the very recent past." It was estimated at an internal National Institute for Health Research (NIHR) working meeting in February 2020 that there could be as many as 18,000 new cases of Lyme disease confirmed in the UK in 2020, against about 4,000 in 2015. Lyme disease is a 'headline' problem, but there are several other chronic (as well as acute) tick-transmitted infections affecting a much larger number of people, as well as companion animals, stock and wild mammals and birds<sup>165</sup>."*

On estates where grouse shooting occurs, landowners, gamekeepers and farmers/graziers combine activities to control both bracken and tick

#### References

- <sup>161</sup> Interviewed in July 2020.
- <sup>162</sup> Speaking in 2021.
- <sup>163</sup> It is not, of course, suggested that only moors managed for grouse shooting control bracken and ticks.
- <sup>164</sup> Tick-borne diseases include Arbovirus (which includes tick-borne encephalitis and the Flavivirus group. Ebola and Zika are members of this group); protists; bacteria (including Lyme disease); tick paralysis; and alpha gal syndrome.

## References

<sup>165</sup> Professor R Brown, 29th May 2020. Professor Brown is Visiting Professor in Epidemiology and Invasive Species Control at the University of Lincoln and a specialist researcher/consultant working in the environmental control of hard-bodied ticks and tick-borne diseases in the Northern Hemisphere at the habitat/landscape scale through the research company 'R & D Applied Biology' in North Yorkshire.

<sup>166</sup> A. Jenkins, cited in Moorland Conservationists: The Untold Story, GWCT, 2020

<sup>167</sup> J Kemp-Welsch cited in *Ibid.*

<sup>168</sup> <https://www.gwct.org.uk/research/species/birds/red-grouse/controlling-louping-ill/#:~:text=From%20the%20blood%20samples%20we,start%20of%20the%20shooting%20season.>

<sup>169</sup> Mattingly & Shere-Wolfe (2020) also point out that in addition to direct health care costs, productivity losses should also be taken into account.

<sup>170</sup> <https://www.lymedisease.org/lymepolicy/work-costs-75billion/>

<sup>171</sup> And it is not known how many people in the UK catch tick-borne diseases in a year. The British Medical Journal online observes that Lyme disease cases may be three-times greater than estimated, see <https://www.bmj.com/company/newsroom/uk-tick-borne-lyme-disease-cases-may-be-3-times-higher-than-previous-estimates/>

<sup>172</sup> Source: Unit Cost Database <https://www.greatermanchester-ca.gov.uk/what-we-do/research/research-cost-benefit-analysis/> with costs updated to 2022 using <https://www.bankofengland.co.uk/monetary-policy/inflation/inflation-calculator>

numbers. The reduction in tick burden on managed moors means that they are more healthy places for both wild and domesticated animals, and humans. This reduction is important as the impact of ticks on wildlife, not just grouse, can be very serious. As one keeper reported:

*"I've seen curlew chicks completely covered in them."*<sup>166</sup>

Although it is not possible to put an economic value on the impact of tick control on wildlife, the worldwide economic impact of poor livestock health is more obvious. Cattle and sheep can be badly affected by tick-borne diseases. Kivaria (2006) reported that the annual cost of cattle lost to tick-borne diseases in Tanzania was estimated to be \$364 million (2006 figures). More recently, and reporting research carried out in the UK, Rocchi, Reid & Sargison (2015) observed that louping ill virus in sheep, if untreated, can result in coma and death in a proportion of animals (between 5% and 60% in affected flocks). A moorland owner reported in 2020 that:

*"Our shepherd began to notice symptoms in some of the lambs and at that point we had sheep and grouse tested for the louping ill virus. The tests proved 84% positive and the vet said it was the worst case he had seen. After better treatment, there was a great improvement in the flock's general condition."*<sup>167</sup>

The impact of louping ill virus on red grouse can be equally dramatic. The virus is responsible for high levels of mortality with 79% of infected grouse chicks dying from the virus<sup>168</sup>.

Currently research is progressing on a new form of louping ill vaccine for sheep. As well as a welfare benefit for the sheep the reduction in viral prevalence will benefit red grouse. This research, costing over £300,000 has been equally co-funded by public grant and by private donation from grouse moor owners.

Research into the economic costs of tick-borne disease in humans, unsurprisingly, produces a variety of different figures. Zhang et al (2006) calculated that the expected median of all costs (direct medical cost, indirect medical cost, non-medical cost, and productivity loss<sup>169</sup>) in five counties in Maryland, USA, aggregated across different diagnosis groups of patients, was c. \$281 per patient (2006 figures). However, Rochlin & Toledo (2020) said that the reported cost per patient diagnosed with Lyme disease in the US was \$11,838 in 2019. Johnson (2018) using data from across the USA suggested the cost of Lyme disease in the country might exceed \$75 billion a year<sup>170</sup>. Mac, Da Silva & Sander (2019) report on six studies that assessed economic burden of Lyme disease from a societal perspective and estimated significant annual national economic impact ranging from \$143,000 in Sweden to \$786 million in the USA, the cost of Lyme disease in Scotland was estimated to be \$735,550 a year. They conclude that

Lyme disease imposes an economic burden that could be considered significant in the US and other developed countries to justify further research efforts in disease control and management. They also point out that the societal costs for Lyme disease can be equally impactful as healthcare costs but are not fully understood. Moreover, Lyme disease is just one tick-borne disease and that, as noted above, seven diseases currently pose serious health risks to birds, mammals and people in the UK<sup>171</sup>.

In the UK it is possible to calculate the cost per individual of using the health services due to a tick-borne disease. A visit to a General Practitioner resulting in a prescription is estimated to cost £80, whereas hospital day-case costs £872, and admission to hospital £2,190 per episode (all costs 2022)<sup>172</sup>. However, these costs do not allow for the severity of an illness resulting from a tick-borne disease or take any account of productivity loss due to the illness. Moreover, it is obviously not possible to estimate how many people do not acquire a tick-borne disease as a result of land management practices common on grouse moors. However, it is possible to assert with some certainty that bracken and tick control on grouse moors result in a positive economic impact, which is likely to increase as more tick-borne diseases establish themselves in the UK and tick numbers rise, as a result of reduced risk of disease to both animals and humans.

## SIXTH ORDER

*"Carbon capture is a big thing for us."* (Moor owner, North Yorkshire)

In the schematic illustrating the economic impacts of grouse moors (Figure 5.4) the impacts, either positive or negative, that are delivered over the longest term and, consequently, are hardest to measure are the land management practices that are aimed at sequestration of carbon, encouraging peat formation, reducing wildfires, and reducing risk of flooding. The environmental and ecological impacts of grouse moor management are examined in sections 5.2 and 5.3. However, the potential impacts of the sixth order economic factors that have been identified from the analysis of interview data in Denny & Latham-Green (2020) need to be considered as part of a symbiotic and integrated economic and social model. This consideration involves an examination of the place of integrated moorland management in providing ecosystem services (examined in more detail in section 5.3).

'Ecosystem services' is the term increasingly used to describe the many and varied tangible and intangible benefits to humans provided by a natural environment from ecosystems and their functions.

Such ecosystems include agro-ecosystems, forest-ecosystems, grassland-ecosystems and aquatic

eco-systems. When they are 'healthy', ecosystems offer such benefits as natural pollination of crops, clean air, the mitigation of flooding and soil erosion, prevention of disease, and human mental and physical well-being through the receipt of recreational and spiritual benefits. Collectively, these benefits are becoming known as 'ecosystem services', and are often integral to the provisioning of clean drinking water, the decomposition of wastes, and resilience and productivity of food ecosystems. The importance of healthy ecosystems has been known by farmers for centuries<sup>173</sup> and by scientists<sup>174</sup> for decades. For example, the service of formation of soils and soil fertility that sustains crop and livestock production depends on the ecosystem processes of decomposition and nutrient cycling by soil micro-organisms. Vargas, Willemsen & Hein (2019) point out that ecosystems contribute to economic development through the supply of ecosystem services such as food and fresh water. Therefore, information on ecosystems and their services is required to support policy making, but this information has not traditionally been captured in economic statistics.

As the UK National Ecosystem Assessment website observes<sup>175</sup>, some scientists have advocated a stricter definition of ecosystem services as being only those components of nature that are directly enjoyed, consumed, or used to maintain or enhance human well-being. Such an approach can be useful when it comes to ecosystem service accounting and economic valuation. However, although the value of food production can be quantified, the value of other services, for example peat formation or mental well-being, have not been readily understood by policy makers, or the public. There is a danger when calculating the value of ecosystem services that only the services whose value can be easily calculated will be included. Moreover, as ecosystem services are defined in terms of their benefits to individuals and groups, they are context dependent: not everybody will value the services produced, or value them in the same way.

The Millennium Ecosystem Assessment (MEA) (2005)<sup>176</sup> grouped ecosystem services into four broad categories: *provisioning*, such as the production of food and water; *regulating*, such as the control of climate and disease; *supporting*, such as nutrient cycles and oxygen production; and *cultural*, such as spiritual and recreational benefits. Integrated moorland management, as defined in this report, delivers all four categories of ecosystem services using the MEA definition.

However, quantifying the economic benefits of eco-system service remains a difficult and inexact science. Schröter et al (2021) point out that although conservation efforts are increasingly supported by ecosystem service assessments, these assessments

depend on complex multi-disciplinary methods, and yet rely on a number of assumptions that reduce complexity. However, as many assumptions are ambiguous or inadequate, misconceptions and misinterpretations may arise when interpreting results of assessments. They point out that an interdisciplinary understanding of assumptions in ecosystem service science is needed to provide consistent conservation recommendations, and suggest that future assessments should be carried out to increase transparency about assumptions, and to test and validate them and their potential consequences on assessment reliability. This work, if carried out, will support the taking up of assessment results in conservation science, policy and practice, but it is in its infancy.

The McMoran et al (2020) study recognised that there were indirect economic benefits and/or costs arising from integrated grouse moor management. However, attempting to account for these aspects was beyond the scope of their research. Denny & Latham-Green (2020) did attempt to identify areas of potential indirect impact arising from moorland management associated with driven grouse shooting. Their primary data gathering included semi-structured interviews with 17 moor or estate owners, 13 (76%) of whom stressed the importance they attached to carbon sequestration and peat formation and restoration<sup>177</sup>. The owner of an estate in North Yorkshire highlighted this point:

*"Carbon capture is a big thing for us. Peat is a major sequester of carbon and, when conditions are right, peat is being formed all the time from sphagnum moss"*<sup>178</sup>. *We have to look after the moors to maintain the peat. This means we have to keep the heather short and new. If it gets old and woody you get wildfires and they will damage or destroy peat that has taken hundreds of years to deposit."*

A Scottish estate owner echoed this theme: *"Our moor has deep peat, over 10 metres deep in places. It is a designated site for blanket bog. If you don't manage the heather, it gets too long and the sphagnum moss can't form, so there is less peat formation. Managing the heather with controlled burning reduces the risk of wildfire, if it is done on a seven-year rotation."*

A moor owner and farmer stressed the importance of stewardship schemes to carbon sequestration, saying:

*"All the (local) farmers have joined into the Higher Level Stewardship environmental scheme (which is being replaced by the ELM scheme). The scheme provides payments for producing environmental outcomes. These outcomes are hard for us individual farmers but if a group of farmers work together, they can succeed. The outcomes include things such as biodiversity, carbon capture, and maintenance of habitats such as blanket bog. I am very keen on integrated moorland management."*

## References

<sup>173</sup> See, for example, the agricultural practices of Charles 'Turnip' Townshend, 2nd Viscount Townshend and his work promoting the Norfolk four-course system.

<sup>174</sup> See, for example, the extensive work of Stephen T. Trudgill on the importance of healthy soils.

<sup>175</sup> <http://uknea.unep-wcmc.>

<sup>176</sup> <https://www.millenniumassessment.org/en/index-2.html>

<sup>177</sup> The interview schedule did not have a question that mentioned carbon sequestration or peat restoration. However, the majority of estate or moor owners spoke about these issues, often with real passion. We are not, of course, suggesting that only owners of moors where grouse shooting takes place are concerned with carbon sequestration, peat formation and restoration.

<sup>178</sup> It should be noted that other vegetation, as well as sphagnum moss, forms peat.



## The estate is in the latest Countryside Stewardship scheme which, apart from other things, provides payments for blocking up the moor drains that were put into the moor...

### References

<sup>179</sup> [https://www.hutton.ac.uk/sites/default/files/publications/Peatlands%20final\\_web\\_reduced%20size.pdf](https://www.hutton.ac.uk/sites/default/files/publications/Peatlands%20final_web_reduced%20size.pdf)

<sup>180</sup> Using data from the MA, recent GWCT estimates put the amount of carbon stored in peat on grouse moors at between 66 and 205 million tonnes, which is between 11% and 35% of the total carbon stored all English peatlands. The GWCT went on to estimate carbon emissions from grouse moors and found that English grouse moors emit between 1% and 5% of the net carbon emissions from England's peatlands per year. English grouse moor carbon emissions are therefore proportionally well below the proportion of carbon that they store, compared with other peatland uses. [https://www.gwct.org.uk/policy/briefings/carbon-storage-on-grouse-moors/?utm\\_source=All+Contacts&utm\\_campaign=82e63069dc-Non-Mem-NL-230421&utm\\_medium=email&utm\\_term=0\\_dd843c5cb6-82e63069dc-275649198&mc\\_cid=82e63069dc&mc\\_eid=1da0a5cac3](https://www.gwct.org.uk/policy/briefings/carbon-storage-on-grouse-moors/?utm_source=All+Contacts&utm_campaign=82e63069dc-Non-Mem-NL-230421&utm_medium=email&utm_term=0_dd843c5cb6-82e63069dc-275649198&mc_cid=82e63069dc&mc_eid=1da0a5cac3)

<sup>181</sup> <https://www.gov.uk/countryside-stewardship-grants/grip-blocking-drainage-channels-wn1>

The importance and economic benefit of carbon sequestration and storage has been recognised by UK policy makers for over a decade. The Climate Change (Scotland) Act 2009<sup>179</sup> recognised the value of peatlands and peatland restoration to ensure that carbon was sequestered rather than emitted. The modelling conducted by Reed et al (2013) showed restoration of peatlands damaged by former intensive management would result in an increase in carbon sequestration and storage, with a number of co-benefits, which could counter the loss of habitats and species elsewhere in the landscape. A 2013 Defra report concluded that it is possible to value peatland carbon in the context of a Payments for Ecosystems Services (PES) scheme by using a standard value approach. It also suggested that to obtain greatest carbon emission reduction benefits PES schemes should generally target severely degraded and drained peatland sites. The report highlighted the need to revegetate bare peatlands to increase carbon storage. However, there is no generally-accepted methodology to calculate the amount of carbon stored in peat on grouse moors<sup>180</sup> or to calculate the economic value of carbon sequestration measures on moorland at the current time.

The impact of moorland restoration work was also claimed to impact on biodiversity (illustrating the holistic nature of the moorlands). The Operations Manager of the agricultural and moorlands contractor (cited earlier) remarked that a significant proportion

of her firm's income comes from peat restoration. She contrasted restoration projects for different clients:

*"In 2019 the company did two projects at the same time, one on a National Nature Reserve and one on an estate. On the estate there were lots of waders and other wildlife. On the Nature Reserve the staff saw very few birds. The Nature Reserve does not manage the heather like the estates do, so it gets long and you get trees sprouting. The lack of light reduces Sphagnum moss formation and you don't get new peat forming. If you don't manage a moor, you get a wood. If you have shorter vegetation, the ground-nesting birds can see predators and they feel safe. They love it."*

Nearly all moor and estate owners commented on the importance of managing the drainage on their land. They were struck by the irony that they can now access government funding<sup>181</sup> to undo what their predecessors were paid by the government to do! An estate owner in North Yorkshire summed the situation up well:

*"The estate is in the latest Countryside Stewardship scheme which, apart from other things, provides payments for blocking up the moor drains that were put into the moor between the 1940s and the 1970s as part of earlier government environmental schemes."*

Another North Yorkshire moor owner said his aim was to manage the land:

*"...so the activities are carbon neutral, and to sort out the water issues so there is no pollution or flooding, etc. I am now being rewarded for undoing what the government paid moorland owners to do post-WW2. I am blocking moor drains, etc, to control flooding downstream."*

This owner pointed out that water from his land drains into the River Ouse, which flows through York. He has put meanders into streams on his land (which had been straightened by government-funded drainage schemes in the 1960s) to lengthen

the water course, reduce peak flows, and improve aquatic life, as a contribution to try to reduce flooding downstream. The potential value of such work done by one moor owner is highlighted by Watson et al (2016) who estimated that the annual value of flood mitigation services carried out on one small river and area of wetlands in the USA provided annual benefits of between \$126,000 and \$450,000 to the town of Middlebury, VT in terms of flood damage reduction. Applying Watson et al's methodology to all moorland flood mitigation schemes delivered by UK grouse moor owners would presumably result in an estimate of the potential value of such schemes. However, such a study would be complex and very expensive.

Therefore, although parallels from some previous research can be drawn, the economic impacts of carbon sequestration and flood reduction work carried out on grouse moors, although significant and positive, are currently impossible to measure accurately. The costs of the flooding that hit the UK (including York, which experienced 'nightmare' floods in December 2015<sup>182</sup>) were estimated by the Environment Agency (Environment Agency, 2018) but it is clearly not feasible to try to calculate on a UK level the economic effect of blocking moor drains, or increasing the length of streams. Similarly, work done to encourage peat formation and reduce wildfires cannot be accurately valued economically on a large whole-landscape scale. However, the value of this work is undoubtedly significant. A qualified ecologist who has never been involved in grouse moor management or shooting pointed out that:

*"Until coronavirus hit us, all political parties were being affected by the impact of climate change. They have now realised that climate change is expensive. The moors hold the biggest carbon store in the UK and have done for hundreds of years. If you have too much old heather, it becomes a major fire risk and when it burns in a wildfire you get a deep fire which can burn underlying peat. This is disastrous for the moor and for carbon release. But controlled burning of short heather does not burn the underlying peat. Effective moorland management, for grouse and other animals, protects the biggest carbon store in the UK. It protects against climate change."*<sup>183</sup>

The Sixth Order economic impacts resulting from integrated grouse moor management clearly exist; indeed, they are recognised by policy makers in the UK. Sequestering and storing carbon, reducing wildfires, and mitigating flooding have positive economic values. It will be interesting to see if in the next few years' work on ecosystems services will have advanced sufficiently for the impacts of current and potential future moorland management regimes to be compared in financial terms.

### 5.1.3 The Economic Sustainability Of Driven Grouse Shooting: Conclusions

Driven grouse shooting does not happen in isolation. The Schematic at Figure 5.4 showing the different orders of economic impact resulting from integrated moorland management, including grouse shooting, represents a holistic approach to identifying impact. It demonstrates the complex integration of actions that are involved in integrated moorland management, and the depth and breadth of the impacts of these actions. The immediate impacts (orders one and two in the schematic) are fairly simple to measure (which is presumably why previous studies have focused on them). Long-term and very-long term impacts result in effects over years, in some cases over decades. Consequently, measuring them accurately is not possible. However, the fact that it is not possible to measure an effect (for example, as noted above, it is not possible to say how many people and animals have not acquired a tick-borne disease as a result of moorland management practices<sup>184</sup>) does not mean that it is not present, and that it is not important. The impacts of integrated moorland management on the agriculture sector through financial facilitation; on tourism through the creation of a unique, accessible and attractive landscape; on human and animal health through tick and bracken control; and on carbon sequestration and flood control through moorland management and restoration practices, are immense. Moreover, their long-term financial impact is clearly massive, not only for local communities, but for the wider UK population.

The question whether driven grouse shooting is economically sustainable is an interesting one. Evidence from previous studies indicates that, viewed as an isolated activity, much driven grouse shooting is not directly profitable for the grouse moor owner per se.

However, it is important to highlight two key findings from previous studies; firstly, the majority of moorland owners and tenants do not set out to make a profit from driven grouse shooting and, secondly, driven grouse shooting is not practised in isolation. Denny & Latham-Green (2020) conducted a survey<sup>185</sup> of people who lived or worked in areas where grouse shooting took place. Responses were received from 73 estate owners, moor owners and leaseholders (sporting tenants) across the UK. All 73 respondents in this category 'agreed' or 'strongly agreed' that it was important to them that they left a better environment on the moor for future generations than when they arrived. In addition, all these respondents 'agreed' or 'strongly agreed' that 'there is an essential, symbiotic relationship between farming and shooting land management'. The strong sense of being the current custodians of the land was identified from both moor owners (*"I am the custodian of the moor."* Estate

### References

<sup>182</sup> See <https://www.bbc.co.uk/news/uk-england-35186241>.

<sup>183</sup> This statement is supported by Heinemeyer et al (2023a)

<sup>184</sup> Unless, of course, a controlled experiment was done by getting matched samples of people and animals to spend time on moors where tick numbers were, and were not, controlled. There would be some interesting ethical obstacles to overcome before such a study could be conducted!

<sup>185</sup> In addition to semi-structured interviews

# Making a living from moorlands is not easy. driven grouse shooting is not an isolated phenomenon, rather it takes place as part of a complex, integrated, year-round web of activities...

owner), and those who had worked with them on the HLS environmental management scheme (*"The tenant is embedded in the community. The events he organises (and discretely funds) bring together the 40 to 50 people in the Dale. It is not charity, or bribery, but because the tenant feels he belongs and that his duty is to do things that others cannot."* Visiting Professor). Respondents clearly believe their role is to focus on the long-term sustainability of their land, and the activities associated with its management for future generations, and the sustainability of their local communities, rather than simply maximising profits. As the report of the GMMRG pointed out: "The economic contribution from grouse moors undoubtedly makes a valuable contribution to some remote local communities. The long-term private investment attracted by grouse moors, and willingness to bear financial losses, is unlikely to be repeated for other activities. Unlike other upland land uses, neither grouse shooting nor deer stalking are subsidised from the public purse."

Any comprehensive estimation of the economic sustainability of integrated moorland management, including driven grouse shooting, should take into account the impacts of the Six Order schematic shown in Figure 5.4. It is hypothesised that if landowners and tenants were fully rewarded for the direct and indirect economic benefits that integrated moorland management, including driven grouse shooting, generates<sup>186</sup> there would be no question about the economic viability of this form of land management. However, in the absence of a holistic reward system for all economic impacts, sustainable moor ownership and leasing will continue to depend on an integrated model of economic management and, in some cases, on landowners and tenants being prepared to invest their money without expectation of a return. It is concluded that driven grouse shooting is economically sustainable on the majority of moors where it is currently practised if it is part of integrated moorland management, provided that grouse numbers and the regulatory environment permit shooting to take place in most years<sup>187</sup>.

Furthermore, it is recommended that any decision about an alternative use of moorland currently used for driven grouse shooting should use the Six

Order model to identify the economic impacts and sustainability of other options. Simply claiming that moorland should be afforested, rewilded, or used for more intensive livestock generation does not take account of the existing evidence. Integrated moorland management, involving grouse shooting, provides several positive economic impacts. This edition of the report is not claiming that DGS and the income generating activities integral to integrated moorland management represent the optimum economic use of the landscape. However, it is saying that those who propose alternative uses of the UK's moorlands should demonstrate that the economic impacts of their preferred options deliver outcomes that are at least as valuable, and that are sustainable.

## 5.2 Integrated Moorland Management: Sustainable Biodiversity?

Making a living from moorlands is not easy. driven grouse shooting is not an isolated phenomenon, rather it takes place as part of a complex, integrated, year-round web of activities, many of which involve multiple stakeholders. Moorland is less agriculturally productive than other land and most grouse moors are classed as LFAs because of their topography, lower production potential and, it is sometimes argued, distance to market. Therefore, a range of income-generating activities is required if people are to make a sustainable living in, often remote and harsh, upland areas.

Few, if any, moorland estates or moor owners solely depend on grouse shooting for their income. They are engaged in year-round operations and have income-generating activities in addition to shooting, typically livestock grazing, commercial forestry, renewable energy generation, and tourism. Each of these income-generating activities are explored further below. The key point about these economic ventures – what this report describes as integrated moorland management – is that they are interconnected with each other, and with grouse shooting, and often co-dependent. People employed by estates and moor owners seldom work on only one area of activity. Different economic ventures, and the management regimes that result from them, combine to impact the classic moorland landscape with its associated flora and fauna. Disentangling the impacts resulting from integrated moorland management is difficult and our review of the literature suggests that it has not been accomplished so far.

Many of these economic activities attract subsidies, with the notable exception of grouse shooting. This chapter will review the evidence for the sustainability of the landscape on which driven grouse shooting is practised and the impacts of integrated moorland management on the biodiversity of these areas of the UK.

## 5.2.1 Livestock Grazing

Livestock have been grazed on the moorlands for centuries. Cattle mainly graze in lower, grass-rich, areas,<sup>188</sup> but sheep can range at higher altitudes and thrive on heather and other moorland vegetation. Managing moorland for grouse has, in the past, often sat uneasily with sheep grazing. Durie (1998) observed that in the mid-19th century although graziers welcomed predator control, particularly control of foxes, they were accused by gamekeepers of burning too much and letting their sheep overgraze young heather thus preventing it from regenerating<sup>189</sup>. During the 20th century, government-funded schemes promoting afforestation and intensification of sheep grazing in the British uplands led to widespread declines in globally rare heather moorland. Between 1948 and 2009, when grazed heavily by sheep, heather-dominated vegetation on Langholm Moor in south-west Scotland declined from 53% to 14% cover. Large-scale sheep reductions from 2011 then allowed an increase of heather-dominated vegetation cover to 18% by 2015 (Ludwig et al, 2020a). It should be noted that the operation of various stewardship schemes, again funded by governments, has worked to reduce the numbers of sheep in many upland areas to prevent over-grazing and to allow heather landscapes to recover. However, sheep removal does not necessarily result in an increase in the diversity of species of vegetation (Marrs et al, 2020).

McMorran, Thomson & Glass, (2020) point out that sheep enterprises generated a profit before capital costs of £25 per hectare on average. However, this statement is qualified when they observe that without subsidies all the sheep enterprises would have returned losses, with average losses of £15 per hectare before capital costs. The sheep enterprises were therefore heavily dependent on public support (66% of revenue on average) to ensure their financial viability. As noted in the section on the Economics of Driven Grouse Shooting, many farmers and their families work closely with gamekeepers and moor owners, and earn additional income from shooting. Additionally, integrated moorland management

can result in farmers benefiting from the financial facilitation role played by many estates and sporting tenants in securing stewardship scheme funding. Without this facilitation role, many moorland farmers would struggle even more than they do at present to remain viable. The work of the farmers and the estates has become – in many areas – symbiotic, leading to the maintenance and enhancement of heather moorlands, with year-round access, which are promoted to tourists<sup>190</sup> and generate very significant income for the local area. A moor owner in Northumberland remarked: "It is unthinkable not have them (farming families) farming the upland areas... We work with them on the HLS scheme which provides payments for environmental outcomes. The outcomes are hard for individual farmers but if a group of them work together, they can succeed."<sup>191</sup>

Since World War 2, it is government policy and funding regimes that have largely determined the number of livestock grazing on heather moorland. As priorities have changed from maximising food production to maximising biodiversity and mitigating climate change, upland farmers and landowners have responded as they seek to generate income. Governments have used economic incentives to affect and change behaviour of those seeking to earn an income from moorland. It is not surprising that livestock grazing has impacted on the flora, and thus the fauna, of moorlands. Moor owners engaged in integrated moorland management must strike a balance between different economic activities, some of which complement each other, and some of which can compete. Livestock grazing and driven grouse shooting can and do co-exist in harmony, if a workable balance is achieved. As noted above, a farmer in North Yorkshire described how livestock grazing can operate to the benefit of moorland: "Cattle are less profitable than sheep due to overheads such as silage, sheds, machinery and so on. However, cattle improve the land for ground-nesting birds including, on my farm, curlew, lapwing and woodcock. Cattle work brilliantly as part of an integrated system."<sup>192</sup> Such an integrated system is sustainable, but the balance can always be tipped one way or another by the operation of government policies and subsidies.

### References

<sup>186</sup> Calculating the overall economic impacts is, of course, not possible at the present time.

<sup>187</sup> The increasing prevalence of heather beetle and ticks, perhaps linked to climatic factors, is a potential threat to having a sufficient surplus of grouse to shoot at.

### References

<sup>188</sup> Although some lighter breeds such as belted Galloways are often used on peatlands to provide some grazing pressure to increase biodiversity.

<sup>189</sup> The same problem that was seen in Ireland in 2002, see section 4.1.7 above.

<sup>190</sup> See, for example, <https://www.northyorkmoors.org.uk/visiting/see-and-do/amazing-views>

<sup>191</sup> Interview with S Denny 13th May 2020





### 5.2.3 Renewable Energy Generation

Integrated moorland management involves upland landowners in a range of income generating activities, including alternative or renewable energy production. It is worth noting that the world's first use of renewable energy was pioneered by a Northumbrian grouse moor estate owner in 1878. Lord Armstrong, owner of Cragside, installed a hydroelectricity plant, raising water by means of an Archimedes screw which enabled water from the lakes on the estate to generate electricity to illuminate the house. Over a century later, increasing numbers of estate owners are seeking to generate income through either water, wind or biomass power-generation schemes.

The IUCN notes that renewable power capacity was projected to expand by 50% between 2019 and 2024. However, the IUCN points out: "Clean energy sources like wind and solar can also impact biodiversity through disturbance and loss of habitat, the generation of noise pollution, collision and other indirect pressures. Therefore, despite the intrinsic and much-needed positive contribution of these renewable technologies to a clean energy future, renewable energy projects need to address the associated risks to biodiversity, throughout the entire project life-cycle -- from design and permitting to the operational and decommissioning phases."<sup>194</sup>

The impact of renewable energy generation on biodiversity has to be balanced against the potential opportunities for mitigating climate change.

The GWCT observed that the UK's commitment to increasing renewable energy production is critical for reaching net zero carbon emissions. The funding available (subsidies funded by taxpayers) to install renewable energy schemes, and the income that can be made from operating them, can be an important part of a diversified income for upland landowners<sup>195</sup>. However, although hydro schemes are typically small scale (the associated buildings being the size of a small barn) and are claimed to have little negative impact on the environment<sup>196</sup>, building wind farms on moorland is shown to affect its habitats, soil, and the wider landscape (Chico et al, 2023). The main impacts on moorland habitats from wind farms are from the use of land for tracks, crane hard standings, turbine bases, control buildings, borrow pits and changes in drainage. Chico et al, (2023) conclude that there is a pressing need to assess the long-term impacts of wind farms on peatlands to ensure that efforts to meet energy targets result only in carbon sequestration, and do not jeopardise ecosystem services because blanket bogs represent a particularly vulnerable habitat.

Pearce-Higgins et al (2009) found the density of some moorland bird species near wind farms was reduced by between 15% and 48%. Another study by Pearce-Higgins et al, (2012) hypothesised that the impact

of wind farms on moorland birds may be highest during the construction phase, with lower numbers of red grouse and curlew during construction. However, Heuch et al (2019) and Marques et al (2020) identified that the operation of wind turbines caused a disproportionate increase in collision mortality of raptors when they were placed in areas that raptors favoured. NatureScot has highlighted that onshore wind turbines pose an "alarming" threat to Scotland's endangered birds of prey, with the MSP for the Highlands & Islands warning that known mortalities might only be "the tip of the iceberg" given the difficulties of collecting accurate and full information on wind-farm collisions.<sup>197</sup>

Moreover, as this report makes clear in the section on alternative uses of moorland: renewable energy, in particular the manufacture, decommissioning and recycling of wind turbines has many environmentally negative impacts. Against these negative impacts it is necessary to note anecdotal evidence that many grouse moors have benefited from the cash-flow capital afforded by a windfarm, from the infrastructure of roads that facilitate burning and predator control, and possibly from reduced bird of prey presence. Moreover, it is entirely possible to drive grouse through a turbine field.

Where forested areas are felled to return an area to moorland (albeit with turbines) for renewable energy generation, over time this could be beneficial in enhancing overall biodiversity (Werritty et al, 2015). Pearce-Higgins et al, (2012) suggested some species such as skylark and stonechat may benefit from the habitat change. Where income from the windfarm is reinvested in surrounding moorland the increased management and small-scale scrub planting could benefit some species. Providing renewable energy is a main priority for the country with clear environmental and economic benefits. However, in an integrated economic and ecological system there are no actions without consequences, and these must be weighed up against negative effects.

### 5.2.4 Tourism

As noted in section 5.2 on the economics of driven game shooting, the evidence, both from people who are involved in shooting and those that are not, indicates that the existence of heather moorlands, with good levels of biodiversity and year-round access, is attractive to tourists and upland areas are proactive in developing strategies to increase tourism (Hopley & Mahoney, 2016). Increasing the accessibility of moorlands to visitors in a sensitive way also brings advantages in terms of public appreciation and understanding of some of the UK's most beautiful environments. Tourism can not only generate income but can also help raise awareness and support from both local inhabitants and visitors to the values of biodiversity<sup>198</sup>. The North York Moors

National Park website is an interesting example of how organisations seek to raise awareness<sup>199</sup>.

Moreover, income from tourism is important to upland communities and to farmers (Busby & Rendle, 2000). The GWCT reports that tourism is an area of increasing interest as an income source for some upland landowners and is extremely important to rural economies more widely<sup>200</sup>. The potential for generating revenue on a large scale to replace the current main land uses is not yet known, nor are the possible ecological impacts. More tourism can generate higher incomes for people and businesses in an area, but increased numbers of visitors will require more infrastructure, and are associated with increased disruption to both people and wildlife. Other concerns for the upland environment include higher risk of wildfires, which are already considerably more likely in spring and summer. Natural England reported that 67% of wildfires occurred in spring, and a further 25% in summer (while only 8% of wildfires occurred at the times of the year when controlled burning was allowed, and these fires were caused by accident or arson), with bank holidays and weekends being particularly associated with fire outbreaks.

The grouse shooting season normally lasts no more than two and a half months, but integrated moorland management is a year-round activity. These activities result in an accessible landscape that many people find attractive and are able to access for year-round tourism and leisure activities. Tourism is one of the income opportunities that upland areas can benefit from and, of course, people who shoot grouse are tourists to the area in which they shoot. Grouse shooting is expensive, and the Guns and their entourage are high-end tourists. The evidence, both from people involved in shooting and those who are not, indicates that the existence of heather moorlands, with good levels of biodiversity and year-round access, is attractive to tourists. Moreover, the presence of some high-quality facilities (hotels, restaurants, etc) means that different levels of tourism, from low- to high-expenditure, can be catered for.

Where forested areas are felled to return an area to moorland (albeit with turbines) for renewable energy generation, over time this could be beneficial in enhancing overall biodiversity (Werritty et al, 2015). Pearce-Higgins et al, (2012) suggested some species such as skylark and stonechat may benefit from the habitat change.

#### References

- <sup>192</sup> Interview with S Denny 12th May 2020
- <sup>193</sup> <https://backup.ons.gov.uk/wp-content/uploads/sites/3/2017/07/UK-natural-capital-developing-UK-mountain-moorland-and-heathland-ecosystem-accounts-2.pdf>
- <sup>194</sup> <https://www.iucn.org/> Accessed 21st May 2021
- <sup>195</sup> One owner of a 5,000 acre moor in North Yorkshire claimed that his small hydroelectric power scheme brought in around £40,000 per year to the estate, the same income as he got from his 1,200 sheep. Interview with S Denny 15th May 2020.
- <sup>196</sup> See, for example, <https://cairnsgorms.co.uk/hydro-schemes-given-go-ahead/> [https://en.wikipedia.org/wiki/Ruswarp\\_Hydro](https://en.wikipedia.org/wiki/Ruswarp_Hydro)

#### References

- <sup>197</sup> See <https://www.heraldsotland.com/news/homenews/23224495-wind-turbines-threat-endangered-scots-birds-prey/#:~:text=Onshore%20wind%20turbines%20are%20providing,turbines%20in%20Scotland%20since%202019>
- <sup>198</sup> <https://www.iucn.org/> Accessed 21st May 2021
- <sup>199</sup> <https://www.northyorkmoors.org.uk/looking-after>
- <sup>200</sup> <https://www.gwct.org.uk/policy/briefings/alternative-uses-for-upland-moors/>



### 5.2.5 Plants And Animals

Moorland (including upland heathland, bogs and rough grassland soils) usually have a peaty top characterised by semi-natural vegetation<sup>201</sup>. The climate and soil types found on moorland have resulted in a characteristic flora and fauna, particularly at higher altitudes where heavy grazing does not restrict 'typical' upland plant growth. This characteristic flora has been favoured over millennia by periodic burning and removal of trees to renew sub-scrub growth for either stock or grouse which has resulted in a generalised heather-dominated moorland (Goodwin, 1981; Rodwell ed, 1991), which is also evidenced in frequent charcoal layers and heather pollen and/or plant fragments in peat cores over thousands of years (see references in Heinemeyer & Ashby, 2023). However, wildfire, inappropriate burning, or lack of controlled burning can alter the mountain, moorland and heath habitat. Encroachment of trees and the 'simplification' of vegetation structure can be caused by the lack of controlled burning, whereas too frequent burning can lead to the alteration of a moor to rough grassland<sup>202</sup>. As in all aspects of integrated moorland management, there is a balance to be struck.

Rodwell (Ibid) suggests that it is possible to detect some broad climate-related patterns among the communities of moorland plants. 'Atlantic heather moor' is typically found through the more equable lowlands and upland margins of north-west Britain. On higher, cooler, ground in the hills of the north and west *Calluna-Vaccinium myrtillus* heath is more dominant. In broad terms this *Calluna-Vaccinium* heath can be regarded as the typical British 'Boreal heather moor', although in the drier conditions of the east-central Highlands of Scotland, which has extremes of temperature, the *Calluna-Arctostaphylos uva-ursi* heath is more common.

Areas where grouse shooting takes place, commonly called 'grouse moors'<sup>203</sup> are not solely composed of typical heather moorland. The latest GWCT grouse moor survey<sup>204</sup> covers 19,780 square kilometres (1.978 million hectares) of the UK, reveals differences in habitat management between groups of estates based on either location or quarry species, and sets this habitat management into its biological context.

The GWCT analysed information from 270 estates covering over 11,750 square kilometres of the British uplands, dividing them into groups based on the main quarry species: red grouse only; red grouse and red deer; and red deer only. The location of the estates within the British uplands determines, through habitat and species availability, the main quarry species. Estates managed solely for red grouse were mainly in southern Scotland, England and Wales. Estates managing both red grouse and red deer were mainly in north-eastern Scotland, with those managed solely for red deer in north-western Scotland. As noted in Section 4, red grouse estates in England were smaller than in Scotland by an average of 300 hectares. In Scotland, grouse moors were roughly half the size (3,300 hectares) of the other two types of estate (7,000 hectares). The proportion of the area of moorland on English red grouse estates was also significantly less than in Scotland (39% compared with 47%), with grassland (a combination of improved and semi-natural grassland) making up about 49% of the area compared with 33% in Scotland. Scottish red grouse estates and red deer estates had less moorland than the estates managed for both (48% versus 62%), with red grouse estates having more of their area made up of grassland (33%) than did red grouse and red deer estates (27%). Estates managed solely for red deer had a greater proportion of their area covered by woodland (19%) than did the other estates (red grouse - 14%; red grouse and red deer - 10%).

Between the 1940s and 1980s, moors that stopped grouse shooting lost 41% of their heather cover, whereas moors retaining shooting lost only 24% (Robertson et al, 2001), although it is too simple to say that driven grouse shooting results in a greater percentage of heather; the impacts of changing government policies and subsidies are important and require further examination. Historically, a landowner's commitment to grouse management may have dissuaded them from converting moors to other land uses such as forestry or agriculture. As a simplification, in England, the loss of heather moorland was mostly due to agricultural improvement and over-grazing, whereas in Scotland, heather moorland was mostly lost because of agriculture, grazing and forestry.

Grouse moor management comprises of a range of management practices, including predator control, controlled burning, light grazing management and disease management (Newey et al, 2016;

Thompson et al, 2016; Mustin et al, 2018; Littlewood et al, 2019).<sup>205</sup> These management practices are carried out to maximise red grouse *Lagopus lagopus scotica* numbers for sport shooting. Grouse moor management has been demonstrated to have positive and negative effects on the distribution and abundance of different species and biodiversity (Thompson et al, 2016; Brooker et al, 2018; Mustin et al, 2018). Predator control, the legal killing of crows *Corvus corone*, foxes *Vulpes vulpes*, stoats *Mustela erminea* and weasels *Mustela nivalis* undertaken as part of grouse moor management to minimise predation of red grouse has been shown to benefit other ground-nesting birds (Fletcher et al, 2010; Newey et al, 2016; Littlewood et al, 2019 and see Mustin et al, 2018 for recent review), and mountain hares (Patton et al, 2010; Brooker et al, 2018; Hesford et al, 2019). Predator control will suppress the local population of controlled species. However, the wider biodiversity impacts of predator control on the controlled species are poorly understood (Brooker et al, 2018). It should be remembered, at this stage, that grouse moors are not alone in controlling predators. As previously noted, Wildlife Trusts, the RSPB, the National Trust and local authorities all take action to remove predators or prevent predation. However, those involved in game shooting are at least open about their actions.



### 5.2.6 Mammals

Excluding Cetacea (aquatic mammals) there are 44 native terrestrial mammal species found in the UK (Harris & Yalden, 2008), and an additional 16 terrestrial introductions such as red-necked wallaby, Chinese water deer, and American mink. There are two species of seal. The largest single group of mammals are the bats, with 17 species. Schedule 5 of the Wildlife & Countryside Act (1981) protects all species of bat, and the wild cat, dormouse, pine marten, otter, red squirrel and water vole (as well as sea mammals). The Mammal Society website<sup>206</sup> lists 11 species commonly found on moorland: mountain hare, weasel, water vole, rabbit, red deer, wild tat, pygmy shrew, mole,

field vole and wood mouse. It is not clear why this list does not include the fox, stoat and badger<sup>207</sup>, all of which are commonly present on moorland. Other mammal species are occasionally found on moorland, and many species of bat are found in the north of England and in Scotland and will fly over moors at certain times of year.

Yalden (2008) states that internationally, uplands hold special mammal communities, especially those found in open landscapes above the tree line. He pointed out that although many mammal species are seriously endangered, uplands generally retain more complete mammal assemblages than lowlands, because variously of their remoteness, lower human population density or better protection status (eg. as national parks and wilderness areas). Historically, they have often served as refuges for lowland species (for example, in Britain). However, studies into the impacts of integrated moorland management on biodiversity are limited in number and often based on small scale studies (many without control or comparator sites). In addition, the literature examining the impacts of integrated moorland management on biodiversity does not always encompass mammals, for example Grant et al, (2012) looked at vegetation, invertebrates and birds, but not mammals.

The main impacts of integrated moorland management on mammals are through predator control and the maintenance of a heather moorland habitat. Predator control by humans is at least as old as livestock husbandry, and probably older. Reduction of predator numbers specifically to allow an increased harvest of some game species was mainly a 19th century development, whereas the adoption of predator control to benefit endangered species for their own sake belongs to recent decades. In Britain, predator control to benefit small game populations and allow harvesting has been practised for nearly 200 years, and has undoubtedly played a role in shaping the present-day fauna. Although earlier gamekeeping severely reduced the geographical range of several mammalian (and avian) predator species, nowadays predator control is subject to legal restrictions based on species' conservation status and humaneness (Reynolds & Tapper, 1996).

The chief targets of mammal predator control measures are fox, stoat, weasel and feral cats. Hudson, Newborn & Robertson (1997) examined the corpses of red grouse on study sites on grouse moors for a period of 10 years. They found that stoat kills (of grouse) were more prevalent in England, but fox (and large raptors) were more frequent predators in Scotland. Predators were also more abundant in Scotland with the frequency of sightings being positively correlated with the number of grouse killed. Grouse mortality was highest in spring. Obviously, foxes do not just eat grouse. Leckie et al (1998), in their study of moorland in south-west Scotland,

#### References

<sup>201</sup> <https://backup.ons.gov.uk/wp-content/uploads/sites/3/2017/07/UK-natural-capital-developing-UK-mountain-moorland-and-heathland-ecosystem-accounts-2.pdf>

<sup>202</sup> Ibid

<sup>203</sup> We argue that the 'grouse moor' label is unhelpful as it implies only grouse shooting takes place on an area of land. As we have shown, grouse shooting rarely, if ever, takes place in isolation from other economic activities, although the management of some areas can be largely dictated by the need to support grouse numbers.

<sup>204</sup> <https://www.gwct.org.uk/research/species/birds/red-grouse/grouse-moor-survey>

#### References

<sup>205</sup> <https://sefari.scot/sites/default/files/documents/Part%204%20-%20Biodiversity%20Impacts.pdf>

<sup>206</sup> <https://www.mammal.org.uk/?s=mammals+found+on+moorland>

<sup>207</sup> UK Fishing Statistics Research

## The inconsistency in claiming that there is not enough data on mountain hares to assess their status is evidenced by the research

found that foxes ate rodents, gamebirds, lagomorphs, carrion and animals that eat mainly insects. Rodents were the most frequent prey in sites dominated by grass, whereas gamebirds and lagomorphs were more frequent in heather moorland. As rodent populations increased, so did the numbers eaten by foxes; as rodent numbers decreased, the numbers of gamebirds eaten increased. It appeared that foxes switched to gamebirds in years or habitats where rodents were uncommon. However, the situation may be more complex than Leckie et al suggested. Ludwig, Roos & Baines (2020) report the results of a 27-year study on a moor in south-west Scotland. Their findings suggested that there was increased predation of grouse chicks in years with high vole abundance. The numbers of foxes were only weakly positively associated with vole abundance when their numbers were not controlled, whereas weasel indices showed no relationship with voles. The effect appeared to be high vole numbers attracting buzzards to the moor, which preyed on grouse broods when found. But when vole numbers declined on the moor, hunting by buzzards would also decrease, presumably moving elsewhere, and predation on grouse would also drop.

The moorland mammal that has generated the most controversy, not least among academics, in recent years is the mountain hare, as is discussed in more detail in Section 4.6, The Situation in Scotland. Here the recent literature on how integrated moorland management effects this species is reviewed. GMMRG report<sup>208</sup> to the Scottish Government, November 2019 pointed out that mountain hares are considered to benefit from some aspects of grouse moor management, particularly the reduction of predators and the creation/maintenance of mosaics of different ages of heather. However, the GMMRG report also claimed that the evidence-base for mountain hares is poor, claiming that: "Not only is there no standardised method of counting hares on moorland, but there is no mandatory formal monitoring of populations. Neither are the numbers of mountain hares shot, either for sports shooting and game food, or for management purposes<sup>209</sup>, known. As a result it is currently not possible to estimate what the population of mountain hares in Scotland actually is, nor how it has changed over time."

However, the evidence base for mountain hare range is extensive, including 100 years of bag data, 30 years of presence-absence surveys and three years of abundance estimates (Watson & Wilson, 2018). Interestingly, there seems to be no relationship between the kill density of mountain

hares and contractions in range (Hesford et al, 2020). These estimates have been generated by moor managers with no financial support from SNH/ NatureScot. Interestingly, despite this evidence base, mountain hare conservation status was deemed by NatureScot to be 'unsatisfactory-unknown'. Survey data shows that mountain hares benefit from driven grouse shooting though improved food quality, increased cover and reduced predation pressure. Crucially, the only places in the British Isles where mountain hare ranges are expanding are on moors where driven grouse shooting is practised (Hesford et al, 2020, Hesford & MacLeod, 2022). Elsewhere, mountain hare abundance has declined as grazing has been improved, woodland cover has expanded and predation pressure increased as gamekeeping efforts have declined and protected predator numbers increase. Moreover, and importantly, the methods used to survey mountain hares produce very different results. The traditional survey method was to carry out daytime transects, as described by Bedson et al (2022) who suggested that hare densities are associated with restored areas of blanket bog rather than grouse moors. However, the mountain hare is largely nocturnal. A study of mountain hares in the Peak District by members of the Peak District Moorland Group using specialised equipment at night revealed five times the density of the species than had been previously estimated,<sup>210</sup> although Bedson et al (2022) disagreed with the methodology used in the Peak District.

The inconsistency in claiming that there is not enough data on mountain hares to assess their status is evidenced by the research<sup>211</sup>, which has established that trends in mountain hare abundance indices vary with region and grouse management intensity. Hare populations are higher and relatively stable on moors where driven grouse shooting is practised relative to lower indices and greater declines on moors where grouse were either walked-up or not shot. Mountain hare numbers fluctuate over time<sup>212</sup> in a quasi-cyclical manner, fluctuations being more pronounced where hares are more abundant, ie. on driven grouse moors. It is not clear whether these fluctuations are due to resource competition, parasitism or shooting. However, Hesford et al (2020) concluded that, between 1995 and 2019, there had been no net change in the area of Scotland occupied by mountain hares, but within that area they found changes in range between sites and sites of differing grouse management intensity.

It appears that reductions in mountain hare numbers over time probably reflected sampling at decline phases of the cycle, particularly on driven moors, rather than being part of true long-term declines (Hesford, 2019). If the UK wishes to have a healthy population of the mountain hares, the evidence is that a management regime that does not involve integrated moorland management is less likely to sustain the species.



### 5.2.7 Birds

The combination of predator control and habitat management can result in some bird species thriving in areas of integrated moorland management. On the Finzean Estate in Aberdeenshire, birdwatchers have recorded 135 species<sup>213</sup>, including many birds of prey<sup>214</sup>. The GWCT's Upland Predation Experiment<sup>215</sup> found that lapwing, golden plover, curlew, red grouse and meadow pipit bred on average three times more successfully when predator control was performed, compared with the same moorland when predators were not controlled. As a result, breeding numbers increased in subsequent years, but in the absence of predator control, they declined. In the UK, numbers of foxes and crows are higher than in most other European countries and losses of egg clutches and chicks to these generalist predators are high (Baines et al, 2023). There also seems to be a positive link between integrated moorland management and the populations of some birds. Results from the Langholm Moor Demonstration Project, described in Ludwig, Roos & Baines (2019), showed that restoring grouse management was beneficial for three wader species; overall, curlew numbers rose by 10% per year on average, golden plover by 16% and snipe by 21%. Their results support the hypothesis that restoring predator control as part of grouse moor management can reverse declines of some wader species. The converse can be seen where integrated moorland management is lost. Analysis of upland bird species trends in southwest Scotland found declines in several upland bird species, including red and black grouse, golden plover, lapwing and curlew, and these are generally attributed to large-scale changes in land use, including afforestation, more intensive farming and reductions in grouse moor management (Whitehead, Hesford & Baines, 2018). The current distribution map of breeding curlew in the UK has been described as "almost a mirror image of the distribution of grouse moors, a correlation supported

by numerous scientific studies – along with red-listed oystercatchers, lapwings, black grouse, golden plover and... hen harriers."<sup>216</sup>

Additionally, an analysis of the status of grouse management in the north of England, the Scottish mainland, Wales and southwest of England showed that range contraction for curlew, golden plover, lapwing and dunlin was smallest where grouse shooting was retained and greatest where it had disappeared completely (Aebischer, Ewald & Tapper, 2010). Predator control is increasingly important if some red-listed species of bird are to thrive (Baines et al, 2023). The meta-analysis carried out by Roodbergen, van der Werf & Hötter (2012) found that predation of the nests of oystercatcher, lapwing, black-tailed godwit, curlew and redshank, had increased by around 40% since the 1970s across the UK.

However, it is not as simple as saying that integrated moorland management is good for many species of birds; different management practices affect bird species in different ways, a point clearly made by (Douglas et al, 2020). This situation can be illustrated by looking at the extent to which controlled burning is practised on an estate. Newey et al (2020)<sup>217</sup> found that curlew and golden plover prevalence generally increased with amount of controlled burning; golden plover occurrence peaked in the 41-60% burn category whereas curlew increased with greater percentages of controlled burning. This was particularly the case for these, and the other bird species assessed by the hectad (10km x 10km) where sample sizes for squares representing intense controlled burning were very small. Merlin prevalence increased with increasing amount of controlled burning up to the 41-60% controlled burning, and then declined and was absent from the squares with 81-100% burning, whereas kestrel was present at a consistent level across all controlled burning categories up to 81%. Interpretation of prevalence at the 81% plus controlled burning category is likely

#### References

<sup>208</sup> Sometimes, incorrectly, called the Werritty report.

<sup>209</sup> The GMMRG report notes that mountain hare management has taken place for four purposes: reducing competition with grouse for food; reducing browsing impact on young trees, etc; reducing the tick burden on red grouse; and reducing parasite burdens on hares and risk of disease, see p. 39 in file:///C:/Users/simon/Downloads/grouse-moor-management-review-group-report-scottish-government%20(1).pdf

<sup>210</sup> <https://www.gwct.org.uk/news/news/2022/february/peak-district-a-stronghold-for-mountain-hares/>

<sup>211</sup> Hesford et al (2019)

<sup>212</sup> Mountain hares have the potential for high population growth.

#### References

- <sup>213</sup> UK Fishing Statistics Research
- <sup>214</sup> GWCT (2020) Moorland Conservationists: The Untold Story <https://www.gwctshop.org.uk/products/moorland-conservationists-the-untold-story> Not all of these bird species were found on upland heather moor, the estate has many different types of habitat.
- <sup>215</sup> <https://www.gwct.org.uk/research/species/birds/lapwing-and-other-waders/predator-control-and-moorland-birds/#:~:text=The%20Upland%20Predation%20Experiment%20based,abundance%20of%20moorland%20birds.>
- <sup>216</sup> <https://www.gwct.org.uk/blogs/news/2022/april/the-legacy-of-a-cultural-landscape/>
- <sup>217</sup> <https://sefari.scot/sites/default/files/documents/Part%204%20-%20Biodiversity%20Impacts.pdf>



confounded by the small sample size. Both lesser redpoll and whinchat showed consistent levels of prevalence at low to moderate levels of controlled burning and showed increases in prevalence in the 61% and higher controlled burning categories. Lesser redpoll prevalence peaked in the 61-80% burn category and the species was absent in the 81-100% category, whereas whinchat was most prevalent in the 81-100% category.

However, Newey et al point out that their study was restricted to the area for which controlled burning data was available and that this was largely from areas where grouse moor management was known to be an important land use. Other areas where burning – either controlled or wildfire – occurred were not studied. Newey et al’s study is impressive but did not have a control (for example, an area of moorland where grouse management does not take place but which is subject to burning). Therefore, it is not possible to say that their findings are applicable to all situations. In addition, as they point out, species may be responding to aspects of moorland management other than controlled burning, and the occurrence of a bird species is likely to be influenced by the wider landscape. Indeed, the Newey et al study has the same limitations that the great majority of ‘biodiversity’ studies labour under: it was looking on a relatively small-scale area over a limited time and thus could not capture the overall mosaic impacts on a catchment/landscape scale on a medium- or long-term basis.

The management of moorland to support grouse numbers may also benefit some raptor species. Ludwig, Roos, et al (2020) carried out a 27-year study as part of the Langholm experiment. They found that ground-nesting raptors, hen harrier (*Circus cyaneus*) and merlin (*Falco columbarius*), increased during periods of grouse moor management and had a higher proportion of successful nesting attempts<sup>218</sup>. Predation was the main apparent cause of breeding failure of both raptor species. In contrast, grouse moor management did not influence either abundance or breeding success of tree- and crag-nesting species, ie. peregrine (*Falco peregrinus*), common buzzard (*Buteo buteo*), and raven (*Corvus corax*). Buzzard sightings increased during the study, in line with their national recovery, whereas peregrine and raven showed little change in abundance. The results of this study suggest that management for red grouse can benefit both hen harrier and merlin.

Our review of the literature leads us to the conclusion that the maintenance of a mosaic of moorland vegetation (Watt, 1947, Velle et al, 2021<sup>219</sup>) as a result of management, and control of predators (chiefly fox, stoat, weasel and crow) results in a habitat that is important for the survival of many rare (red-listed) bird species.



### 5.2.7 Invertebrates

Grant et al (2012) in their research report (for the RSPB) point out that an understanding of the effects of grouse moor management on moorland invertebrates is limited. Although rotational controlled burning on dry dwarf shrub heath increased the diversity and abundance of some invertebrate groups (eg. ground beetles) via increase in the structural diversity of vegetation, unmanaged and degenerate Calluna stands were found important for other groups (eg. lepidopteran larvae). Although invertebrate diversity tends to be relatively low when compared with other habitats, rare species are associated with moorland, including moths, bees, butterflies, various money spider species, craneflies, and ground beetles (Backshall, 2001). For example, the bilberry or mountain bumblebee is only found in bilberry-rich moorlands with heather, which provides nectar late in the summer and protection from the weather.<sup>220</sup> The GWCT and RSPB agree that different management regimes suit different species of invertebrate; butterflies and moths tend to be more diverse and abundant on moorland areas when heather is older, compared with recently burnt areas. Importantly, although the number of species of plants or animals found on heather moorland can be fairly low, those species that thrive are often specialist species not found elsewhere, highlighting the importance of a mosaic of maintained heather moorland for their conservation.

Newey et al (2020) agree with the fundamental point that the invertebrate fauna of moorland tends to reflect its structural diversity and can be quite rich. They observe that invertebrate species respond differently to climatic conditions, vegetation and soil types, and management regimes. Thus, green hairstreak butterflies were most prevalent at low to moderate levels of burning and showed a general decline in prevalence with very high levels of burning. However, the pattern in change in prevalence with increasing burning is not clear. It is possible that more invertebrates are detected in areas that have been

intensively burnt because they are easier to find than in areas of dense, high heather and grass.

Eyre, Luff and Woodward (2003) carried out a potentially interesting research project over a five-year period in the Scottish borders with areas of land some of which was subject to three different management regimes: management by burning; management by cutting; and management by herbicide application. (However, it is not clear what the size of the areas of land subject to different management regimes was, how frequently they were managed, or even the type(s) of herbicide used.) They recorded 39 nationally rare and scarce species of invertebrate, as well as more commonly-occurring species, and found that the management of dry Calluna moor had a positive effect on the habitat diversity for ground beetles and plant bugs, but had little effect on rove beetles and spiders. The most important habitat proved to be on streamside sites, especially sediment. Unsurprisingly perhaps, a number of these rarer species were restricted to sites managed by burning and cutting but other species were only found on unmanaged wet Calluna moor. Molinia-dominated moor was generally of poorer quality than Calluna sites, with fewer rare and scarce species and lower site rarity values based on the ground beetle species recorded. The highest median site rarity scores were for dry, open, managed Calluna sites. They concluded that, to maximise both habitat diversity and the incidence of rare and scarce species on grouse moors, a mosaic of both managed and undisturbed patches differing in soil characteristics, plant composition and vegetation structure appears to be required. This recommendation was reinforced by Buchanan et al (2006) who pointed out that: “The differing habitat associations of invertebrates mean that sites with a mosaic of habitat types are liable to support a greater diversity and abundance of invertebrates than homogeneous sites.” More recently, Sanderson, Newton and Selvidge (2020) found more invertebrates in the vegetation building-phase (seven-year-old) cut heather than in fresh cut or mature vegetation. Importantly, the GMMRG report concluded that: “There is also evidence that regular controlled burning managed in accordance with the Controlled Burning 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.”

The literature strongly suggests that integrated moorland management, including management regimes to enable grouse shooting to take place, by producing a patchwork, or mosaic, of heather and other vegetation, is likely to support a richer population and diversity of invertebrates than a heather-dominant moor without regenerating burnt, cut or grazed heather patches. However, at the risk

of being repetitious, more research is needed before firm conclusions can be drawn.

### 5.2.9 Diseases, Pests And Parasites

All environments harbour organisms that are commonly classified as pests or parasites, many of which can cause disease among both plants and animals. This report does not set out to enumerate and describe all diseases, pests and parasites found on moorland, rather it summarises the literature relevant to those that are most common, and which can have significant economic consequences and implications for the sustainability of driven grouse shooting and other moorland activities involving humans.



### TICKS AND BRACKEN

Probably the most high-profile disease-causing parasite on moorland is the tick. Over 20 species of ticks are found throughout the UK but the sheep tick (*Ixodes ricinus*) is most prevalent in upland areas where the creatures it feeds on (sheep, deer, rabbits, hares, birds, lizards and rodents) live. However, ticks are increasing their distribution, especially in woodlands and are now found in urban areas and even on beaches. The ‘headline’ disease caught by humans from tick bites is Lyme disease (not all ticks carry Lyme disease). Lyme disease is an infection caused by bacteria belonging to the *Borrelia* genus, notably *Borrelia burgdorferi*. *Borrelia* are spirochaete (spiral-shaped) bacteria and have many similarities to the organism that causes syphilis. The number of people who contract Lyme disease in a year is unknown, but evidence suggests it is rising. Data from Public Health England show that there were 1,534 confirmed cases of Lyme disease in England in 2017, compared with 1,134 cases in 2016<sup>221</sup>. There is, however, likely to be significant under-reporting owing to a combination of factors. It was estimated

#### References

<sup>218</sup> Defra announced in 2020 that there had been a 100% increase in the number of hen harriers in Britain (albeit from a low base) with moorland estates in the north of England used for grouse shooting being responsible for much of this increase.

<sup>219</sup> The four stage vegetation cycle described by Watts was based on either lowland heath or extreme montane areas rather than grouse moors. Readers interested in the heather (calluna) cycle and the ways it can be managed are referred to Velle et al.

<sup>220</sup> It is important to note that, in nearly every instance, biodiversity is maximised within a landscape by having a greater number of habitat types each containing a mosaic of successional stages. Therefore, simple numbers of species per habitat have limited utility for understanding and maximising biodiversity. The important thing is how unique an ecological community is.

#### References

<sup>221</sup> <https://www.guidelinesinpractice.co.uk/infection/lyme-disease-when-to-suspect-and-how-to-manage/454252.article>

## References

<sup>222</sup> Professor Roy Brown, 29th May 2020. Professor Brown is Visiting Professor in Epidemiology and Invasive Species Control at the University of Lincoln and a specialist researcher/consultant working in the environmental control of hard bodied ticks and tick-borne diseases in the Northern Hemisphere at the habitat/landscape scale through the research company 'R & D Applied Biology' in North Yorkshire.

<sup>223</sup> Tick-borne diseases include Arbovirus (which includes tick-borne encephalitis and the Flavivirus group. Ebola and zika are members of this group); protists; bacteria (including Lyme disease); tick paralysis; and alpha gal syndrome.

<sup>224</sup> Louping ill seems to have been present in the UK for around 800 years, and has been recorded for more than 200 years in sheep flocks. As sheep farming expanded to the uplands in the 19th century, grouse were exposed to louping ill <https://www.gwct.org.uk/research/species/birds/red-grouse/controlling-louping-ill/#:~:text=From%20the%20blood%20samples%20we,start%20of%20the%20shooting%20season.>

<sup>225</sup> GWCT (2020) Moorland Conservationists: The Untold Story <https://www.gwctshop.org.uk/products/moorland-conservationists-the-untold-story>

<sup>226</sup> Interviewed on 20th May 2020 by S Denny

<sup>227</sup> Interviewed on 20th May 2020 by S Denny

<sup>228</sup> <https://www.gwct.org.uk/research/species/birds/red-grouse/controlling-louping-ill/#:~:text=From%20the%20blood%20samples%20we,start%20of%20the%20shooting%20season.>

<sup>229</sup> <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/acaricide>

<sup>230</sup> The protozoan parasite *Cryptosporidium* infects all major vertebrate groups and causes significant diarrhoea in humans, with a spectrum of diseases ranging from asymptomatic to life-threatening. Children and immunodeficient individuals are disproportionately affected, especially in developing countries, where cryptosporidiosis contributes substantially to morbidity and mortality in preschool-age children. Despite the enormous disease burden from cryptosporidiosis, no antiprotozoal agent or vaccine exists for effective treatment or prevention. Source: Sponseller et al (2014)



at an internal NIHR working meeting in February 2020 that there could be as many as 18,000 new cases of Lyme disease confirmed in the UK in 2020, against about 4,000 in 2015<sup>222</sup>.

The risks to health from tick-borne diseases are serious, and under-estimated<sup>223</sup>. Professor Roy Brown has written that: "The number of tick-borne diseases is increasing dramatically (seven diseases currently pose serious health risks to birds, mammals and people in the UK). The rates of infection in ticks and multiple pathogen loads are also increasing. New pathogen strains (eg. the Flavivirus causing tick-borne encephalitis) have become 'native' in the UK in the very recent past." Lyme disease is a 'headline' problem but there are several other chronic (as well as acute) tick transmitted infections affecting a much larger number of people, as well as companion animals, stock and wild mammals and birds."

The impact of tick-borne disease, such as louping ill<sup>224</sup>, tick-borne fever, babesiosis and tick pyaemia, on moorland livestock can be very serious. Sheep can be badly affected by louping ill virus, as one moorland owner said: "Our shepherd began to notice symptoms in some of the lambs and at that point we had sheep and grouse tested for the louping ill virus. The tests proved 84% positive and the vet said it was the worst case he had seen."<sup>225</sup>

In moorland areas, ticks are particularly prevalent in bracken. Dense bracken covers about 900,000 hectares in the UK and is increasing by between 1% and 2% per annum. Bracken is present and increasing on a further 700,000 hectares. A bracken control company director<sup>226</sup> pointed out that: "Bracken holds c. 70% of the tick load on a moor." Moreover, in the UK changes in land use policy and the climatic gradient have encouraged bracken growth over the last 30 years and not only does the plant hold the majority of the ticks on a moor, but tick numbers are increasing rapidly. Moor owners and gamekeepers in England and, especially, North Wales and Scotland report ticks as being a 'massive problem'. In Scotland ticks were described by an owner of a 25,000 acre (about 10,100 hectare) estate as endemic<sup>227</sup>.

As well as being a host for ticks, bracken is also a disease-causing organism in its own right, although conclusions about a risk to human health from bracken cannot firmly be drawn (Wilson et al, 1998). Although the young fronds of bracken are eaten by people in some parts of the world (for example Japan) it is toxic containing carcinogens linked with, among other illnesses, several diseases in animals, including oesophageal and stomach cancer, ovotoxicity, bone marrow depression and blindness (Wilson et al, 1998). In addition to this direct toxicity to animals and humans due to a number of poisoning and growth impacting chemical groups within the spores, frond, rhizome and true root systems, bracken also impacts through the action of the living plant and litter on the soil and water systems in the habitat, including direct toxicity in drinking water (O'Driscoll et al, 2016).

On estates where grouse shooting occurs, landowners, gamekeepers and farmers/graziers combine activities to control both bracken and tick numbers. The reduction in tick burden on managed moors reduces the health risks for both wild and domesticated animals, and humans. However, the steady increase in the distribution and numbers of ticks means that their impact on animals, including humans, is likely to continue to be a significant problem unless treatments evolve with diseases

## THE DISEASES OF GROUSE

Grouse can be very seriously affected by louping ill, and the virus is associated with high levels of mortality, with 79% of grouse chicks dying from the virus in both laboratory and field conditions.<sup>228</sup> Fortunately, sheep can be vaccinated and treated with tick-killing pesticides such as acaricides, and where this is done, both sheep and other animals, including grouse, are less likely to suffer from louping ill. The development of acaricide resistance by ticks is a, as yet unrecorded, concern.<sup>229</sup> In addition to diseases carried by ticks, the red grouse is also assailed by other maladies including the strongyle worm and respiratory cryptosporidiosis<sup>230</sup>.

*Trichostrongylus tenuis*, also known as the strongyle worm, is a gut nematode found in the UK. This endoparasite causes a condition often called strongylosis or 'grouse disease'. When the adult worm burrows into the caeca walls it causes damage and internal bleeding which in itself is harmful to the grouse. The worms ultimately reduce the digestive efficiency thus affecting the condition of the grouse. The GMMRG report, November 2019, pointed out that the presence of the strongyle worm in the gut of red grouse can cause cyclical fluctuations in grouse numbers every six to nine years. Strongylosis can be controlled by using a medicated grit, normally quartz, coated with a worming agent, currently flubendazole, which is also commonly used to treat worm burdens in humans, sheep and cattle. This medication is only available for use with a veterinary prescription and must be withdrawn from use at least 28 days before the grouse are shot and put into the food chain. The use of medicated grit, which should be placed on bespoke trays across a moor, has substantially suppressed strongylosis. As the GMMRG report points out that, given previous efforts at controlling the strongyle worm without medicated grit were unsuccessful, and ever-increasing pressure on grouse by protected predators (as evidenced from the Langholm Moor projects), its use is now deemed essential if grouse levels are to be kept high enough to yield a harvestable surplus. The GMMRG stated that: "Having reviewed the written and verbal evidence presented to the Group we find that, when used correctly, flubendazole is a widespread treatment that has proved highly effective in reducing endemic strongyle worm levels in grouse guts. Also, when used correctly, its residues in grouse for human consumption currently appear to present a very low risk. As past efforts of controlling strongyle worm burdens have not worked, the use of medicated grit is a key factor in maintaining consistent grouse numbers year on year." Best practice guides for the use of medicated grit are readily available<sup>231</sup>.

It is important to note that, in common with nearly all aspects of integrated moorland management, there are important evidence gaps in the use of medicated grit. As the GMMRG report observes: "Although there is as yet little evidence of a resistance problem with the use of medicated grit, more research is required on the potential development of such resistance and its implications... There is some evidence that flubendazole is toxic to aquatic organisms; accordingly GWCT guidance recommends that grit trays be located no closer than five metres to running or standing waters. At present the Scottish Environment Protection Agency (SEPA) does not test for the presence of flubendazole contamination in water bodies. Current testing for flubendazole residues in the food chain is based on a small number of grouse samples each year and it is unclear what level of contamination would constitute a threat to

human health." There is also a possibility that if many grouse visit a grit tray, *Cryptosporidium* might spread. However, this disease had only been detected once on grouse moors in Scotland up to 2019.

The first instance of a grouse in the UK infected by *Cryptosporidium baileyi* was diagnosed in 2010. By 2013, signs of infection were reported from grouse on half of all grouse moors in northern England, bringing severe concerns of economic losses to grouse shooting (Baines et al 2020). The prevalence of respiratory cryptosporidiosis has been shown to vary with age, being twice as common in juveniles (4.5%) as in adult birds (2.4%). Birds shot later in the season are more like to have the disease than those killed earlier. Baines et al suggest that disease incidence is highest in naive juveniles that have previously not been exposed to infection, with prevalence dropping as birds develop immunity. Their study: "Found no evidence of increased prevalence over time, and fears of escalated disease prevalence, bringing with it increased mortality and lowered productivity, that may have significant impacts on the economic viability of shoots, have not yet been realised."



## HEATHER BEETLE

The heather beetle (*Lochmaea suturalis*) is a naturally-occurring species in the heather-dominated landscapes of the UK (Gillingham, 2016; Pinder et al, 2015). The beetle's favoured diet seems to be *Calluna vulgaris* (ling heather), but it can also feed on ericaceous heaths such as bell heather and cross-leaved heath which are both also common in moorland areas. The beetle attacks heather by scraping the plant's outer surface that helps its leaves retain water, thus exposing the plant to risk of drying out. The plant responds to this risk by cutting nutrient supply to the affected parts, thus causing it to appear dead. The Heather Trust<sup>232</sup> points out that: "Periodically, heather beetle populations expand into huge outbreaks, in which millions of beetle grubs can decimate<sup>233</sup> hundreds of hectares of carefully managed heather. The Trust has long been concerned

## References

<sup>231</sup> See for example, <https://www.gwct.org.uk/media/502626/medicated-grit-guidelines.pdf>

<sup>232</sup> <https://www.heathertrust.co.uk/heather-beetle>

<sup>233</sup> The Heather Trust uses the word 'decimate', the meaning of which is to cull by one tenth. 'Devastate' would be a more appropriate word to use.

about the potential for heather beetle to devastate heather moorland on a wide scale." Whether or not heather dies or survives a heather beetle outbreak appears to be linked to the stress that the plant is already under; pre-existing drought, water-logging, crushing and heavy grazing are common features where heather dies back after beetle damage.

Different methods of controlling heather beetle numbers have been tried, but there does not appear to be a 'best practice' management regime at present (Gillingham et al, 2015). A study commissioned by the Heather Trust (The Peak District Heather Beetle Project<sup>234</sup>) reported in 2019 that there was no difference in heather regeneration from plots treated with the three different management approaches of cutting, burning or control (ie. do nothing) when considered in the long term. This suggests that many heather beds affected by the beetles are as likely to recover in the absence of specific active management as with it. It is possible that biological controls based on the heather beetle's natural predators and parasites might be developed. To increase knowledge, in 2021 the GWCT's upland research group initiated plot-based experiments to consider whether heather burning, cutting or simply leaving it alone is the best way of managing heather recovery following beetle outbreaks. Initial (and unpublished) results suggest that heather beetle attacks and severe damage was most prevalent on managed plots, mostly those that had been burnt where the heather was re-growing (and thus had higher nutrient levels and a greater carbon sequestration potential). Beetle attacks were found on mown heather, but these were less prevalent than on burnt growth. Older, unmanaged heather with lower nutrient levels was not attacked at all (Heinemeyer and Denny personal correspondence).

The impact of severe outbreaks of heather beetle on grouse numbers is significant and, in some years, results in too few birds to enable shooting (either driven or walked-up) to take place. As the section on the economic impacts of driven grouse shooting points out, the negative consequences of seasons with no shooting are not limited to moor owners but affect a wide range of businesses and individuals.

### 5.2.10 Biological Diversity

As Feest et al (2010) pointed out, there is no internationally accepted definition of biodiversity, the contracted term used for the concept of biological diversity. However, for the purposes of this report the authors will use the term biodiversity to mean the variety and variability of living organisms (Levin 2001) found on and in moors where integrated moorland management includes driven grouse shooting.

Assessing the biodiversity of an area is not simple. Detailed surveys of flora and fauna, as well as geological forms, take a great deal of

time and effort. As a result, important areas for conservation are typically identified using a subset of well-known species, commonly termed 'surrogate' or 'indicator' groups. Birds have been commonly used as biodiversity surrogates due to the good level of knowledge of their taxonomy, ecology and distribution. Raptors in particular have been often proposed as an effective surrogate for other biodiversity based on their dietary diversity, being at the top of the food chain, their preference for highly productive areas, their generally threatened status and high public appeal. However, using raptors for this purpose may be a mistake. Santangeli & Girardello (2021) found that raptors perform marginally worse than all other avian species in representing important biodiversity areas and eco-regions. If the findings of this recent study are replicated, then the attention given by some groups to hen harriers and other charismatic raptor species might need to be re-thought.

In the UK, SSSIs are areas that are deemed important for biodiversity. According to Defra, in England, SSSIs cover approximately 50% of habitat considered to be of conservation priority under the UK Biodiversity Action Plan. This includes 95% of key coastal habitat, 86% of woodland and 72% of heathland. There are over 4,000 SSSIs in England, covering about 7% of England's land area. Over half of them, by area, are internationally important for their wildlife, and designated as SACs, SPAs or Ramsar sites. The purpose of SSSIs is to safeguard, for present and future generations, the diversity and geographic range of habitats, species, and geological and physiographical interest features. In Scotland there are 1,422 SSSIs, covering around 1,011,000 hectares or 12.6% of Scotland's land area. Sites range in size from the very small, like Bo'mains Meadow SSSI, at just under a hectare, to the vast Cairngorms SSSI, which extends to more than 29,000 hectares.

The amount of land designated as SSSI can be used as an approximate measure of environmental quality and biodiversity. Based on this logic, it is interesting to note the findings of the GWCT's Grouse Moor Survey<sup>235</sup>. The results of the survey showed that, on average, SSSIs make up 16% of the upland area of Britain, and the shooting estates in the GWCT survey covered 15% of upland areas. However, shooting estates accounted for 29% of upland SSSI areas, compared with an expected 16% if grouse moors were randomly distributed. The GWCT states that: "Many SSSI designations in the uplands were originally made because of the habitats and species on moorland, which can be supported by grouse management. Some of the best examples of heather moorland in the UK are designated as SSSIs and 'Natura' sites – SPAs and SACs – in recognition of their importance. In England, 74% of upland SPAs are managed as grouse moors. However, on some grouse moors inappropriate burning or the lack of agreed heather management plans have led to the

classification of the site as being in 'unfavourable condition'<sup>236</sup>, although it is not clear which factors were assessed to arrive at this designation.

Inevitably the evidence for the contribution of integrated moorland management, including grouse shooting, to biodiversity is incomplete. However, compared with upland areas where grouse shooting does not take place, the biodiversity of 'grouse moors' seems to be at least as rich, if not richer.

### 5.2.11 Multiple Stakeholders

Integrated moorland management involves multiple stakeholders. At a very local level there can be different stakeholders trying to make a living from an area of land. For example, an owner of a moor in Wearside has shooting rights over around 5,500 acres (about 2,226 hectares) of land, consisting of three pieces of joined moor. He has his own sheep on one area of land that he farms in-hand, and graziers have the sheep rights over the other two areas. Another landowner near Alston in Northumberland owns a moor that is part common land, and part freehold. He works with 10 long-established local upland farms to co-ordinate moorland management activities, as well as shooting. A land agent observes that much grouse moor in England is common land: "There are different interests: who owns the land, who has grazing rights, who has shooting rights; these can all be different people."<sup>237</sup> As well as those individuals directly involved in activities on the moors, governmental agencies, interest groups, and local communities all have a legitimate interest in moorland management and its outcomes. Unsurprisingly, disputes between stakeholders do arise. A lawyer, specialising in land disputes, remarked: "You do get areas of dispute where parties have competing interests on the land. I have not come across disputes between local communities and shoots, it tends to be specific action groups that take action,"<sup>238</sup> an interesting observation.

Disputes between stakeholders are not inevitable and multi-stakeholder initiatives can be successful in tackling complex sustainability issues, provided that different perspectives can be reconciled, which is not always possible (Dentoni, Bitzer and Schouten, 2018, Eastwood et al, 2022-). However, other studies have demonstrated that the application and deliberation of shared mental schemata for making sense of the world can result in shifts in entrenched positions and positive shared outcomes provided, of course, that participants are open to reason and discussion (Zimmermann, Albers & Kenter, 2021). Reed et al (2020) emphasise the importance of framing messages and proposed actions in ways that are consistent with the identity, values, norms and beliefs of those concerned with the management of peatlands.

From media reports it is possible to get the impression that there is always conflict between

some groups of stakeholders, for example between gamekeepers and the bird protection organisations. However, at a local level there can be close collaboration between these of stakeholders. On the Finzean Estate in Royal Deeside, Aberdeenshire, the gamekeeper has worked with local RSPB officials to ring golden eagle nestlings whose parents have bred successfully on the estate for some years<sup>239</sup>. The Edinglassie estate, also in Aberdeenshire, is part of the RSPB Grampian Wader and Wetland Initiative, and the Bolton Castle estate in Wensleydale, North Yorkshire, hosts an annual curlew conference and works closely with the BTO, the local Nosterfield Nature Reserve, and members of the International Wader Study Group<sup>240</sup>. As well as individual initiatives, some organisations overtly set out to bring people with different perspectives and beliefs together. The Heather Trust has as its mission: "To develop and promote sustainable, resilient moorlands through facilitation and collaboration; engagement and representation; education and demonstration based on research, experience and best practice."<sup>241</sup> The Trust was described by its Director as a 'reconciliation project' that aims to bring together the various interest groups that are involved with land use on the moors<sup>242</sup>.

Evidence from both primary sources and the literature indicates that where people and groups are prepared to discuss their points of view, share information about what they do and the impacts they have, accommodation and co-operation are common. Multiple stakeholder working is sustainable provided that people act in accordance with the law, as the 'Why Moorland Matters' summit referred to above notes. Sadly, as noted elsewhere in this report, the criminal damage<sup>243</sup> and threatening behaviour of some individuals opposed to grouse shooting suggest that they are not interested in developing shared outcomes with other stakeholders.

### 5.2.12 Are The Biodiversity Impacts Of Integrated Moorland Management Sustainable?

The range of economic activities involved in integrated moorland management suggests that the majority of areas where driven grouse shooting takes place have developed a sustainable model of operation; although in some areas there is a dependency on landowners and tenants who are prepared to subsidise moorland management<sup>244</sup>. These areas have developed over the centuries a unique, diverse and apparently sustainable flora and fauna, the extent and richness of which have been (and presumably will continue to be) influenced by government policy and funding regimes. So, although heather cover was reduced by over-grazing as encouraged by a desire to increase food production, it has increased (in some areas) by different policies designed to achieve a more diverse

#### References

<sup>234</sup> [https://01a393a3-c4d4-4ca5-885d-c2330c108548.filesusr.com/ugd/fdc287\\_d96c2aa4f7874c2a983a61c94ac98c8f.pdf](https://01a393a3-c4d4-4ca5-885d-c2330c108548.filesusr.com/ugd/fdc287_d96c2aa4f7874c2a983a61c94ac98c8f.pdf)

<sup>235</sup> <https://www.gwct.org.uk/research/species/birds/red-grouse/grouse-moor-survey/>

#### References

<sup>236</sup> <https://www.gwct.org.uk/policy/briefings/biodiversity-and-conservation-on-grouse-moors/>

<sup>237</sup> Interview with S Denny 15th May 2020

<sup>238</sup> Interview with S Denny 5th June 2020

<sup>239</sup> GWCT (2020) Moorland Conservationists: The Untold Story <https://www.gwctshop.org.uk/products/moorland-conservationists-the-untold-story>

<sup>240</sup> Ibid.

<sup>241</sup> <https://www.heathertrust.co.uk/>

<sup>242</sup> Interview with S Denny, 22nd May 2020 and <https://www.heathertrust.co.uk/about-heather-trust>

<sup>243</sup> In 2021 a single moor in the North of England had over 80 legal predator traps destroyed by people opposed to grouse shooting.

<sup>244</sup> The fact that some landowners and tenants subsidise integrated moorland management does not mean that it is unsustainable. As we point out in section 4.3, grouse moor ownership may result from inheritance, but is more frequently as a result of purchase. Assuming the UK will continue to have – or attract – rich people, some of them are likely to invest in moorlands.

**References**

<sup>245</sup> See, for example <https://publications.naturalengland.org.uk/publication/42005>

<sup>246</sup> Such as the Wensleydale Creamery [https://en.wikipedia.org/wiki/Wensleydale\\_Creamery](https://en.wikipedia.org/wiki/Wensleydale_Creamery)

<sup>247</sup> See <https://defra.defra.gov.uk/blog/2023/01/26/environmental-land-management-schemes-details-of-actions-and-payments/>

<sup>248</sup> The term 'ecosystem' was coined by Tansley (1935) as a way of describing the basic units in nature in which plants, animals and habitat factors of soil and climate interact in one system.

<sup>249</sup> <https://www.iucn.org/>

<sup>250</sup> <http://naturalcapitalforum.com/about>

<sup>251</sup> <https://www.gov.uk/government/news/natural-capital-tool-launched-to-help-protect-the-environment>

<sup>252</sup> <https://www.millenniumassessment.org/en/About.html>

<sup>253</sup> <https://webarchive.nationalarchives.gov.uk/20160106130009/http://www.ons.gov.uk/ons/re/environmental/uk-natural-capital/natural-capital-accounting-2020-roadmap-interim-review-and-forward-look/index.html>

<sup>254</sup> <https://www.ons.gov.uk/economy/environmentalaccounts/articles/uknaturalcapitaldevelopingukmountainmoorlandandheathlandecosystemaccounts/2017-07-21>

natural environment<sup>245</sup>. Legislation protecting raptors and other species has resulted in their reappearance or increase on many moors.

If people, both the public and government, continue to value heather moorland landscapes, then they will need to be maintained. This edition of the report concludes that, based on a review of the authoritative evidence, the current model of integrated moorland management, that includes driven grouse shooting as part of the economic and social mix, is a sustainable approach to maintaining such landscapes. It is not clear what other management regimes would deliver the same result. The evidence presented in the Section 7.0 on Alternative Uses of Moorland makes clear that these alternatives, if adopted as the sole use of moorland, would not maintain the current landscape and biodiversity but result in very different impacts. It depends on what is valued.

However, there are threats to the sustainability of the integrated moorland management model. Whether driven by rising temperatures or other factors, the increasing numbers of ticks and the increasing number of dangerous diseases they transmit (and their possible future resistance to pesticides) could pose a significant problem for humans and other animals that venture onto the moors. In addition, there is always the risk of existing grouse disease control measures becoming ineffective, or new diseases emerging for which treatment is not available. Finally, if rising temperatures do lead to increased populations of heather beetle, then the sustainability of the heather-clad moorland – and the grouse – will be seriously compromised. Of course, all alternative uses of moorland face future threats.

It is concluded that, assuming government policy is based on evidence rather than emotions of a limited number of individuals and groups, the biodiversity of integrated moorland management, including driven grouse shooting is sustainable and should be maintained. However, one must be less sanguine about the long-term sustainability of the model in the face of rising temperatures and disease.

### 5.3 Integrated Moorland Management: Sustainable Natural Capital?

It is difficult to do much with moorland. A combination of bedrock, soil types, climate and altitude has produced a landscape and vegetation that cannot support intensive agriculture, or forestry at 400 metres to 600 metres above sea level. Moreover, most of the UK's moorland is remote and sparsely populated. Although mineral extraction has taken place on some moors in the past, few viable deposits remain. With the exception of some light industry<sup>246</sup>, the economy of moorland areas is dominated by low-intensity agriculture and forestry,

tourism, and integrated moorland management (which, of course, often includes agriculture, forestry, tourism, alternative energy generation, etc).

What governments and society want and need from moorlands has evolved over time, and wants and needs have not always been the same. The post-1945 focus on maximising food production and increasing commercial non-native forestry has now been modified, at least for the short term. Single, or non-integrated, policy approaches are now being cited as contributors to a loss of biodiversity, a degradation of vegetation and soil, and increases in carbon release and flooding; for example, Yallop et al (2006) describe some of the negative effects trying to achieve the government's targets for increasing calluna cover through controlled burning in Environmentally Sensitive Areas, which some land managers viewed as a mistake (even though on many moors the proportion of dry heath burned annually was lower than that required to meet recommended burning rotations). Partly in consequence of these negative impacts, policy makers in the UK currently have a focus on natural capital and ecosystem services. The new ELM scheme rewards farmers and other landowners for the provision of public goods, while also allowing them to continue to produce high-quality and sustainable food.<sup>247</sup> This chapter will explore the extent to which integrated moorland management, including driven grouse shooting, provides natural capital and delivers ecosystem<sup>248</sup> services. It will highlight that we are at an early stage in our development and application of these concepts and evidence of long-term impacts is sparse.

#### 5.3.1 What Are Natural Capital And Ecosystem Services?

The publication in 1980 of a 'World Conservation Strategy', and the 1991 document 'Caring for the Earth', by the IUCN<sup>249</sup> are some of the earlier initiatives in shaping the concept of natural capital. The IUCN's emphasis on sustainable use "based on scientific and socio-economic standards, taking into account traditional knowledge, and the principle of the equitable allocation of resources and the distribution of benefits" has informed thinking about natural capital. The IUCN has also strongly influenced this current report's examination of the sustainability of driven grouse shooting against environmental, economic and social dimensions.

Inevitably, there are different definitions of natural capital and ecosystem services, although the differences are typically only minor. The Natural Capital Forum<sup>250</sup> defines natural capital as the world's stock of natural assets, which include geology, soil, air, water and all living things. Ecosystem services are services that people derive from natural capital (a top-down model) and which make human life possible (Bouma & van Beukering, 2015). Therefore,

ecosystem services include food, water, plant materials used for fuel, building materials and medicine, but also climate regulation and natural flood defences provided by forests, carbon stored in peat, and pollination of crops by insects. Additionally, and importantly, there are cultural ecosystem services resulting from the cultural, educational and amenity-based social impacts people who people get from the environment. Defra takes a slightly different view in defining natural capital as the sum of ecosystems (a bottom-up model) that provide food, clean air and water, wildlife, energy, wood, recreation and protection from hazards.<sup>251</sup>

In theory the natural capital and ecosystems services models lend themselves to measurement. Several natural capital accounting tools and key indicators have been developed and tentative steps have been made to put financial values on both positive (benefits) and negative (costs) impacts of ecosystems. The United Nations initiated the Millenium Ecosystems Assessment in 2001.<sup>252</sup> In March 2015, as part of the Office for National Statistics' (ONS) and Defra's Natural Capital Project, the Natural Capital Accounting 2020 Roadmap was published<sup>253</sup>. This roadmap set as one of its objectives the development of eight habitat-based ecosystem accounts, one of which was for mountains, moorlands and heathlands (MMH). The development of an ecosystem account for MMH was described in 2017<sup>254</sup> and feedback was sought from 'experts in all disciplines'. In July 2019, ONS published its first iteration of UK natural capital: mountains, moorland and heath accounts<sup>255</sup>. However, measurement systems such as that developed by the ONS, although noble in intent, suffer from a common weakness in that they are attempting to measure the immeasurable with imperfect instruments, a situation the ONS recognises. Moreover, the research on which ecosystems accounts is based does not always consider all the evidence, is often based on short-term, individual studies, and inevitably they are not up-to-date. To give just two examples: firstly, the ONS MMH ecosystems account of 2019 includes the positive impacts of wind turbines, but does not take into account the negative ones, which are explored in the section of this report examining renewable energy. Secondly, the document describing the development of a MMH ecosystem account (ONS, 2017) claimed that golden eagles and other raptors were an indicator of biodiversity<sup>256</sup>. However, as we note in section 5.2, Integrated Moorland Management: Sustainable Biodiversity, Santangeli & Girardello (2021) found that raptors perform marginally worse than all other avian species in representing important biodiversity areas and eco-regions.

However, while accepting the inevitable imperfection of such ecosystem services instruments that do exist, the concept that natural capital results in benefits to mankind is helpful. Furthermore, applying (albeit with

caveats) the indicators and measurements that exist may enable indicative comparisons between different land-management regimes to be made.

The 2019 ONS MMH ecosystems account publication states that MMH areas provide many services both to the economy and to society and presents "initial and highly experimental estimates" of the flow of services expressed in monetary and non-monetary units. The ONS points out that MMH ecosystem services accounts presented "are partial as it was not possible to estimate monetary and non-monetary units for all of the services that MMH provide and there are some services provided that are not captured in the account". The ecosystem services are split into provisioning, regulating and cultural services, detailed in Table 5.2 below. Despite their admitted imperfections, the analyses produced by ONS are worth examining as they indicate how policy makers are thinking about categorising the goods and services produced by the natural environment, and how they are beginning to be valued in financial terms. Any examination of the sustainability of driven grouse shooting must take account of this thinking and identify evidence that contributes to the accuracy and relevance of these models.

**Table 5.2 Extract From ONS 2019 Publication Showing Environmental Services Provided By Mmh. Source: Office For National Statistics <sup>257</sup>**

Natural service provided by MMH	Included in ONS 2019	Not included in ONH 2019
<b>Provisioning</b>	Wind power	Reared animals and their outputs
<b>Products such as food, water and fuel</b>		Wild animals <sup>258</sup> Freshwater Peat extraction Biomass-based energy resources
<b>Regulating</b>	Carbon sequestration	Flood risk mitigation
<b>Benefits such as water purification, climate regulation, noise and air pollution reduction and flood hazard reduction</b>	Air pollution removal by vegetation Waste detoxification	
<b>Cultural</b>	Recreation	Science and education
<b>Non-material benefits, for example recreational enjoyment and aesthetic experience</b>	Field game sports <sup>259</sup>	Spiritual, symbolic and other interactions

**References**

<sup>255</sup> <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapital/mountainmoorlandandheathaccounts#what-is-the-asset-value-of-mountains-moorlands-and-heath>

<sup>256</sup> The recommended sources for this claim were the Breeding Bird Survey, the RSPB and Scottish Natural Heritage.

<sup>257</sup> <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapital/mountainmoorlandandheathaccounts#what-ecosystem-services-do-mountains-moorlands-and-heath-provide>

<sup>258</sup> As observed in section 5.2, on The Economics of Driven Grouse Shooting, grouse are a valuable commodity and people pay significant sums to both shoot and eat them.

<sup>259</sup> Section 5.5 points out that field sports have long been a cultural phenomenon for many people, rather than purely recreation.

ONS estimates the asset values of these services as being worth over £20 billion a year to the UK, as

shown in Table 5.3. It is stressed that the figures in Table 5.3 are indicative only.

**Table 5.3 Uk Mountains, Moorlands And Heath Asset Values (£ Millions) By Service, 2014 And 2017:**  
Source Office For National Statistics <sup>260</sup>

Service	Value 2014	Value 2017
Carbon sequestration	9,898	10,576
Air pollution removal	385	391
Recreation	9,769	9,174
<b>Total</b>	<b>20,052</b>	<b>20,141</b>

On a much smaller scale, NatureScot has also attempted to estimate the financial benefits derived from the natural capital produced from National Nature Reserves in Scotland<sup>261</sup>. The publication, 'Piloting Natural Capital Accounts on SNH Land'<sup>262</sup> presents a balance sheet of public and private costs and benefits. For example, public benefits include gains for free such as carbon sequestration and private benefits include the income that SNH receives from sales of food raised on nature reserves. It should be noted that the values are for the benefits provided during the life of the asset of 60 years, in line with government guidance. NatureScot estimates that the total sum of private and public benefits over 60 years is £683 million. Perhaps inevitably, the services and benefits that NatureScot identifies are slightly different from those considered by the ONS. The benefits that have monetary values attached to them by NatureScot are: food, energy, carbon sequestration, air quality, physical health, recreation and tourism, education and volunteering, and wildlife. Again, it is stressed that the figures in Table 5.3 are indicative only. However, it is worth observing that the economic and social benefits resulting from driven grouse shooting, as described in Sections 5.2 and 5.5 of this report, would result in the value of physical recreation, recreation and tourism being much larger than calculated by NatureScot. This point is made not to dismiss the work of NatureScot, but to highlight the problems inherent in measuring natural capital and ecosystem services.

### 5.3.2 Integrated Moorland Management And Natural Capital

The focus of this section is the impact of integrated moorland management on the key natural capital indicators of air, water and carbon sequestration. Economic and social impacts are discussed in Sections 5.1 and 5.4 respectively. Consequently, this section requires an examination of the literature on vegetation management especially burning and particle emission, water quality and water levels, and peat formation, topics which are intimately integrated with each other. These issues are not purely of academic interest. Achieving net zero greenhouse gas emissions by 2050 is now a statutory requirement for the UK. <sup>263</sup>

Peatlands are a type of wetland that occur in most countries. They are often defined by the dominance of peat, a soil with an organic content greater than 35%. The high organic content results from dead vegetation which only partially decays due to waterlogged conditions (notably, peat in its saturated form is approximately 95% water); peat accumulates where the production of organic matter exceeds its decomposition. Importantly for a world where climate change is a major problem, carbon is the key component of peat (about 50% C content in the dry matter). Some estimates suggest that the world's peatlands store twice as much carbon as all the world's forests<sup>264</sup>. Globally, peatlands have been severely over-exploited and damaged by drainage, agricultural conversion, burning and mining for fuel. At a national level, the British Ecological Society has identified that a priority for nature-based solutions (NbS) is the restoration of the UK's peatlands, which could contain around three billion tonnes of carbon, but may be emitting 2.3 million tonnes of CO2 annually<sup>265</sup>. The accumulation (sequestration) of carbon and limited release (storage) is significant in action against climate change because of the

huge amounts of carbon stored in UK peat, and its potential release as a greenhouse gas. But in 2021 Natural England stated that less than 1.3% of England's peatlands remain in a 'near natural' state (although this term is not consistently defined, does it just mean minimal human interference?), with the rest having been affected and degraded by peat extraction, grazing, fire, and drainage for agriculture and forestry planting. <sup>266</sup>

Over 25% of the UK land area is classified as uplands, the bulk of which have vegetation comprised of blanket bog, dwarf-shrub heath (including heather) and acid grassland. Long-term bog development in the UK, mainly since the end of the last glacial period (approximately 10,000 years with most peat formation during the past 6,000 to 8,000 years), has resulted in extensive peat cover, except on steeply sloping ground. Blanket bog is a long-term carbon sink, but has the potential to emit large amounts of methane potentially causing a net positive contribution to greenhouse gas (GHG) emissions and thus to global warming (Heinemeyer et al, 2019). Importantly, the UK has about 15% of the globally rare blanket bog habitat (Ibid).

It is essential to note that most peatland in the UK is not found on moorland. It is estimated that England's total upland peat area emits around 603,000 tonnes of CO2 per year, which is 5.6% of the total peatland greenhouse gas emissions in England. *The remaining 94% of England's peatland emissions come from lowland (mostly agricultural) peat*<sup>267</sup>. The GWCT points out that peatland under grouse moor management represents only a portion of this upland peat, although about 30% of the UK's blanket bog is managed for red grouse by encouraging ling heather (*Calluna vulgaris*) cover (Heinemeyer et al, 2019). Using data from the MA, the GWCT estimates put the amount of carbon stored in peat on grouse moors at between 66 and 205 million tonnes, which is between 11% and 35% of the total carbon stored all English peatlands. The organisation goes on to estimate CO2 emissions from grouse moors and found that English grouse moors emit around 1% to 5% of the net CO2 emissions from England's peatlands per year. Thus, the GWCT claims that English grouse moor CO2 emissions are therefore proportionally well below the amount of carbon that they store, compared with other peatland uses<sup>268</sup>. However, it is noteworthy that there are no robust data on separate emissions from heather-dominated blanket bogs, especially for those under heather management (Heinemeyer & Ashby 2023 and Heinemeyer et al, 2023). In addition, there have been considerable efforts made over the last couple of decades to reverse blanket bog degradation and increase resilience to climate change through restoration measures including blocking of grips and gullies (many of which were originally dug as a result of government agricultural policies), revegetating

bare peat, reintroducing *Sphagnum* and other vegetation species, removing trees and scrub, and use of mowing to encourage an active blanket bog vegetation (Heinemeyer et al, 2019). It is recognised that there is considerable potential from peatland restoration and moving away from management practices driven by single policies (eg. maximising food production, or afforestation) that should result in peat formation and long-term carbon sequestration (Ibid).

Before examining the literature on the impacts of integrated moorland management on CO2 emissions or sequestration, it is important to note that terms such as moorland, peatland and blanket bog are often used interchangeably, either deliberately or casually. As the IUCN points out, in the UK there is "no single formal definition of 'peat' and 'peatland', differing interest groups having differing definitions"<sup>269</sup>. Although the UK is a signatory to the IUCN, management of peatlands is devolved, which has resulted in both differing definitions of such terms as 'deep peat'<sup>270</sup> and different regulatory and thus differing management regimes. The lack of consistency in definition and management poses problems for the identification and measurement of ecosystem services. Additionally, in the UK the term 'peatland' is only broadly descriptive. The areas of 'peatland' encompass a mosaic (Watt, 1947) of management; different surface flora (and fauna); variable qualities of organic 'peat' soils; dry to saturated soil (the hydrology); and different approaches to preventing damage and enhancing function. It has been estimated that England has 14,185 square kilometres of peatland with 34% of that classified as deep peat and 25% blanket bog. However, in England deep peat and blanket bog are not synonymous – almost all blanket bog is deep peat, but there are large areas of deep peat that are fens (often drained and badly degraded).<sup>271</sup> Moorland is a term which is often, and incorrectly, used interchangeably with peatland. In fact, moorland includes upland heathland, blanket bog, upland grassland, bracken, scrub, native woodland and exposed rock as well as peat. There is peat, including deep peat, on moorland, but not all moorland is peatland.



#### References

- <sup>260</sup> <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapital/mountainmoorlandandheathaccounts#what-is-the-asset-value-of-mountains-moorlands-and-heath>
- <sup>261</sup> Not all National Nature Reserves in Scotland are classified as MMH, see <https://www.nature.scot/enjoying-outdoors/scotlands-national-nature-reserves>
- <sup>262</sup> [https://www.nature.scot/sites/default/files/2019-12/Testing%20a%20Natural%20Capital%20approach%20on%20SNH%20land%20summary\\_0.pdf](https://www.nature.scot/sites/default/files/2019-12/Testing%20a%20Natural%20Capital%20approach%20on%20SNH%20land%20summary_0.pdf)
- <sup>263</sup> <http://publications.naturalengland.org.uk/publication/5419124441481216>
- <sup>264</sup> [www.unep.org/news-and-stories/story/peatlands-store-twice-much-carbon-all-worlds-forests-1st-Feb-2019](http://www.unep.org/news-and-stories/story/peatlands-store-twice-much-carbon-all-worlds-forests-1st-Feb-2019)
- <sup>265</sup> <https://www.britishecologicalsociety.org/event/nature-based-solutions-for-climate-change-in-the-uk/>

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- <sup>266</sup> <http://publications.naturalengland.org.uk/publication/5419124441481216>
- <sup>267</sup> <https://www.gwct.org.uk/policy/briefings/carbon-storage-on-grouse-moors/>
- <sup>268</sup> <https://www.gwct.org.uk/policy/briefings/carbon-storage-on-grouse-moors/>
- <sup>269</sup> <https://www.iucn.org/>
- <sup>270</sup> In England deep peat is defined as soil with a surface peat layer of 40 cm or more. In Scotland it is defined as 50 cm or more.
- <sup>271</sup> <http://publications.naturalengland.org.uk/publication/5419124441481216>

### 5.3.3 To Burn Or Not To Burn?

As noted above, the focus of this section is on how integrated moorland management impacts on natural capital and ecosystem services. Therefore, it is necessary to examine the ways in which management regimes affect air and water quality, and carbon capture or release. It is also necessary to compare the impacts of integrated moorland management with the alternative uses of moorland that this report has identified. This examination and comparison are not simple and will neither be comprehensive nor present an 'answer'. The science is simply not extensive, adequate or good enough. Although management regimes impact on air, water and carbon in a holistic way, nearly all research (inevitably) looks at current moorland management impacts in discrete ways. For example, Whitehead et al (2021) in an article in *Ecological Indicators*, a respected and peer-reviewed journal, examined impacts of burning on moorland vegetation, but not the impacts of cutting, or the implications for water quality or carbon sequestration as these were outside the scope of their study.

Fire has always played an inherent part in the ecology of heathlands and heather-dominated uplands, including on blanket bog. Charcoal and pollen counts from many deep peat cores across the UK indicate historically high heather cover and frequent fire episodes over millennia (eg. Chambers et al, 2017; Webb et al, 2022). Heinemeyer et al (2023) argue that the role of fire needs to be seen in a broader view than is often currently presented, both temporally (considering historic management practices and long-term risks of uncontrolled fires) and spatially (considering site conditions and looking beyond the UK), as discussed by Davies et al (2016a).

The practice of muirburn, the controlled burning of vegetation in moorland areas to maintain open moorland is centuries, if not millennia, old. It is not a practice that started on, or is confined to,

grouse moors; Pellegrini et al (2021) found that in ecosystems including temperate forests, savannas and grasslands, fire can stabilise or even increase soil carbon, a finding confirmed for low-intensity fires in boreal forest (Flanagan et al, 2020) and many other peatland ecosystems (Leifeld et al, 2018). As noted in the previous chapter, in the 19th century, gamekeepers in Scotland were concerned that sheep farmers were burning too much and too often (Durie, 1998). As would be expected, research on the impacts of burning on the ecosystem is sometimes contradictory. Whereas Noble et al (2019) found no evidence to support the use of burning as a tool to increase existing sphagnum or promote sphagnum re-establishment success, Whitehead et al (2021)<sup>272</sup> concluded that prescribed burning at regular intervals could increase sphagnum cover, which confirmed previous findings by Milligan et al (2018). Moreover, the contention that sphagnum species "are the main contributors to peat formation in bogs" (Gregg et al 2021) is not supported by causal evidence; rather the argument seems to be based on circumstantial evidence (Heinemeyer & Ashby, 2023).

The UK's heather-dominated landscapes are semi-natural habitats that have been shaped by human disturbance regimes for centuries. Spatially and temporally heterogeneous land-use practices, such as cutting, burning, and grazing, have resulted in complex mosaic landscapes that are of high priority for conservation in Europe. In fact, such open landscapes are likely to represent a climax vegetation community (Fenton, 2023). Contemporary conservation practices subject these systems to management regimes that are generally less diverse, in terms of disturbances and fine-scale temporal and spatial variability, than traditional land use, but the ecological consequences of these simplifications are unclear (Vandvik et al, 2005). The Future Landscape Forum's<sup>273</sup> (FLF) assessment of the current scientific literature shows that controlled burning, if conducted properly, can maintain heather communities with a

varied age-structure resulting in a greater diversity of flora and fauna on a landscape scale compared with a cessation of vegetation management. The overall positive role of fire also supports this view in a global assessment of terrestrial vertebrate richness patterns (Moritz et al, 2022). The little evidence available for UK peatlands does not support the claims that unmanaged blanket bogs transition to 'intact' bogs with increased plant biodiversity. On the contrary, even after more than 60 years, a comparison at Moor House shows clear benefits on plant biodiversity of burning, with increased 'peat-forming' species, versus no management with heather dominance (Milligan et al, 2018). In addition, other biodiversity benefits of heather management (eg. some ground-nesting birds) are highlighted in a report by Heinemeyer et al (2023). However, more long-term evidence is needed, especially when considering shallow peat soils and the possible development of scrub or forest cover. The FLF stresses the need to move away from the precautionary principle against burning and towards an adaptive management approach to include prescribed burning alongside alternative management regimes, such as mowing, rewilding, rewetting and a cessation of heather management. At the same time, the FLF urges that scientists should begin gathering more robust scientific evidence for all heather management options (notably, we know far less about the alternatives to controlled vegetation burning).

If the science is not definitive, one thing is clear: burning arouses very strong passions. *Revive*, an organisation that advocates 'grouse moor reform' (although the organisations that make up the *Revive* coalition seem more intent on banning grouse shooting than on any reform), is just one of the organisations calling for the practice to be banned.<sup>274</sup> However, such demands seem to ignore two factors. Firstly, despite its climate, fire is an important natural force both in Scotland (Montiel & Kraus, 2010) and in England. Due to frequent short-term droughts, in the past lightning has caused large-scale fires in both conifer woods, heaths and moorland. Studies of one estate cited by Montiel and Kraus in the eastern highlands of Scotland indicated a natural fire return interval of between 80 and 100 years over the last 400 years. If fire is ignored, rather than studied, there is a risk that an important ecological process is not recognised. Secondly, it is claimed that controlled burning can reduce the fuel load available, leading to less severe wildfires, reduced risk of damage to the environment, and allowing better access to the land for firefighting, increasingly important (and urgent) when Britain's climate is clearly getting warmer (Future Landscape Forum, 2023).

Expert practitioners, firefighters and academics are becoming increasingly concerned about the potential impacts of rising fuel loads in our uplands due to a cessation of vegetation management

(Belcher et al, 2021), especially considering climate change predictions (Barber-Lomax et al, 2021). In June 2023 a number of experts gave evidence to the Rural Affairs & Islands Committee of the Scottish Parliament. Notably, Deputy Assistant Chief Officer Bruce Farquharson, the Wildfire Capability Lead at Scottish Fire and Rescue Service said: "There is evidence that managed cool burns do not penetrate any more than a centimetre below the surface of peatland." He continued: "My concern is if we restrict where muirburn can be carried out by bringing in a specified depth, then what we're doing is allowing a larger proportion of the fuel load to be unmanaged – and the very thing we're trying to prevent, which is damage to the peatlands will, in fact, be at higher risk because a wildfire absolutely will damage the peatland."<sup>275</sup>

The UK Climate Change Committee's 2023 report acknowledged that the risk of wildfire will increase significantly in future decades. The report states: "The events of the last year (2022 saw the highest annual number of wildfires, greater than 30 hectares, ever recorded in the UK) reinforce the urgency of making better preparations for climate change now. Action cannot be delayed further."<sup>276</sup> The Committee also said that it would 'revisit' its 'previous position around prescribed fire/burning.'<sup>277</sup> Regional Fire & Rescue departments are firm in their view that allowing heather fuel loads to build up not only increases the risk of wildfire but also makes their job of controlling wildfire much harder (see Barber-Lomax et al, 2021). The recent appointment of a national Wildfire Manager by Fire & Rescue departments in Wales is a clear demonstration of this view. Although controlled burning (sometimes known as 'cool burning' or 'muirburn' – a management practice increasingly taught to fire fighters) will not in itself prevent wildfires from occurring, by reducing fuel loads, it can slow their progress and reduce their severity, thus lessening the risk to people, wild and domesticated animals, property, infrastructure and upland ecosystems. In many countries, including the USA, it is known that controlled or prescribed fires reduce the severity and potential for the next wildfire in areas where they are used (Arkle et al, 2012), and firefighters know these areas as places where fire activity can be reduced and can use those areas as anchors to try to catch wildfires before they spread (Harris et al, 2021). However, issues around the frequency (Yallop et al, 2006), the intensity of prescribed fires in relation to wildfire (Davies et al, 2016a) and possible alternatives remain understudied (Harper et al, 2018).

Wildfires are a major source of CO2 emissions (Turetsky, Donahue & Benscoter, 2011). The 2019 wildfire of Scotland's Flow Country resulted in 22 square miles of a UNESCO world heritage site being damaged and about 700,000 tonnes of carbon emission. In 2018 Scottish Natural Heritage and the Scottish Fire and Rescue Service (SFRS) examined

#### References

<sup>272</sup> It is concerning to note that the only peer reviewers for this paper were from the RSPB, an organisation with its own agenda related to driven grouse shooting.

<sup>273</sup> The FLF is a group of academics and practitioners with specialist knowledge of the management, ecology, functioning and fire risk associated with heather-dominated landscapes in the UK. The FLF is concerned that debate and, increasingly, decisions about upland management have become polarised and overly focused on a single issue: driven grouse shooting. Its view is that this focus is wrong and dangerous. The FLF states that its concerns are not related to habitat management for grouse. It has three aims in relation to heather management:

1. To reduce the risk of wildfires that pose a danger to life and property;
2. To support and ideally increase the capture of carbon across large areas of the landscape currently dominated by heather;
3. To maintain and, if possible, improve the biodiversity and other ecological benefits associated with the UK's heather-dominated landscapes.

#### References

<sup>274</sup> <https://revive.scot/scotland-controversial-muirburn-season-begins-again-following-a-temporary-ban-during-lockdown/>

<sup>275</sup> The Wildlife Management & Muirburn (Scotland) Bill: Expert Insights in Scottish Parliament - Game and Wildlife Conservation Trust ([gwct.org.uk](http://gwct.org.uk))

<sup>276</sup> <https://www.theccc.org.uk/publication/progress-in-adapting-to-climate-change-2023-report-to-parliament/#key-messages>

<sup>277</sup> See <https://www.theccc.org.uk/wp-content/uploads/2023/03/WEB-Progress-in-adapting-to-climate-change-2023-Report-to-Parliament.pdf> page 70, box 2.3 and page 83, figure 3.1





#### References

<sup>278</sup> CA Briefing Note: Grouse Shooting Petitions Committee - Westminster Hall Debate, Monday 25th January 2021

<sup>279</sup> Such as the wildfire on Marsden Moor of April 2021. A box of fireworks was discovered at the scene of the fire <https://www.bbc.co.uk/news/uk-england-leeds-56901934> Police interviewed a man and a woman and subsequently submitted a file to the Crown Prosecution Service <https://www.bbc.co.uk/news/uk-england-leeds-56931147>

<sup>280</sup> <https://www.bbc.co.uk/news/uk-england-manchester-44648348>

the correlation between the number of wildfires where the SFRS was called out and heather burning. Out of a total of 153 fires, only four were in areas of moorland managed for grouse, and none were during the burning season, but were rather the result of accident or arson.<sup>278</sup> Wildfires are typically large, burn out of control and can cover extensive areas. They are frequently described as 'hot burns' as opposed to controlled fires which are described as 'cool burns'. In the UK wildfires occasionally result from lightning strikes but the vast majority are due to either accidental<sup>279</sup> or deliberate actions, which tend to be in the spring or summer, often at weekends or on Bank Holidays. The 2018 wildfire on the RSPB's Saddleworth Moor in 2018 was partly enabled by a spell of dry weather and heather vegetation that had become 'leggy' as it had not been managed. Professor R Marrs, Liverpool University, claimed that the fire would not have spread too easily or penetrated the underlying peat if the vegetation had been managed by occasional burning. He was quoted as saying: "Leaving the land alone causes much more damage than controlled burning because there's more heather to burn so it gets hotter and spreads to the peat, which in turn spreads the fire."<sup>280</sup> It is estimated that the fire resulted in seven centimetres of peat being lost, which could take 200 years to replace. Marrs et al (2019) showed that peat continued to grow under a range of prescribed burning rotations at appropriate rotations, and calculated that such management could help mitigate carbon loss in the event of a wildfire.

When contextualised against wildfire risk, the current published science does not show that controlled burning is detrimental to carbon capture on managed heather peatlands (eg. Harper et al, 2018). This was confirmed by the latest, and in this point corrected and revised review for NatureScot (Holland et al, 2022). On the contrary, there is a lot of peat-core evidence, modelling studies and newly-emerging science to suggest that biochar produced by controlled burning is an effective and thus potentially valuable means of locking up carbon in peatland soils (eg. Worrall et al, 2013; Leifeld et al, 2018; Heinemeyer et al, 2018). Charcoal has also been linked to reducing the microbial action associated with decay (Flannagan et al, 2020), and the release of greenhouse gases like methane from peatland (Davidson et al, 2019). These biochar effects may also be more effective at capturing carbon when compared with cutting vegetation (Heinemeyer et al, 2019; 2023) and compared with unmanaged litter decomposition, confirming a previous model prediction by Worrall et al, (2013). Notably, recent debates about the role of charcoal in peatland carbon accumulation are not about the quality of the science but have been based on unfounded accusations about how the science is interpreted, inappropriate use of terminology and misleading model scenarios about drainage not including any representation of controlled fire (Young et al, 2019; Ashby & Heinemeyer, 2021; Young et al, 2021). Moreover, unmanaged, ageing heather on blanket bogs seems to lead to lower shoot nutrient levels and thus lower carbon uptake (which is reversed by management rejuvenating vegetation). Unmanaged heather can also dry out the peat, stimulating decomposition and likely reducing the net carbon uptake, whereas alternative heather cutting seems to increase sedge cover with likely increased methane emissions (Heinemeyer et al, 2023). However, although an increased sphagnum cover might buffer against these effects (eg. Larmola et al, 2010), we lack understanding about where this is possible and how all these findings relate to heather-dominated shallow peat soils.

It appears that there is a balance to be struck between wildfire as an important natural ecological force, and the current desire to reduce CO2 emissions. Are there alternatives to controlled burning that strike this balance and are sustainable? The GMMRG report noted that there is relatively little comparative information on the impacts of heather burning versus cutting and from the few studies that it found (up to 2019), the differences were 'apparently not simple'. However, cutting carries an increased risk of ignition of important peat deposits (Santana & Myers 2014), and results in reduced depth of moss (Holmes & Whitehead 2022). The evidence is incomplete, but that which does exist does not demonstrate that cutting is environmentally 'better' than burning. Moreover, Holmes and Whitehead also found that

controlled burning resulted in, on average, twice as many flower heads in burn plots than in those that had been cut, and four times as many as those in the control plots. This finding highlights the value of burning, rather than cutting heather, for encouraging this important food resource for birds and insects.

Heinemeyer (2023), and others argue that the move towards cutting of heather and associated vegetation as a prescribed alternative to controlled burning is taking place without sufficient scientific study to compare the risk and benefits of each treatment. For peatlands, less is known about the impacts of cutting (some likely negative, see Holmes and Whitehead 2022) than the impacts of burning (Heinemeyer et al, 2019, 2023). However, organisations seem to apply the precautionary principle only to burning (Ashby & Heinemeyer, 2021) although cutting of heather and associated vegetation, and other aspects of alternative management, clearly requires further research (Harper et al, 2018). For example, ground-level accumulation of desiccated litter from mowing likely carries an increased risk of ignition of important peat deposits by smouldering (Santana & Marrs, 2014), with potentially catastrophic loss of stored carbon, greatly diminished capacity for future carbon storage and severe ecological consequences of bare and eroding peat. Finally, the claim that rewetted bogs will become fire resilient, a claim that is often made, seems not to be based on any applicable evidence and simply ignores the fact that many peatlands might not offer the necessary water balance to achieve the needed wetness, especially considering climate change (as indicated by model scenarios, Gallego-Sala & Prentice, 2013), topographic impacts and seasonal drought conditions (Ashby & Heinemeyer, 2021). Moreover, wetter areas, as observed in forests, might increase biomass and fuel production and thus increase fire severity (Arkle et al, 2012) as well as increase the emission of CH<sub>4</sub>, (methane) a much worse greenhouse gas than CO<sub>2</sub> (carbon dioxide).

It can be hypothesised that the issues of upland drainage and over-grazing, once encouraged by UK government grants and headage payments, have been confounded in the evidence base with impacts of heather management by controlled burning.

Heinemeyer & Ashby (2021) and Ashby & Heinemeyer (2021) conducted a literature review of the research on moor burning compared with both cutting moorland vegetation and not managing it as part of their constructive criticism of the IUCN's position statement 'Burning and Wetlands'<sup>281</sup>. They identified three points that they suggest should be considered when making any decision about controlled burning. As these points are based on their literature review, we believe they are worthy of consideration.

1. To date, no study has assessed rotational burning impacts using a real-world approach, with

measurements made across active grouse moors and extending over a complete management cycle. Thus, the current evidence base cannot be used to draw robust conclusions about ecosystem services impacts, particularly in relation to carbon storage, greenhouse gas (GHG) emissions, flooding and water quality.

2. The results of many burning studies are unreliable because they use experimental designs that are unable to detect causal relationships and/or make significant statistical errors. They suggest that the entire evidence base needs to be reviewed on this basis. Indeed, this is crucial to obtain robust evidence to assess significant differences between the different treatments being tested, on which policy can be based.
3. Due to the uncertainties within the evidence base, the precautionary principle is often cited as a reason to halt prescribed burning on peatlands. However, it is rarely (if ever) applied when considering other even more understudied or unproven peatland management options, eg. mowing or cutting of heather or no management, as well as restoration measures like rewetting (which as noted above can increase methane emissions). These management options are also likely to cause negative impacts when applied in certain contexts. The precautionary principle should not be used as a basis for decision-making solely for burning.

Table 5.4 presents a summary of the literature review conducted by Ashby & Heinemeyer (2021). As controlled burning is intimately integrated with other moorland management issues such as water levels (drainage) and peat formation, their literature review inevitably covers more than vegetation management. For reasons of brevity, the table does not detail the many references cited by Ashby & Heinemeyer (2021) and readers should refer to their article in the journal *Wetlands*<sup>282</sup> if so desired.



#### References

<sup>281</sup> <https://www.iucn-uk-peatlandprogramme.org/news/burning-peatlands-position-statement>

<sup>282</sup> See references.

**References**

<sup>283</sup> Methane is a powerful greenhouse gas with a 100-year global warming potential 28 to 34 times that of CO2. Measured over a 20-year period, that ratio grows to 84 to 86 times. <https://unece.org/challenge#:~:text=Methane%20is%20a%20powerful%20greenhouse,are%20due%20to%20human%20activities.&text=Coal%20is%20another%20important%20source%20of%20methane%20emissions.>

<sup>284</sup> For a fascinating demonstration of the impacts of prescribed burning on sub-surface temperatures, see the 'Mars Bar vs Muirburn' film at [https://m365.eu.vadesecure.com/safeproxy/v47f=r4G58Rc2mPXy6Bxq4p\\_m4BAkHPGU2NEhZQLKVVvE9Q12OKupP0hEmRH9RRKRy1zuP\\_WUJ60W3A0IDgts2A&i=ircKD8TORo1HXwDa5hMIVTKOIPQqHGxBKGU1ONT9V0d6gg0\\_cNbnfTAW3\\_o32ibh2KemAJEwBPDOde5Xcag&k=9CRQ&r=EnlIGYTA4jHUIJNRtGjWj2nZVNDQRQWxGE+r0JiaASuNjlvPhUCbTY7GnJB4hFMquD3FRArV2TybWotH6tlg&s=a5b8b0f944058279324d7b4d32ce9b6ab1ad0bc441948169122af6b07dbc760&u=https%3A%2F%2Fwww.facebook.com%2FTomatinMG%2Fvideos%2Fm-a-r-s-b-a-r-vs-m-u-i-r-b-u-r-n%2F379362616482584%2F](https://m365.eu.vadesecure.com/safeproxy/v47f=r4G58Rc2mPXy6Bxq4p_m4BAkHPGU2NEhZQLKVVvE9Q12OKupP0hEmRH9RRKRy1zuP_WUJ60W3A0IDgts2A&i=ircKD8TORo1HXwDa5hMIVTKOIPQqHGxBKGU1ONT9V0d6gg0_cNbnfTAW3_o32ibh2KemAJEwBPDOde5Xcag&k=9CRQ&r=EnlIGYTA4jHUIJNRtGjWj2nZVNDQRQWxGE+r0JiaASuNjlvPhUCbTY7GnJB4hFMquD3FRArV2TybWotH6tlg&s=a5b8b0f944058279324d7b4d32ce9b6ab1ad0bc441948169122af6b07dbc760&u=https%3A%2F%2Fwww.facebook.com%2FTomatinMG%2Fvideos%2Fm-a-r-s-b-a-r-vs-m-u-i-r-b-u-r-n%2F379362616482584%2F)

<sup>285</sup> In April 2021, a wildfire broke out on Marsden Moor which burnt for three days <https://www.bbc.co.uk/news/uk-england-leeds-56931147> The moor, owned by the National Trust, had been rewetted in places and coir used to create dams. These coir dams burnt for longer than the surrounding vegetation. Winter flooding in the areas of the dams had killed surface vegetation, exposing areas of peat that burnt in the fire. A similar blaze broke out on the same moor in 2019

**Table 5.4 Summary Of Meta-Analysis Reviewing The Evidence For Burning, Mowing And Non-Managed Moorland**

Common assertions made about integrated moorland management incorporating controlled burning	Summary of Ashby & Heinemeyer (2021) review
<b>Burning is damaging to peatlands</b>	No consensus in the literature that prescribed burning is damaging to peatlands. The overall effect of burning on peatlands is unclear due to insufficient, contradictory, or unreliable evidence on carbon, water quality and biodiversity. Bare ground resulting from controlled burning is short lived and small scale. Large carbon emissions cited are largely based on lowland arable peatlands. There is no national net greenhouse gas data from managed grouse moors.
<b>Peat-forming species and specific indicators and controlled burning</b>	Environmental conditions regulate peat formation: hydrology, pH, litter quality, and other factors. Any species can form peat in the right conditions. Sphagnum and Eriophorum are not specific indicators of peat formation and may not be the most sensitive habitat indicators. Burnt areas can support similar levels of Sphagnum and Eriophorum to comparable unburnt or not recently burnt areas.
<b>Burning promotes drier communities</b>	Burning was historically associated with drainage. Drier communities were likely to be due to lowering of water tables due to drainage and not solely due to burning. Many drainage ditches are now blocked (or are being blocked) or have naturally infilled. Claims of micro-erosion networks and increased tussock formation due to burning are speculative and not linked to impacts on ecosystem functions. Wildfires can dramatically alter vegetation but should not be confused with impacts of prescribed burning on deep peat with high water tables.
<b>Impacts of rewetting</b>	Little evidence exists that peatlands in their natural state only ever provide ecological and environmental benefits. Rain falling on saturated peat will pool or run off. Runoff from saturated peat can exacerbate downstream flooding. Peatland with high water tables emit large amounts of methane, <sup>283</sup> especially in high temperatures. Wetness reduces burn damage to moss, litter and peat layers.
<b>Habitat state of peatlands</b>	Habitat status is currently based on vegetation composition using criteria that do not measure ecosystem parameters and functions, but plant traits are poor indicators for defining ecosystem functions. Criteria should be based on ecosystem functions and systems, with measurement of peat accumulation, water storage, etc. In current system bogs classed as degraded could be in good ecological condition, and vice versa. Different management regimes will lead to conflicting outcomes for ecosystem services eg. permanently saturated peatland will have lower flood mitigation potential and high methane emissions.
<b>Rotational 'cool' burning versus uncontrolled 'hot' burns</b>	Moss and peat layer in wet blanket bog ecosystems are generally buffered from the effects of prescribed burning (minimal moss damage, no peat ignition) <sup>284</sup> . Prescribed burning converts around 5% to 10% of biomass carbon into charcoal, a long-term carbon store resulting in high soil carbon accumulation. Mowing likely allows nearly all biomass to decompose over time, locking away around 1% to 2% of biomass carbon. Wildfires lead to far greater losses of peat and carbon. Any assessment of burning impacts on carbon and greenhouse gas emissions must consider methane fluxes. Low severity fires may suppress peatland methane emissions. Mowed and unmanaged sites have been shown to emit far more methane than sites managed by prescribed burning.
<b>Burning of peat after rewetting and under uncontrolled hot burns</b>	The wildfire mitigation of peatland rewetting (on vegetated peatlands) has never been tested in the UK context. Bog vegetation dries in summer, especially in prolonged dry spells, and becomes more flammable. Even on largely undisturbed peatland, the water table draws down by 20cm to 30cm in summer. Normally wet peat is flammable during drought conditions. <sup>285</sup>
<b>Burning and water storage</b>	There is no evidence that controlled burning increases flood peaks. The initially slightly lower water tables (about 2cm to 3cm) in burnt versus mown areas might offer additional water storage under conditions when wet sites are saturated.

**References**

<sup>286</sup> IUCN (2020) International Union for Conservation of Nature UK Peatland Programme: Burning and Peatlands Position Paper. Version 2, 31st March 2020, IUCN, Edinburgh, UK

<b>Long-term versus short-term impacts</b>	No study has fully assessed rotational burning impacts using a real-world approach, with measurements taken across active grouse moors and extending over a complete management cycle, or longer. The impacts of prescribed burning on UK peatlands are unknown and have not been adequately assessed using the correct spatiotemporal context. Many studies have failed to take pre-burn measurements, and crucial post-burn measurements are usually only taken for around three years at the start of a burning rotation. The current short-term approach to the study of prescribed burning is biased towards finding adverse effects as all forms of habitat disturbance cause immediate ecological 'damage'. When negative impacts are reported, they are often for short-term effects or for effects that are so small they may not be ecologically significant.
<b>Methodological issues</b>	Many studies of burning are unreliable and cannot be generalised due to poor experimental designs and/or significant statistical errors. Many reported impacts cannot be solely attributed to burning. The well-known and much cited EMBER report studies should not be cited to support the claim that burning has a "significant adverse impact on peatland biodiversity, carbon emissions, drinking water quality and flow management". A much wider evidence base is needed.
<b>Research needs</b>	Robust experimental research is needed at a broad range of nationally representative sites and/or assessments to validate proxies or tests of ecological functions (ie. peat accumulation) that can be rapidly applied in the field. Assessments will be complicated due to differing management regimes and site conditions. The ecosystem services to be measured will impact assessment. Catchment-scale experiments to ascertain the flood mitigation potential of peatlands in different hydrological, vegetative, and management states are urgently needed. More data about the net greenhouse gas budget impacts of peatland management are required, especially given future climate scenarios with warmer summers. Prescribed burning and alternative management impacts need to be measured over a 15 to 25-year timescale.
<b>Uncertain alternative management methods</b>	Mowing is under-studied, but causes damage to surface vegetation and peat, increases sedge grasses and associated methane emissions, and reduces crane-fly emergence, which has negative impacts on upland birds. The IUCN <sup>286</sup> recommends that the precautionary principle means that burning should be avoided, and should apply this concept to mowing. IUCN advocates the use of rewetting as a way of reducing wildfire risk, but there is no direct evidence to support this position. Rewetting could lead to increased methane emissions, increased run-off in hilly areas, and reduced water quality.
<b>Habitat condition versus ecosystem functions</b>	Ecosystem functioning is the critical issue. There is a lack of specific evidence in support of burning and alternative management in relation to ecosystem functioning factors. Clearly defined habitat conditions and objective restoration goals based on ecological/ecosystem function are required. A series of moorland sites across the UK with different conditions, implementing alternative management regimes should be established to enable a long-term, moorland-scale experimental/monitoring approach.
<b>Independent assessment of the evidence towards policy advice</b>	An independent assessment of the prescribed burning evidence should evaluate studies according to their methodological strength, and unreliable studies should be rejected from consideration. There is a need to assess properly the potential of prescribed burning in wildfire mitigation. A set of ecosystem function thresholds based on actual ecological data and an agreed-upon and evidenced set of definitions concerning habitat status within an applied context is needed.

Ashby & Heinemeyer's (2021) very extensive review of the literature is revealing. They highlighted the conclusion that isolated, relatively small-scale studies do not provide an evidence base for decision-making about the ecosystem services provided by different moorland management regimes. The natural capital concept and the ecosystem services model are important (especially in a period of

climate change), but the data about how differing moorland management regimes impact on climate change, water quality and flood risk, and wildfire mitigation is simply not robust. A new, multi-site, long-term research project is required that assesses the impact of differing management methods. At present there is no robust evidence to indicate whether grouse moors using traditional management



#### References

<sup>287</sup> Richard Benyon, Trustee of PlantLife, Plantlife Spring 2021, issue 89

<sup>288</sup> Savills estate agents were quoted in Country Life (11th January 2023) as saying that 69% of the 27 estates they sold in Scotland in 2022 were purchased by such people.

methods are less ecologically sustainable than alternative uses for moorland; livestock production, afforestation, alternative energy production, rewilding or conservation; on the contrary, the balance of the existing evidence suggests that controlled burning has positive impacts on carbon storage and biodiversity, as well as reducing the risk of wildfire.

Crucially, it is important here to repeat a key point already referred to in this report: nearly all 'grouse moors' have multiple functions. The landscape on which driven grouse shooting takes place is utilised for a range of income-generating activities including livestock production, alternative energy production, and forestry, as well as tourism and leisure. Although some landowners control all these activities themselves, many have to collaborate and co-ordinate with multiple stakeholders, including graziers and farmers. Moreover, driven grouse shooting takes place on both owned and leased land. Gathering valid and reliable evidence about the ecological sustainability of 'grouse moors' will involve studying driven grouse shooting as a part of the complex and holistic mix that is integrated moorland management, not as an isolated phenomenon.

### 5.3.4 An Ecosystem Management League Table?

It would be helpful for policy makers, practitioners and others, if researchers were able to construct a 'league table' ranking the alternative uses of moorland in terms of their impact on carbon capture and release, water quality and flood risk, and wildfire mitigation. However, as this chapter shows the current state of the evidence is neither robust nor extensive enough for the impacts of management practices associated with grouse shooting activities, or alternative management regimes, to be identified and ranked. To reiterate a point made above, isolated, relatively small plot-scale and short-term studies do not provide an evidence base for decision-making about the ecosystem services provided by different moorland management regimes. The current evidence certainly does not encompass the reality of integrated moorland management. Watt (1947) observed that: "It is one thing to study the plant community and assess the effect of factors which obviously and directly influence it, and another to study the interrelations of all the components of the ecosystem with an equal equipment in all branches of knowledge concerned." Limited research objectives result in prejudiced positions and critical understanding of ecosystem functions are set aside. The problems in nature are mostly problems of the ecosystem rather than of soil, animals or plants. Watt summed up the challenge for scientists and policy makers thus: "What I want to say is what T S Eliot said of Shakespeare's work: we must know all of it to know any of it." This edition of the report suggests that it is

not possible to say with any assurance that integrated moorland management, including the practices associated with grouse shooting such as muirburn, is less sustainable in terms of the ecosystem services (carbon emission and sequestration, water quality and flood mitigation) it provides than alternative uses of moorland. In fact, the current evidence (which is incomplete) indicates that the ecosystem services delivered by recent integrated moorland management regimes is, on many moors, delivering increasingly valuable ecosystem services which may not be delivered by alternative management regimes; there is not enough research about these alternative management regimes to make fully informed decisions. To repeat an important point: the current evidence is that, in the long-term and across the moorland landscape, controlled burning is very likely to be effective at reducing the risk of wildfire, achieves a wetter and more diverse ecosystem than old, heather-dominated cover and is also likely to sequester more carbon. Controlled burning is also essential for the production of the mosaic of different growth and community stages towards a 'climax vegetation'.

### 5.3.5 Future Responsibilities

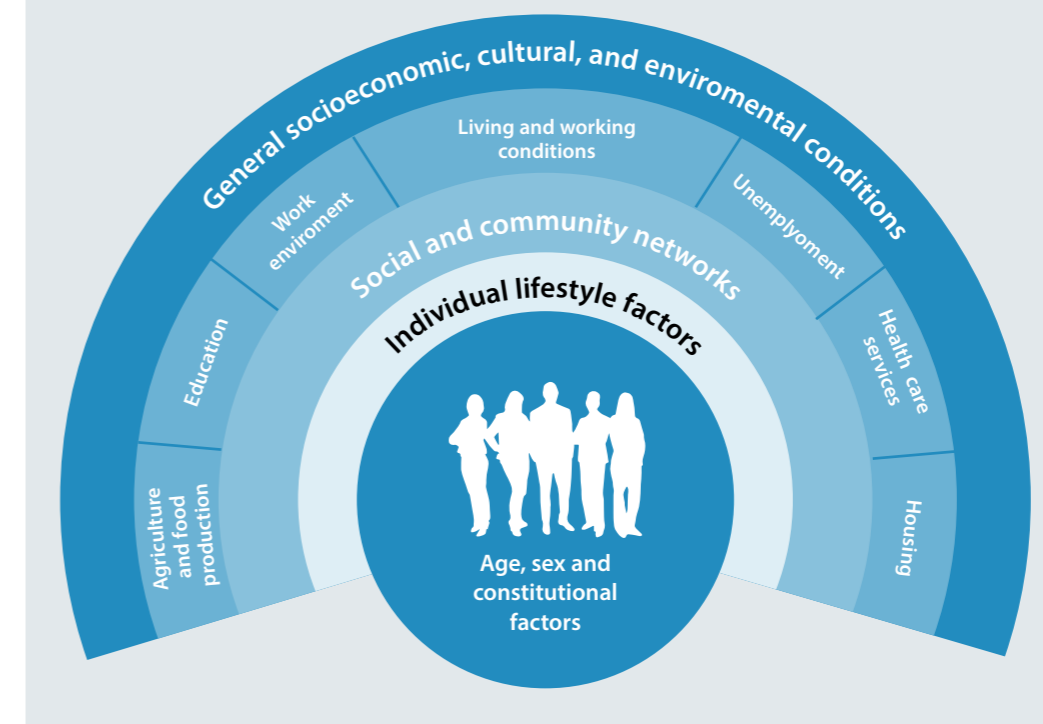
Climate change is everyone's problem. It cannot be envisaged that any UK government will remove the statutory requirement to achieve net zero GHG emissions by 2050. The change from the Common Agricultural Policy's Basic Payment scheme to the ELM scheme is part of a revolution<sup>287</sup>, although delays in confirming details of the ELM scheme are proving increasingly frustrating to landowners and managers. It is likely that owners and directors of businesses will be held increasingly accountable for measuring, monitoring and reducing GHG emissions. Business owners will be penalised for excess emission, and rewarded for reducing emissions and for, especially, sequestering carbon and methane. Landowners, including owners of moorland, are running businesses. Financial institutions and rich people are looking at certain types of land as a new asset class; estate agents report an increasing number of estates being bought by 'natural capital and conservation buyers'<sup>288</sup>. It is very conceivable that 'green bonds' based on natural capital credits could be developed in the next decade. Upland landowners are able to deliver public goods, which are the basis for receiving support from the ELM scheme. The challenge they face is to work with scientists to establish and implement practicable and effective systems that measurably deliver ecosystem benefits in a very complex and integrated ecosystem. It is a challenge that needs to be met by any moorland owner who wants to demonstrate that the ways in which they use their land is sustainable, and to be rewarded for increasing natural capital.

## 5.4 The Social Impacts Of Driven Grouse Shooting

Driven grouse shooting, unlike walked-up shooting, involves a wide range of individuals from a variety of backgrounds, not just Guns, but also beaters, pickers up, drivers, flankers, caterers and supporters. This extensive 'cast list' facilitates contact between individuals from different social, economic, demographic and geographic backgrounds and

maximises the potential for social impacts (Latham-Green, 2020b). When considering 'social impacts' this review considers what difference the presence of integrated moorland management makes to people's social, work and cultural lives and their health and well-being. These impacts may be on individuals, the community or wider society<sup>289</sup>. The report considers both social and community cohesion and the social determinants of health as defined by Dahlgren & Whitehead (1991) shown in Figure 5.5 below.

Figure 5.5 Social Determinants Of Health (Dahlgren & Whitehead, 1991)



The remote nature of the majority of moorland communities in areas where driven grouse shooting takes place means that the value of strong community networks and a vibrant local economy can be particularly important, both subjectively to individuals in terms of their mental health and well-being, and quantitatively to society in terms of potential cost savings to the taxpayer resulting from reduced demand on health services, etc.

In the largest study of its kind yet carried out, participation in driven game shooting, including that of red grouse, was shown to have a statistically significant positive impact on participants' mental health and well-being, measured using the nationally recognised short Warwick-Edinburgh mental well-being score (SWEMWBS), compared with the national average (Denny & Latham-Green, 2020; Latham-Green, 2020). The costs of poor mental health in the UK have been estimated at £105 billion per annum (Department of Health Independent Mental Health Taskforce, 2016). There are few studies that attempt to value subjective well-being (Maccagnan

et al, 2019). However, a 2019 study suggested that maintaining well-being could be valued at £10,560 per person per year<sup>290</sup> (Cox, Bowen & Kempton, 2012 in Maccagnan et al, 2019). This section explores some of the potential reasons for this positive impact on well-being, and on community and social cohesion in communities in areas where driven grouse shooting is practised.

### 5.4.1 Community And Sense Of Belonging

A 2020 study into upland communities in areas where grouse moor management is practised found that nearly three quarters (74%) of moorland community respondents took part in driven grouse shooting in some capacity, and it was an activity followed by all ages and both genders (Denny & Latham-Green, 2020). The study also found that moorland communities in areas where grouse shooting takes place have a high level of 'community' and a greater sense of belonging than the national average.

#### References

<sup>289</sup> It is acknowledged that there are individuals who are opposed to shooting on ethical grounds, as noted in section 6.4. The presence of shooting estates may have social impacts on them as individuals (McMorran 2009). However, no studies of individuals living in moorland communities that are opposed to shooting have been identified. The negative impacts highlighted in Latham-Green's 2020 study into all aspects of driven game shooting related to conflicts between those for and against shooting and poor practice and wastage highlighted in the commercial pheasant and partridge shooting industry.

<sup>290</sup> This valuation compares loss of subjective well-being with severe mental health problem development, using Quality Adjusted Life Year (QALY) health economist assessed weights (Maccagnan et al, Ibid).



Identity and strong social networks, sometimes referred to as bonding social capital (Putnam, 2000; Claridge, 2018a), are intrinsically linked (Claridge, 2018a; b). People with a shared identity, for example those who take part in driven game shooting (Latham-Green, 2020), or who live in upland communities with a strong cultural and heritage identity (McMorran et al, 2013; McMorran, 2009), have been shown to build strong friendships or 'social and community networks', based on their shared understandings and sense of belonging (Latham-Green, 2020). Previous studies into upland communities have identified positive community support either facilitated by or directly provided by many estates (McMorran et al, 2013; McMorran, 2009; Glass, Bryce & McMorran, 2015).

Strong social and community networks can reduce the risk of loneliness, which is a significant public health issue with those people affected often needing support (Groarke et al, 2020). Residents in upland, moorland English communities where grouse moor estates are present have statistically lower levels of loneliness than the national average (Denny & Latham-Green, 2020) and participants in driven game shooting (of all quarry types) were also found to have lower levels of loneliness than the national average (Latham-Green, 2020). Reducing levels of loneliness matters: the societal and health costs of loneliness have been estimated at £6,000 per person over 10 years (Mcdaid, Bauer & Park, 2017).

Where moorland areas are managed for driven grouse shooting, research has shown a wide range of community activities, clubs, societies and resources are available (Denny and Latham-Green, 2020). Events are frequently organised by and even funded discreetly by landholders of grouse moors (Denny and Latham-Green, 2020), highlighting the commitment to community of those landholders, as illustrated in this quote from Denny and Latham-Green's 2020 study:

"The tenant is embedded in the community. The events he organises (and discretely funds) bring together the 40 to 50 people in the Dale. It is not charity, or bribery, but because the tenant feels he belongs and that his duty is to do things that others cannot."

The presence of gamekeepers and other estate workers and contractors with young families getting involved in supporting community activities as well as regularly using local facilities (McMorran, 2009; Glass, Bryce and McMorran, 2015; Denny and Latham-Green, 2020), contributes to ensuring a vibrant and active community in upland areas throughout the year, not just during the tourist season. The majority of McMorran's 2015 study respondents believed there were community-level benefits of grouse shooting, with 70% in the Angus Glens and 53% in the Monadhliath noting community-level benefits, and only 8% in Angus Glens and 15% in the Monadhliath not noting any community benefits (Glass, Bryce and McMorran, 2015).

Studies considering the impact of grouse moor management have highlighted the positive impact of grouse shooting estates in ensuring that communities maintain an intergenerational mix (Glass, Bryce and McMorran, 2015; McMorran et al, 2013; McMorran, 2009; Denny and Latham-Green, 2020). Inter-generational relationships and the building of intergenerational understanding and respect have been recognised as an important element of social cohesion and social capital (Commission On Integration And Cohesion, 2007; Hatton-Yeo and Batty, 2011). It has been recognised that more resilient communities help deliver positive impacts for health and well-being, through intergenerational connection (O'Connor et al, 2019). The proportion of those aged over 65 in the UK is expected to rise to 26% by 2041, with the greatest number residing in rural and coastal areas (Office for National Statistics (ONS), 2018). This increase is likely to be partly as a result of the outflow of young people to towns and cities to find employment; young people in rural areas have been found to be at higher risk of unemployment due to their spatial isolation and to the narrow range of opportunities available (Cartmel and Furlong, 2000). Rural out-migration of youth and in-migration of retirees has been recognised as a threat to sustainable, rural communities (Thomson, 2012), indicating the importance of creating a sustainable local economy with diverse work opportunities, as explored in the next section.

**Previous studies into upland communities have identified positive community support...**

### 5.4.2 Wider Determinants Of Health

Although employment is covered in more detail in section 5.1 of this report relating to economic impacts, it is important to note the wider social impacts of employment and training. These are shown in Figure 5.5 and have been identified as social determinants of health by Dahlgren and Whitehead (1991). Employment in particular is recognised as one of the key determinants of both good health and a key means for tackling inequalities (Dahlgren and Whitehead, 1991; Bartley, et al 2005, Ellis and Fry, 2010).

Having a variety of skilled employment opportunities is particularly important in the more remote, rural areas of the UK where alternative employment is often limited and/or seasonal (Scottish Government, 2012; Monk et al, 1999). Communities in areas where integrated moorland management, including driven grouse shooting, is practised have a more diverse economy, and are less reliant on tourism than comparable upland areas where land management practices do not include driven grouse shooting (Denny and Latham-Green, 2020). In his 2009 study of Tomintoul and Strathdon Communities, McMorran found that grouse shooting made a very significant contribution to the local economy, in terms of employment and benefit to local businesses, with 81% of respondents agreeing that the community received benefits from the existence of the grouse shooting industry and 58% feeling that grouse shooting was a major employer in the area. The indirect impacts of employment on the wider community have also been highlighted in many areas, one local garage reporting 80% of its business came from the grouse shooting estates (McMorran, 2009). Interestingly, McMorran found that although only 10% of his respondents were directly employed by the grouse shooting industry, 18% of respondents said their livelihood was directly dependent on it (McMorran, 2009). McMorran's later report considering the 'Economic, Social and Environmental Contribution of Landowners in the Cairngorms National Park' found that, out of season, gamekeepers and estate workers used local cafés, shops and restaurants which themselves provided local employment and helped overall to sustain a local economy and community that would otherwise not be viable (McMorran et al, 2013). A job can enable people to build relationships and a social network, together with contacts for future opportunities for themselves or their families (Dreiling et al, 2015). Employment can also contribute to an individual's role identity and sense of purpose/belonging (Stets and Burke, 2000; Walsh and Gordon, 2008), which positively impacts well-being (Haslam et al, 2009).

A lack of diverse training and skills development opportunities in rural areas has been recognised as an issue due to a number of factors including transport

and access to Further Education (Monk et al, 1999; Scottish Government, 2012; The Commission for Rural Communities, 2012). Development of skills has been shown potentially to impact positively well-being through increasing self-esteem and self-efficacy (Denny et al, 2011; Hazenberg, Seddon and Denny, 2015). Careers directly linked to shooting include gamekeeping, gun dog training, gun-smithing, land conservation, ecosystem management and shotgun tuition. Training is currently widely available, with the NGO Educational Trust noting 25 colleges offering gamekeeping courses, in a 'non-exhaustive' list<sup>291</sup>, and demand for these courses is high<sup>292</sup>. The wider industries supported by the presence of grouse shooting in remote, upland areas, such as the hospitality and retail industries, provide indirect career opportunities (McMorran, 2009; McMorran et al, 2013; Glass, Bryce and McMorran, 2015; Denny and Latham-Green, 2020; Latham-Green, 2020).

### 5.4.3 Identity And Intangible Cultural Heritage

Those who live in rural communities, such as the uplands, often have a strong rural identity and sense of place, which they hold dear (Williams, 2011). Identity has been recognised as a key element of building strong social networks, one of the key determinants of health (Dahlgren and Whitehead, 1991). An individual's strong feeling of identity can have positive impacts on their mental well-being. It can "provide individuals with a sense of meaning, purpose, and belonging (ie. a positive sense of social identity)" (Haslam et al, 2009), which usually has positive psychological consequences (Haslam et al, 2009). Rural identity has been explored in prior research (Heley, 2011, 2010), with those involved in shooting expressing clear rural identities (Hillyard and Burrige, 2012; Latham-Green, 2020) (and, for some respondents, links to their cultural heritage (McMorran et al, 2013)), and valuing activities which were grounded in 'rural realities' (McMorran, 2009). A recent study looking at the social impact of participation in all forms of driven game shooting found that 91.3% of participants surveyed (n=2,424) felt a strong identity with the countryside, which importantly was not dependent on residence in a rural area. No significant statistical differences in the sense of rural identity were found when comparing responses from rural and urban dwellers, rather it was connected to the rural activity in which they participated, driven game shooting (Latham Green 2020).

United Nations Educational Scientific and Cultural Organisation (UNESCO) identifies the concept of intangible cultural heritage (ICH), which relates to social practices, knowledge and seasonal events that some individuals and communities recognise to be part of their cultural heritage, as an important

#### References

- <sup>291</sup> See, <https://www.gamekeepertrust.org.uk/role-of-a-gamekeeper>
- <sup>292</sup> In March 2022, Scotland's leading rural colleges reported that they have been inundated with student applications for places in their gamekeeping and wildlife management courses <https://www.ross-shirejournal.co.uk/news/gamekeepers-benefit-from-classes-268217/>

## References

- <sup>293</sup> <https://www.ons.gov.uk/economy/environmentalaccounts/articles/uknaturalcapitaldevelopingukmountainmoorlandandheathlandecosystemaccounts/2017-07-21>
- <sup>294</sup> <https://naturalengland.blog.gov.uk/2020/02/19/natural-england-publishes-a-new-report-on-the-state-of-our-natural-capital>
- <sup>295</sup> <https://www.gov.uk/government/news/natural-capital-tool-launched-to-help-protect-the-environment>

factor in the well-being of individuals (United Nations Educational Scientific and Cultural Organization (UNESCO), 2018). Cultural heritage does not begin and end with monuments. It also includes “living expressions ... such as oral traditions, performing arts, social practices, rituals, festive events, knowledge and practices concerning nature and the universe or the knowledge and skills to produce traditional crafts” (UNESCO, 2003). Although the UK is not yet a signatory to the UNESCO ICH treaty, there has been research into its relevance in areas such as the importance of safeguarding traditional craft and skills in the Midlands (Harrison, 2019) and the social and cultural well-being of Cornish coastal communities (Urquhart and Acott, 2014). The place of cultural services as a constituent of the UK’s natural capital are recognised by the ONS<sup>293</sup>, Natural England<sup>294</sup> and Defra<sup>295</sup> and, as noted previously, by the IUCN’s category 5, ‘cultural landscape’ designation.

As noted above, many respondents, including beaters, pickers-up and the Guns, felt a strong sense of heritage through their participation in shooting (Latham-Green 2020 study). They believed that taking part in shooting represented a link to their heritage and returning to their roots, a seasonal ritual which was often shared across generations, a finding that was particularly true for those who grew up in rural areas but now live in urban areas (Latham-Green, 2020). In his study into the Economic, Social and Environmental Contribution of Landowners in the Cairngorms National Park, McMorran (2013) found that participants believed grouse moor management contributed to preservation of a ‘culturally significant activity and landscape’. In this 2013 study most respondents (75%) ‘agreed’ or ‘strongly agreed’ that grouse shooting was an important part of the culture and history of the community (McMorran et al, 2013).

This connection to heritage was also apparent in a study that explored the motivations of grouse moor owners and leaseholders, finding that many grouse moor owners expressed a connection to the land they managed across the generations

(Denny and Latham-Green, 2020). This study found that individuals who manage or lease grouse moor estates see themselves as custodians of the land. All grouse moor owners and leaseholders surveyed (n=73) believed it was very important that they leave a positive legacy, and an environment better than the one they inherited. Indeed, the majority of grouse moor owners surveyed (47 out of 73) did not require their moor to make a profit for them to continue to fund its operations. In support of this finding, a college lecturer interviewed as part of the study noted that:

*“Having watched from the side-lines and listened at various meetings, what I got out of it was a group of individuals who were very committed not just to improving upland management practice in their area but with a very strong belief that they wanted to pass something on to the future, that really old-fashioned idea that you don’t inherit a landscape from your ancestors, you hold it in trust for your children. They had the attitude they wanted to put something in place that was better than when they started. I have sat in similar meetings where the general impression of the meeting is how much can I get out of it and these guys didn’t generally think like that.”* (Denny and Latham-Green, 2020)

### 5.4.4 Green Spaces Access, Well-Being And Exercise

Most estate owners in areas where driven grouse shooting takes place facilitate access to the public. This allows both those who participate in shooting, and those who do not, to access green spaces. Participation in driven game shooting in any role has been shown to facilitate regular physical exercise, with distances of 14 kilometres or more walked on a driven grouse shooting day by some participants (Latham-Green, 2020). A study into upland, moorland communities where grouse moor management is practised found that 84% of survey respondents regularly exercised on the moors, with seven out of

10 of them doing at least 150 minutes of moderate exercise a week, more than the national average (Denny and Latham-Green, 2020)<sup>296</sup>. The camaraderie and social capital built through participation in driven grouse shooting encourages exercise in all weathers (Latham-Green, 2020) and the maintenance of pathways and tracks that facilitate access by estates enables access all year round for tourists and local communities alike (Denny and Latham-Green, 2020).

Exercise outdoors has been shown to have a greater positive benefit than exercise indoors (Zhang, 2017; Thompson Coon et al, 2011; Loureiro, Veloso and Veloso, 2014; Frühauf et al, 2016). Access to green spaces has been shown to help increase activity and reduce obesity (Coombes, Jones and Hillsdon, 2010; Countryside Recreation Network, 2006). Physical inactivity and obesity can lead to long-term conditions such as diabetes and cardiovascular disease (Leong and Wilding, 1999), which are costly to manage in the NHS. A 2014 study indicated that obesity had a burden of around £47 billion a year on UK society (circa 3% of GDP), making it the greatest impact after smoking (Dobbs et al, 2014). The availability of accessible green spaces to encourage physical activity is likely to reduce this economic burden on society. The 2014 PACEC study into all types of shooting, found that the majority of the demographic group engaged in shooting (of all types) were male and over 40 (Public and Corporate Economic Consultants (PACEC), 2014) and Latham-Green’s 2020 study found that 86.7% of participants were male with a median age of 57 (Latham-Green, 2020). The value of regular exercise, to both the individual and society in preventing the costs of ill-health, is higher for individuals 45 and over (World Health Organisation (WHO), 2019). It has been estimated that only 40% of men complete moderate physical exercise (30 minutes a day, five or more days-a-week (Pollard, 2010). It has been suggested the best form of exercise for men reluctant to take up physical activity is to find something they enjoy and can easily include in everyday activities, with walking being considered one of the best options (Pollard, 2010). An analysis of 18 observational studies, from a review of 4,295 studies on walking starting with research from 1970, found that walking reduced the risk of heart problems by 31% and the risk of death by 32% during the study period (Harvard Men’s Health Watch, 2009; Pollard, 2010). In 2016, Public Health England estimated that a lack of physical activity was costing the UK £7.4 billion per year (England, 2016).

Latham-Green (2020) calculated the indicative value of physical health benefits resulting from regular exercise for number of beaters and pickers-up in the UK, using the WHO HEAT for walking and cycling (WHO, 2019). The calculation took into account age, distances walked and frequency of participation, with those who participated less than once a week not included in the calculation. The study found

that, based upon the HEAT tool, an *indicative* value of around £547 million<sup>297</sup> per year can be suggested as the health-related financial impact of participation in all types of driven game shooting by beaters and pickers-up due to the increased walking in which this group participates. The same study found that the average distance walked by grouse beaters was 14 kilometres and the average age of participants was over 45 (median age 57). Using this data, and assuming beaters were out twice a week for the entire four-month season, a value can be estimated for the exercise completed by each beater aged over 45 using the using the HEAT tool. An *indicative* societal value of up to £1,966<sup>298</sup> per beater per year can be identified as the health-related societal financial impact of their participation in driven grouse shooting. Over the full assessment period of 10 years, the total economic impact is up to £19,658<sup>299</sup> per grouse beater aged 45 or over<sup>300</sup>. For those under 45 the values are lower. For each beater aged under 45, grouse beating twice a week, a value of up to £211<sup>301</sup> per year (£2,115 over 10 years<sup>302</sup>) can be suggested as the health-related financial impact of this participation. Again, it is stressed that the above figures of financial benefit are indicative. However, they do highlight that there are benefits to society, in the form of savings to health care, from people getting exercise through their participation in driven grouse shooting.

Spending time outdoors has been shown to have positive mental well-being benefits (Frühauf et al, 2016; Kerr et al, 2012; Ryan et al, 2010). These figures, although indicative, are very significant. There are quantifiable health benefits gained by thousands of people a year as a result of their participation in driven grouse shooting. Proponents of alternative uses for moorlands should calculate the potential health benefits delivered by these uses if they are to have a comprehensive case for change.

Additionally, the role of land in enhancing human spirituality, some connection with a perceived God in a place of ‘therapeutic stillness’, has been considered in relation to overall human well-being (Winter, 2012). In a comparative study of two upland communities, 69% of respondents agreed that the landscapes resulting from grouse moor management were beautiful (McMorran, 2009). Areas such as the uplands, even when they are some distance from individuals’ homes, have been shown to be areas to which people hold strong attachments (Williams, 2011).

Integrated moorland management, including driven grouse shooting, has been shown to increase biodiversity of some bird species, as detailed in section 5.2. Predator control on moorland increases numbers of various bird species including red grouse, golden plover, and the red-listed curlew and lapwing (Baines et al, 2014). Research has shown that there

## References

- <sup>296</sup> Not all respondents took part in driven grouse shooting.
- <sup>297</sup> Converted from EUR to GBP at a rate of 0.8453 on 11.02.2020. (Bank of England, 2019)
- <sup>298</sup> Converted from 2,270 EUR to GBP at a rate of 0.8666 on 09.04.2021 (Bank of England, 2021)
- <sup>299</sup> Converted from 22,700 EUR to GBP at a rate of 0.8666 on 09.04.2021 (Bank of England, 2021)
- <sup>300</sup> Discounted to 2021 values at an annual rate of 5% the total economic impact is £15,194
- <sup>301</sup> Converted from EUR to GBP at a rate of 0.8666 on 09.04.2021 (Bank of England, 2021)
- <sup>302</sup> At a discounted rate of 5% the value is £1,632.





is high usage of upland moors for birdwatching and walking by both people who live in upland moor areas (Glass, Bryce & McMorrin, 2015) and the wider UK population. In 2007 the RSPB estimated that upland areas of the UK host 100 million day-visits per year. Birdwatching is a pastime enjoyed by many individuals throughout the UK, with birdsong enhancing individuals' experiences of the countryside. The RSPB has over 12,000 volunteers and over a million members (RSPB, 2017) and these individuals, along with many other people throughout the UK, value birds in the natural environment and gain enjoyment through birdwatching, a positive social impact, especially when groups of birdwatchers meet up to enjoy their pastime together.

As is noted in the introduction to this report, sustainability has three dimensions; economic, environmental and social. The evidence from the existing literature is that in terms of social impacts, driven grouse shooting should be seen as sustainable.

#### 5.4.5 Social Impacts: Conclusion

Driven shooting, unlike walked-up shooting, involves a wide range of individuals from a variety of backgrounds, not just Guns, but also beaters, pickers-up, drivers, flankers, caterers, supporters and others, facilitating contact between individuals from different class backgrounds and maximising the potential for social impacts. This chapter has described how moorland management regimes that facilitate driven grouse shooting enable people to take part in activities, both as part of driven grouse shooting and separate to it, which result in positive impacts on their social and work lives, and their physical and mental health and well-being. It is possible to calculate the indicative values of some of these activities to individuals, and to groups of people, and these values are often significant. Individuals, communities and the state benefit from many of the social impacts of driven grouse shooting. As is noted in the introduction to this report, sustainability has three dimensions; economic, environmental and social. The evidence from the existing literature is that in terms of social impacts, driven grouse shooting should be seen as sustainable. Alternative uses of moorland will deliver different social impacts, but these have not yet been fully identified. Any decisions about the implementation of these alternative uses must take into account the potential loss, or gain, in social impact.

## 6.0

# The Opponents Of Driven Grouse Shooting

Despite the existing balance of evidence, there are individuals and organisations that are opposed to driven grouse shooting. This opposition is for a variety of reasons and tends to focus on specific issues rather than taking a holistic view of sustainability such as that advocated by the IUCN.

Organisations such as Animal Aid and the League Against Cruel Sports are opposed to all killing of animals by shooting sports on ethical grounds (Brady, 2015). High profile supporters of banning driven grouse shooting, such as the television presenter Chris Packham, and former RSPB Director of Conservation, Mark Avery, have strong views, organising protest events (Avery, 2016) and online petitions to be debated in parliament, including a call for driven grouse shooting to end (UK Government and Parliament, 2019 and 2021), both of which failed. These high profile campaigners are proficient in the use of social media enabling them to articulate and disseminate their views in the media, something which those involved in shooting recognise they are less well-equipped to do in order to provide balance to the arguments (Latham-Green, 2020). Moreover, some individuals and organisations are not afraid of using selective evidence to oppose driven grouse shooting, especially on such issues as controlled burning (a subject examined below).

Some politicians oppose driven grouse shooting, and other shooting sports, on ethical grounds. In 2017 the Welsh Government commissioned a review of shooting over land it owned. Despite the recommendations of the review, conducted by National Resources Wales (NRW, 2018a pages 4, 5 and 6), the then Welsh Environment Minister opposed shooting on ethical grounds. Ultimately shooting over NRW land was banned from March 2019 (Bodkin, 2018).

Different national organisations vary in their stance on shooting. Although the Royal Society for the

Prevention of Cruelty to Animals (RSPCA) is opposed to sports game shooting entirely, including the use of any form of predator control (RSPCA, 2014), the National Trust at present supports low intensity grouse shooting, managed in a way in line with its ethos of recognising rural heritage, traditions and spirit, and fitting with its principal purposes of conservation and access, following recognised codes of practice (National Trust, 2015). However, the RSPB has questioned the impact of driven grouse shooting and has called for a licensing system to be introduced UK wide (RSPB, 2020a).

Most opponents of driven grouse shooting act in accordance with the law. However, a small number of opponents use violence, intimidation, and abuse to advance their cause; for example, in August 2018 a group of hunt saboteurs, dressed in black and wearing balaclavas, arrived at a shoot, where they tried to stone vehicles and intimidate shoot staff. The police were called to disperse the individuals and the shoot was forced to end the day early (Darlington and Stockton Times, 2018). It is clear from Raptor Persecution UK's website that the incident caused discomfort to local people:



“A villager from Reeth said: ‘It was quite scary as the protesters had balaclavas on and there were so many police cars and vans.’” (Raptor Persecution UK, 2018, para.21)

However, the shoot days themselves are not the only target. Estates have faced intensive intimidation campaigns and vandalism<sup>303</sup>. Some estates have had to employ security teams. Gamekeeper abuse, both face-to-face and online (FarmingUK, 2021), is increasing, with many anti-driven grouse shooting groups using covert and overt surveillance of gamekeepers going about their daily duties (Brown, 2019). This intimidation and abuse has been condemned by nature conservation groups and some local MPs (Cross, 2021; Chalmers, 2021). A 2020 report which surveyed 162 Scottish gamekeepers about their working lives and conditions found:

“About 8% of the respondents reported receiving abuse or threats from people outside of their profession on a regular basis (once or twice a month), whilst 56% had experienced such abuse/threats ‘rarely’ (once or twice per year)... The majority of abuse received was verbal abuse although incidents of physical violence and online abuse were also reported”

(Thomson et al, 2020, p.25)

A survey of more than 1,000 gamekeepers published in February 2021 by BASC and others found that almost two-thirds of respondents across the UK had received abuse and threats as a direct result of their profession (BASC, NGO and CA, 2020). The key findings were:

- “Nearly two-thirds (64%) of gamekeepers have experienced abuse and/or threats because of their occupation.
- Abuse via social media channels is a rising issue for gamekeepers, with 56% of respondents recording an increase in the number of incidents over the last 12 months compared to previous years.
- Respondents who have been targeted also recorded increases in physical (32%) and verbal (37%) abuse.
- Some gamekeepers also reported that the pressure of being targeted for doing their job has led directly to the breakdown of personal relationships.”

(BASC, 2021a, para. 4)

In response to these findings, the then Environment Minister, George Eustace MP noted:

“Gamekeepers do vital work as custodians of the land. They play an important role in the shooting industry, which delivers significant benefits to rural economies. Any form of abuse or intimidation is wholly unacceptable, and those responsible should feel the full force of the law. We will take the findings of this report on board.” (BASC, 2021a, para. 5)

Most gamekeepers live in a tied houses on the estates, meaning there is no escape from the fear of intimidation when they go home after work. The Gamekeepers’ Welfare Trust (GWT) launched a counselling service in December 2020 to provide support to gamekeepers and their families, noting that many gamekeepers are facing increasing abuse targeted at both themselves and their families and even at school, which can negatively impact their own and their families’ mental health (GWT, 2020).

It should be noted that some advocates of field sports have resorted to tactics like those used by some opponents, for example the case in which the judge found that articles published in an online magazine (Country Squire Magazine) had libelled Chris Packham<sup>304</sup>. Such practices are most regrettable.

## 6.1 Arguments Of Opponents Of Driven Grouse Shooting: Evidence For And Against

Opposition to driven grouse shooting can be summarised under eight headings. These headings do not include an ethical opposition to the killing of any animal, a belief that even if not shared must be acknowledged and respected (in the same way that the belief that it is legitimate to kill some animals in certain circumstances should also be acknowledged and respected). The eight arguments employed against driven grouse shooting are:

- Driven grouse shooting is not economically viable and there are better alternative uses for moorlands such as tourism and forestry.
- Walked-up grouse shooting is a ‘better’ alternative to driven grouse shooting.
- Driven grouse shooting involves the illegal killing of raptors.
- Opposition to predator control.
- Use of lead shot.
- Muirburn results in damage to peat, thus releasing carbon.
- Moorland management for driven grouse shooting involves draining moors, resulting in an increased risk of flood.
- Driven grouse shooting involves the killing of Mountain Hares.

The evidence for and against these arguments<sup>305</sup> will be examined in turn.

### Driven grouse shooting is not economically viable and there are better alternative uses for moorlands such as tourism and forestry.

Section 5.1 of this report details the economic impacts of the management activities involved in driven grouse shooting using the six-order model

developed by Denny & Latham-Green (2020). No proponent of ‘better’ or alternative uses for moorland has demonstrated that these would result in improved economic viability using the six-order model. Crucially, those opposing driven grouse shooting on economic viability grounds fail to recognise, or acknowledge, that many landowners of moorland do not just manage their land for driven grouse shooting. Estates do not just run grouse moors, they also generate income from green energy production agriculture, forestry, and non-shooting related tourism. In addition, those opposing driven grouse shooting on economic grounds need to note that alternative uses such as forestry and renewable energy require government subsidy to ensure profitability, and those with the most viable economic opportunities often have more negative environmental and social impacts than driven grouse shooting.

There is a need for a great deal of research before the full economic impacts of the management activities involved in driven grouse shooting (described as integrated moorland management in this report) can be said to be less viable than the alternative uses suggested for moorland. Moreover, there is a need to recognise that, as the IUCN points out, economic factors cannot be separated from social and environmental factors in any consideration of sustainability. The evidence for the positive social and environmental impacts resulting from integrated moorland management should not be ignored.

*This argument deployed by those opposed to driven grouse shooting is not supported by the balance of available evidence.*

### Walked-up grouse shooting is a ‘better’ alternative to driven grouse shooting.

Some individuals and organisations such as the RSPB argue that they are not opposed to grouse shooting entirely, just driven grouse shooting. They suggest a less intensive form of grouse shooting such as walked-up shooting would be acceptable.



However, it is not economically viable for land to be managed solely for walked-up grouse shooting (Sotherton, Tapper & Smith, 2009). Without driven grouse shooting, many upland estates would have little incentive to practise integrated moorland management which the evidence strongly indicates would result in a decline in biodiversity and an increased risk of wildfire.

The argument for walked-up shooting also fails to take account of the economic and social benefits that driven grouse shooting provides to a community, as well as the intangible, cultural associations expressed by those involved (Denny & Latham-Green, 2020; Latham-Green, 2020).

*This argument deployed by those opposed to driven grouse shooting is not supported by the balance of available evidence.*

### Driven grouse shooting inevitably involves the illegal killing of raptors

Perhaps the most effective argument used against driven grouse shooting has been that it intrinsically involves the killing of raptors, which is illegal. Some gamekeepers do kill raptors; on 31st March 2023 a Mr. Rory Parker pleaded guilty to shooting a sparrowhawk whilst employed as a gamekeeper on the Moy Estate, Inverness. He is cited by Raptor Persecution UK as being the 56th gamekeeper to be convicted of raptor persecution offences in Scotland since 1990.<sup>306</sup> However, it should be noted that 56 convictions in 33 years amounts to fewer than 1.7 convictions per annum. Furthermore, it should be noted that people who are not gamekeepers also kill raptors illegally; a Mr. Barry Nicolle, a wildfowl enthusiast in south west Scotland, pleaded guilty to 14 charges at Dumfries Sheriff Court in relation to illegal poisoning of red kites in the area in April 2023.<sup>307</sup>

In contrast to Mr. Parker and his ilk, many estates and their gamekeepers actively work to protect and increase raptor numbers. The Buccleuch Organisation<sup>308</sup> works closely with the South of

#### References

<sup>303</sup> One estate has CCTV evidence of an individual urinating on legal fox control snares leaving them inoperable (Brown, 2019).

<sup>304</sup> See, <https://www.judiciary.uk/wp-content/uploads/2023/05/Packham-v-Wightman-Judgment-250523.pdf>

<sup>305</sup> In advance of the 21st June 2021 debate of the Petitions Committee in Westminster Hall on the petition organised by Wild Justice calling for driven grouse shooting to be banned, the organization sent an email (on 18th June 2021) urging its supporters to contact their MPs to support the petition. The email cited most of the arguments listed in section 6.4.1. add added three others: that few grouse that are shot are eaten (this is untrue), that a grouse moor is as ‘unnatural as a car park or a wheat field’, and that ‘our upland National Parks have been de-wilded by grouse moor management’. It is hard to accept these latter two arguments given the literature review undertaken to produce this report. During the Petitions Committee debate, 11 MPs took part. Only two MPs were in favour of a ban on driven grouse shooting, while the nine that were against a ban cited extensive evidence supporting the continuation of driven grouse shooting. In closing the debate, Tom Hunt MP said that “with respect to the petitioners, there is clearly not support in this House for the petition. In fact, there is probably less support than there was for years ago”, when a similar petition to ben grouse shooting had been debated.

#### References

<sup>306</sup> <https://raptorpersecutionuk.org/2023/03/31/gamekeeper-convicted-of-raptor-persecution-on-moy-a-notorious-scottish-grouse-shooting-estate/>

<sup>307</sup> <https://raptorpersecutionuk.org/2023/04/05/galloway-wildfowl-collector-pleads-guilty-to-14-charges-relating-to-the-poisoning-of-red-kites/>

<sup>308</sup> <https://www.buccleuch.com/>



Scotland Golden Eagle Project (SSGEP) and, when a golden eagle was found dead on its Queensberry Estate in early 2023, it was the gamekeepers who informed the police and the SSGEP. The executive chairman of Buccleuch was quoted as saying: "Buccleuch work closely with the SSGEP in the local area and we are extremely proud of our record in recent years of helping rebuild the population. The bird was removed from the site on Saturday and is being tested to understand the cause of death. Our team will continue to offer any assistance it can on this matter."<sup>309</sup> All organisations involved in game shooting oppose and condemn the illegal killing of raptors.

Although not condoning in any way the illegal killing of raptors, it must be noted that, without the management practices associated with driven grouse shooting, there would be many fewer raptors than there are. Raptors benefit from the legal control of generalist predators. A gamekeeper in County Durham, cited in Real Wilders (2023), pointed out: "We carry out predator control for the grouse, but by so doing we are protecting all ground-nesting birds including curlew, lapwing, hen harriers and merlin."<sup>310</sup> The passerines (songbirds) and small mammals that thrive on grouse moors provide an abundance of food for raptors. Warren & Baines (2012) documented dramatic declines of red-listed birds (including raptors) in Berwyn (Wales) when habitat management and predator control was removed in 2002. In the same period the number of carrion crow, a generalist predator, increased by 526%. It was at Berwyn in 2022 that an ornithologist was monitoring a hen harrier nest under licence: "From a distance of around 350 metres, I observed the adult female leave the site where she was incubating eggs. A passing crow obviously spotted the white eggs and dropped like a stone onto the nest."<sup>311</sup>

Establishing the reason for the disappearance of raptors is not always simple even when birds are fitted with tracking devices. BBC Scotland reported on 30th November 2022 that an osprey from the

Scottish Borders had flown to Portugal where it was feared dead as the signal was lost from its GPS tracker. However, the signal resumed two days later and the bird was located in Morocco. For many years Natural England has been involved with monitoring, tagging and satellite tracking hen harriers. To date, more than 60 individual birds have been tagged by Natural England, helping to determine their fortunes and inform wider hen harrier conservation work. Updates on tracked birds are reported on the Natural England website.<sup>312</sup> The results are worth examining: in 2021, 31 pairs of hen harriers attempted to breed in England, of which 24 were successful, and 84 chicks fledged. In 2022, Natural England followed the fortunes of 14 adult birds carrying transmitters fitted in previous years. Five of the older, more experienced birds (which are given names) - Dru (tagged 2017), Frank (2018), Sofia (2018), and Colin (2019) - attempting to breed in England in 2021, as well as Sorrel (2016) attempting to breed in Scotland. Dru's and Sofia's nesting attempts failed, as the nestlings were taken by predators, but Colin bred successfully, raising four young, and Frank successfully bred with two females, meaning he has now fathered 21 chicks in his lifetime. Although Colin's tag stopped transmitting in April 2021, he was photographed and positively identified at the nest. The remaining nine adult birds tracked during the 2021 breeding season were all one-year-old birds, hatched in 2020. Of the three of these that were wild-reared, one (Susie) bred successfully. The other six were brood-managed birds, reared in captivity, of which five attempted to breed and four successfully bred, raising seven chicks between them.

In 2022, of the 84 chicks that fledged in England, 17 were fitted with satellite tags by Natural England. Seven of these were brood-managed birds (MA tags), and 10 were wild-reared birds. Two of the wild-reared birds tagged this year were the offspring of the 2020 cohort of brood managed birds. By November 2021, all tagged birds had settled into their winter ranges.

Some remain within their breeding areas, others migrated short distances away from the breeding grounds, and some wintered abroad. Two of the 2021 wild-tagged birds crossed to France, whereas all other birds remained in the UK, though one brood-managed juvenile appeared to set off across the channel before turning back and returning to southern England. Between July 2022 and February 2023, movement transmissions from eight of the satellite-tagged birds ceased. When movement transmissions are no longer received, Natural England informs the police, and immediate efforts are made to locate and recover the birds on the ground. This is not straightforward, as the final transmissions from the tags do not always give a precise location. Following intensive search efforts, the bodies of two of the 2021 brood-managed birds were located and sent for post-mortem examination. The finding circumstances did not suggest that the birds were illegally killed. The evidence of the Natural England hen harrier tracking scheme is that hen harrier numbers are gradually increasing and that the causes of death are frequently unknown. It is certainly not possible to say that hen harrier numbers suffer solely, or even mainly, because of illegal killing resulting from management practices associated with driven grouse shooting. However, it is possible that, even in 2023, some hen harriers are illegally killed on grouse moors by gamekeepers. Some question the sustainability of driven grouse shooting in relation to hen harrier conservation, arguing that less intensive moor management is the only solution to the issues surrounding raptors (Thompson et al, 2009); others believe that to resolve the conflict between those for and against shooting for the benefit of raptors, a better understanding and dialogue needs to be built between the parties to enable collaborative working (Hodgson et al, 2018), as illustrated by Defra's successful Joint Hen Harrier Action Plan (Defra, 2016).

The conflict between those against driven grouse shooting and the shooting community has been exacerbated by organisations on both sides of the raptor persecution debate interpreting the available data in a way that either supports their interests and agendas or damages the image of opposing groups (Hodgson et al, 2018). Additionally, some organisations produce 'research' papers that fail to include all relevant context but are still published in academic journals. Ewing et al (2023), researchers from the RSPB, state that illegal killing accounts for between 27% and 43% mortality in first-year hen harriers, and 75% of hen harriers aged one to two years old. They go on to suggest that: "Illegal killing is likely attributable to grouse moor management." Ewing was quoted in the media as saying: "Hen harriers have been legally protected for almost 70 years, but this study adds to the already overwhelming evidence base that illegal killing on grouse moors remains a key cause of this species'

low population size and its ongoing absence from the uplands, particularly grouse moors." The paper also says that the UK Government has not done enough to increase the population of hen harriers. However, Ewing's paper fails to note at least three very relevant points: that Natural England stated that the number of hen harriers in England is higher than it has been for at least 100 years; Natural England also stated that the two English SPAs have achieved their conservation targets for hen harriers, *although they both contain driven grouse moors*; and, thirdly, the RSPB tried to prevent the hen harrier brood management scheme, and is opposed to the reintroduction of hen harriers in the south of England. The obvious assumption is that the RSPB's opposition to driven grouse shooting results in these contextual points being omitted from the paper. It is a great pity that organisations, on both 'sides' of the arguments for and against driven grouse shooting, cannot at least agree on the context and data on which to base their position.

The shooting community opposes raptor persecution and has been working with Natural England and other partners on the Joint Hen Harrier Action plan (Defra, 2016), which has seen initial trials successful in increasing hen harrier breeding success in England (Defra & Natural England, 2020). Brood management is not universally accepted as a conservation tool and the values of individuals influence its acceptance. In a 2019 study examining the conflict between hunters and conservationists concerning driven grouse moor management and raptors (that collated data from 536 respondents from field sport or nature conservation organisations) support for different conservation management methods varied by organisation type. Respondents were categorised according to the main objectives of their affiliated organisation: Field sport, Non-raptor, Pro-raptor, and Pro-bird (ie. organisations promoting conservation of birds excluding raptors, raptors specifically, or birds generally). The study found that: "Pro-bird affiliates showed clear preference for less invasive management, and along with Pro-raptor respondents did not support brood management (removal and later release of eggs/young when harrier density is high). Field sport individuals expressed a degree of support for all management types." (St John et al, 2019).

In Scotland a different approach has been taken with the focus on "populations of breeding golden eagles, hen harriers and peregrines on or within the vicinity of grouse moors being in favourable condition"<sup>313</sup>. Hen harrier numbers are positively affected by management of upland moorland for driven grouse shooting, which requires a high-level investment both financially and in terms of man-power and expertise. To invest this time and money, landowners require a return on investment. High numbers of hen harriers have been shown to make driven grouse moors

#### References

- <sup>309</sup> [https://www.bbc.co.uk/news/uk-scotland-south-scotland-64624395?utm\\_source=All+Contacts&utm\\_campaign=4f180349be-Morning+Briefing+140223&utm\\_medium=email&utm\\_term=0\\_dd843c5cb6-4f180349be-27564919&mc\\_cid=4f180349be&mc\\_eid=1da0a5cac3](https://www.bbc.co.uk/news/uk-scotland-south-scotland-64624395?utm_source=All+Contacts&utm_campaign=4f180349be-Morning+Briefing+140223&utm_medium=email&utm_term=0_dd843c5cb6-4f180349be-27564919&mc_cid=4f180349be&mc_eid=1da0a5cac3)
- <sup>310</sup> Real Wilders, GWCT (2023), p. 10 <https://www.gwct.org.uk/media/1384480/Real-Wilders-LR.pdf>
- <sup>311</sup> Real Wilders, GWCT (2023), p. 26 <https://www.gwct.org.uk/media/1384480/Real-Wilders-LR.pdf> The ornithologist was able to frighten the crow away and the hen harrier's eggs eventually hatched.
- <sup>312</sup> <https://www.gov.uk/government/publications/hen-harriers-tracking-programme-update/hen-harrier-tracking-update>

#### References

- <sup>313</sup> However, this focus may change to result in the withdrawal of a licence to shoot grouse in the event of substantial evidence of raptor crime.

## References

<sup>314</sup> <https://www.facebook.com/The-Langholm-Moor-Community-Buy-Out-Group-2378467672238517/>

<sup>315</sup> <https://www.heraldsotland.com/news/homenews/23224495.wind-turbines-threat-endangered-scots-birds-prey/#:~:text=Onshore%20wind%20turbines%20are%20providing,turbines%20in%20Scotland%20since%202019>

<sup>316</sup> The RSPB spent £6 million on controlling stoats on Orkney, see: <https://www.pressandjournal.co.uk/fp/news/highlands/1759112/orkney-stoat-cull-row-erupts-over-trap-setting/> And <https://www.nature.scot/professional-advice/land-and-sea-management/managing-wildlife/orkney-native-wildlife-project>

<sup>317</sup> <https://www.telegraph.co.uk/news/2023/04/23/rspb-contractors-kill-foxes-crows-hide-from-public/>

<sup>318</sup> See, for example: <https://www.independent.co.uk/climate-change/news/national-trust-norfolk-sandwich-b2317459.html> and <https://www.wildlifetrusts.org/saving-species/water-voles>

<sup>319</sup> [https://en.wikipedia.org/wiki/Ian\\_Newton](https://en.wikipedia.org/wiki/Ian_Newton)

financially unsustainable, with diversionary feeding being trialled and found to be ineffective in reducing hen harrier predation of grouse (Langholm Moor Project Demonstration Board, 2019). Walked-up grouse shooting, as noted previously, is not a financially viable alternative to driven grouse shooting and levels of moor management that benefit hen harriers and raptors would be unlikely to be maintained to facilitate walked-up shooting.

Langholm Moor has been sold to a community organisation and previous levels of moor management for grouse for sports shooting are not being maintained, instead the land is being managed for grazing, rewilding and carbon capture<sup>314</sup>. The discontinuation of moorland management for grouse could have long-term consequences for the hen harrier and other species, as evidenced by the Berwyn SPA (also noted above), the most extensive tract of blanket bog and upland heath in Wales. The site was designated in 1998 as an SPA for its internationally-significant numbers of hen harrier, merlin, peregrine and red kite, while also supporting significant proportions of Welsh populations of upland breeding waders. Grouse moor management declined on the site after World War 2, and by the late 1990s driven grouse shooting had ceased. A 2012 report highlighted the changes in the numbers of red grouse and the abundance of other upland birds in the Berwyn SPA using shooting bag records, grouse count data collected on four moors between 1995 and 2012; and repeat upland bird surveys in 1983-5 and 2002, illustrating the potential changes to environments when moorland management is discontinued. Although some species benefited, research has found that both black and red grouse numbers decreased and hen harrier numbers decreased by half over time, after moor management for driven grouse shooting ceased (Warren & Baines, 2012).

There is a risk with introducing inflexible licensing conditions in Scotland, which land owners and the shooting community fear will be used vexatiously to disrupt grouse moor management without foundation (as they believe has been the case with the Wild Justice's legal challenges). It may lead to owners pursuing alternative uses resulting in an end to land management that results in increased numbers of hen harriers and other ground-nesting birds. If moor management for driven grouse ceases, the food source for hen harriers will eventually drop, and predator numbers will increase. Although hen harrier numbers may rise initially, ultimately the cessation of moorland management for grouse would likely be adverse for hen harriers. The cessation of driven grouse shooting could lead to other land uses being introduced such as forestry or wind farms (at least 33 raptors were killed as a result of colliding with onshore wind turbines between 2019 and 2022)<sup>315</sup>, both of which are unfavourable for ground-

nesting raptors. It is unclear if numbers of grouse can reach very high levels near some grouse moors in Scotland without brood management, as noted by the suggestion of 'ceiling numbers' for grouse following the Langholm study and the development of the brood management scheme within Defra's Joint Hen Harrier Action Plan (Langholm Moor Project Demonstration Board, 2019; Defra, 2016). Evidence suggests that hen harrier populations need to be evenly distributed across all suitable habitats in the UK (GWCT, 2019). Without a plan like the Hen Harrier Action Plan utilising brood management, it is difficult to see how this will work.

The brood management programme provides a workable compromise. It encourages their engagement with nature conservation partners in identifying and relocating hen harrier chicks above the agreed ceiling number for breeding pairs to alternative locations away from the driven grouse moor on which they work. This approach both provides an incentive against illegal persecution and enables driven grouse shooting and its associated moor management to continue.

*This argument deployed by those opposed to driven grouse shooting is not as simple as saying: "Raptors are sometimes killed on grouse moors. Therefore, driven grouse shooting should be banned." In fact, driven grouse shooting management practices generally support raptors and, if they are removed, then raptor numbers will decline. Many estates where driven grouse shooting is practised are working in partnership with conservation groups on initiatives to increase raptor numbers. Raptors die for numerous reasons, not always as a result of illegal killing, and not all illegal killing of raptors is by gamekeepers. The balance of evidence clearly shows that banning driven grouse shooting will result in a decline in raptor numbers. However, estate owners and managers must overtly show they are both complying with existing wildlife legislation and supporting raptor conservation initiatives.*

### Opposition to predator control

Predator control is often cited as a reason to oppose driven grouse shooting by some individuals and organisations. However, grouse shooting estates (and other areas where game shooting is carried out) are not alone in their use of predator control. The RSPB uses predator control to maintain its nature reserves<sup>316</sup> as part of a range of conservation tools including fencing off set areas, shooting of predators, and traps<sup>317</sup>, to give at risk species such as hen harriers, curlews and lapwings the best chance of survival (Harper, 2018). County Wildlife Trusts, local authorities, and the National Trust also use predator control.<sup>318</sup>

Opponents say that the levels of predator control on grouse moors are too high, without citing authoritative studies. This claim ignores the fact that, as Ian Newton<sup>319</sup>, a world authority on

bird populations has said, that medium-sized generalist predators such as foxes and crows are unnaturally abundant on moorland<sup>320</sup>. Moreover, to maintain a diverse range of species (many of which are red-listed) the current evidence shows that predator control is an essential conservation tool, particularly for ground-nesting birds such as lapwings, curlews and hen harriers<sup>321</sup> that are highly susceptible to predation from species such as foxes and crow (Baines et al, 2023). The Founder and Director of Curlew Action<sup>322</sup>, Mary Colwell, who was awarded a medal by the RSPB for her work to raise awareness about the plight of the curlew, has said conservationists have to choose between having gamekeepers with curlew, or having no gamekeepers with no curlew.

*This argument deployed by those opposed to driven grouse shooting is not supported by the balance of available evidence.*

### Use of lead shot

The use of lead shot has been controversial for many years. Lead is a toxin and there are potential environmental and human health risks from using it in ammunition. Lead has been proven to have negative health impacts (Pain et al, 2010) and although careful butchering can minimise exposure to lead, some argue that there could be a risk that birds ingest shot while feeding (Quy, 2010). Moreover, a 2022 small-scale study found that lead shot can fragment into tiny shards that cannot be detected by hand or eye, so can be consumed<sup>323</sup>. The Food Standards Agency (FSA) notes that to minimise risk, consumption of lead-shot game should not be eaten too frequently (FSA, 2015), although the 2022 study cited above said that there was little risk if a family ate one pheasant shot with lead a week. In the UK lead shot is legal to use for shooting birds that are permitted quarry (and mammals such as rabbits, hare and deer). However, there have been restrictions on the use of lead shot since 1999. The Environmental Protection (Restriction on Use of Lead Shot) (England) Regulations 1999, amended 2002 and 2003<sup>324</sup>, prohibits the use of lead shot for all wildfowl, with further restrictions below the High Water Mark of ordinary spring tides, and over specific SSSIs. Restrictions on lead ammunition are also in place in Northern Ireland, Scotland, and Wales. However, in the UK lead shot is legal to use for shooting birds that are legal quarry (and mammals such as rabbits, hare and deer).

In some European countries such as Denmark (Kanstrup et al, 2016) and the Netherlands, lead shot has been banned completely. However, Norway reversed its decision to ban lead shot in 2015 (Ares and Baker, 2015).

The current evidence, while acknowledging that lead is a toxin, suggests that the dangers of eating



small amounts of animals killed by lead shot are not significant. Pain et al (2010) pointed out that the risk of lead in the diet for UK consumers eating gamebirds had been previously assessed as low. Moreover, lead is found in many plants and non-game animal products that people and animals eat. Many commonly eaten foodstuffs contain lead absorbed from the environment, with the most important contributors to lead dietary exposure being cereal products and grains, vegetables (especially potatoes and leafy vegetables) and tap water (European Commission, 2018). Game that has been shot with lead is one of the foodstuffs the National Health Service advises pregnant women not to eat<sup>325</sup>, along with anything made with unpasteurised milk, some types of fish, pates, under-cooked meat and many others. However, it is animals that have been killed by lead shot that attract media attention and a response from food retailers; in 2019 Waitrose announced that from the 2020 to 2021 game shooting season, all game it sold would be 'lead-free'.

The game shooting sector, supported by countryside organisations, appears to have moved swiftly to respond to market pressure. In 2020 the sector committed to a five-year phase out of lead ammunition for the shooting of live quarry with shotguns. As the BGA said on its website<sup>326</sup>, this commitment was made: "Precisely because the stockists and retailers of BGA Assured Game were telling us that they would not tolerate lead-shot birds for long." At the National Game Dealers Association (NGDA) annual general meeting of March 2021, members voted to commit to sourcing all feather and fur<sup>327</sup> game, as well as venison and wild boar, from lead-free supply chains from 1st July 2022. The BGA has also developed a 'lead-free' shoot assurance

## References

<sup>320</sup> <https://www.countytimes.co.uk/news/18859955.powys-project-returns-breeding-ground-many-birds/>

<sup>321</sup> It is possible that nine hen harriers were predated by a fox on a RSPB reserve, <https://www.c4pmc.co.uk/post/reports-emerge-of-nine-hen-harriers-predated-by-a-fox-on-rspb-s-bowland-reserve>

<sup>322</sup> <https://www.curlewaction.org/>

<sup>323</sup> <https://www.cam.ac.uk/research/news/pheasant-meat-sold-for-food-found-to-contain-many-tiny-shards-of-toxic-lead>

<sup>324</sup> <https://www.legislation.gov.uk/uk/si/2003/2512/made>

<sup>325</sup> <https://www.nhs.uk/pregnancy/keeping-well/foods-to-avoid/>

<sup>326</sup> <https://www.britishgameassurance.co.uk/>

<sup>327</sup> Fur game includes rabbits and hares for example.

<sup>328</sup> The lead-free scheme will be audited by SAI Global, an established name in the rural community, delivering certification for Red Tractor and LEAF Marque among many others. See <https://www.britishgamealliance.co.uk/bga-launches-new-register-of-lead-free-shoots/>

## References

<sup>329</sup> In June 2023, Deputy Assistant Chief Officer Bruce Farquharson, the Wildfire Capability Lead at Scottish Fire & Rescue Service, said to the Rural Affairs and Islands Committee of the Scottish Parliament: "I think the differentiation in peat depth is, from my perspective, irrelevant and there is evidence that managed cool burns do not penetrate any more than a centimetre below the surface of peatland." The Wildlife Management & Muirburn (Scotland) Bill: Expert Insights in Scottish Parliament - Game and Wildlife Conservation Trust (gwct.org.uk)

<sup>330</sup> <https://greenecofriend.co.uk/grouse-moors-flooding/#:~:text=The%20intensive%20management%20of%20grouse,with%20an%20Emergency%20Survival%20Kit>

scheme, that will be audited<sup>328</sup>. Both these moves are in response to pressure from the largest retailers of game demanding a lead-free supply chain, and although the NGDA may only represent 30% of the game dealers in the UK, others are likely to follow suit.

As was pointed out in the chapter on the Economics of Driven Grouse Shooting, there is a strong market for grouse with birds commanding premium prices and many grouse moor owners rely on being able to put their slain birds into the food chain to defray some of their costs. By 2025 when the voluntary transition away from lead shot takes effect (affecting not only grouse but other gamebirds intended for the food chain), lead shot on grouse moors will likely cease to be an issue.

*This argument deployed by those opposed to driven grouse shooting is increasingly being negated by the self-regulation that the game shooting sector is taking.*

### Muirburn damages peat causing carbon loss

Rotational burning of heather or 'controlled burning' is an emotive subject, for which incomplete or misleading evidence has often been presented, as noted above. Muirburn, managed controlled burning carried out in the correct season by skilled land managers does not burn peat<sup>329</sup>, but rather produces a cool burn which, if done correctly, can help reduce the risk of wildfires and manage vegetation to allow maximum biodiversity and production of grouse. In addition, the latest evidence from the first 10 years of Heinemeyer's 20-year study, indicate that controlled burning captures carbon more effectively than cutting or not managing vegetation (Heinemeyer, 2023), a finding supported by Pellegrini (2022), Holmes & Whitehead (2022) and several other studies (see Section 5). Cutting produces a decomposing and quickly desiccating litter that is likely to lock up less carbon long-term and does nothing to reduce the risk of wildfire, whereas neglecting to manage vegetation greatly increases severity of any wildfire that does occur.

*This argument deployed by those opposed to driven grouse shooting is not supported by the balance of available evidence.*

### Moorland management for driven grouse shooting involves draining moors, resulting in an increased risk of flood.

Organisations opposed to driven grouse shooting

have expressed concern over possible increased risk of flooding downstream from land managed for grouse shoots, for example Green Eco-Friend<sup>330</sup>. However, a report commissioned by the RSPB in 2012 found that evidence for flooding being negatively impacted by land management for game shooting purposes was inconclusive. It noted that drainage and land management can be found to have both positive and negative impacts on water flows and associated flood risk (Grant et al, 2012a). It concluded that: "It is difficult to disentangle the multiple and interacting effects of grazing, burning, drainage and habitat restoration on water flows without conducting further research at multiple scales." (Grant et al, 2012a, p.7). This general finding (and a lack of evidence) was confirmed in the extensive review by Allott et al (2019).

The clear balance of evidence indicates that opponents of driven grouse shooting that cite increased flood risk are mistaken in their argument that moorland is drained as part of enhancing grouse breeding success. Drainage ditches are not dug on moorland to support grouse, as the GWCT makes clear:

"Drainage ditches were dug on moorland mainly to improve grazing for agriculture, not to support grouse. The practice was most common in the 1950s to 1980s, primarily driven by Government grants paid to improve hill farming. Many grouse moor managers and other moorland landowners are now working to block up historical drains and re-wet moorland for the benefit of grouse."

(GWCT, 2020a, para. 2)

Drainage of moorland was encouraged by government policy in the post war era to provide peat fuel for burning and to increase UK agricultural production (Holden, Chapman & Labadz, 2004; Werritty et al, 2015; GWCT, 2020a), but more recently the government has been subsidising conservation work to re-block drainage systems previously created on the moors and restore peatlands (Defra, 2018, 2019; IUCN) United Kingdom Peatland Programme, 2020). It is interesting to note that the 2024 Countryside Stewardship Mid-Tier scheme provides grants to farmers and land managers to improve the wildlife potential of their land and enhance their natural capital. The scheme supports a range of enhanced environmental outcomes from restoring wildlife habitats and creating woodlands,

to managing flood risk. An owner of an estate in Yorkshire has noted the irony that he "is now being rewarded for undoing what the government paid moorland owners to do post-WW2"<sup>331</sup> and a retired game keeper points out that some 40 years ago he was being part-funded by English Nature to block drains, while at the same time MAFF was still offering grants for digging them.<sup>332</sup> The MA claims that between 2011 and 2021: "2,945 kilometres of old agricultural drains (grips) [have been] blocked, to re-wet the peat, equivalent to a further 6,008 hectares of peatland restored."<sup>333</sup>

In reality, drainage of moorland negatively impacts the success of grouse, as the young grouse chicks can fall into drainage ditches, and drying out moorland has been found to reduce the diversity and abundance of moorland insects (Carroll et al, 2015), which are a key food source for grouse chicks (Coulson, Butterfield & Henderson, 1990).

*This argument deployed by those opposed to driven grouse shooting is not supported by the balance of available evidence.*

### Driven grouse shooting involves the killing of mountain hares

Mountain hares (*Lepus timidus*) are mainly found in the Scottish Highlands and northern upland areas of the UK. Having been superseded across most of the UK by the introduction of brown hares by the Romans, mountain hares were re-introduced to the English uplands in larger numbers in the 19th century as part of grouse moor management, including for sports shooting purposes<sup>334</sup>. Mountain hares appear to benefit from the management regimes employed to raise red grouse, including predator control and rotational burning (Hesford et al, 2019). As their numbers increase due to grouse moor management, mountain hares have been regularly harvested, either through culling (mountain hares have been thought to transmit ticks to grouse) or sports hare shooting, on Scottish moors managed for grouse. Although there is no substantive evidence to support the population control of mountain hares as part of a strategy of tick and/or louping ill virus control to benefit red grouse (GMMRG, 2019), disease control is often cited as a reason to cull mountain hares on grouse moors.

Mountain hares are a priority species under the UK Post-2010 Biodiversity Framework (The Wildlife Trusts, 2021) and are protected in the UK under the Wildlife & Countryside Act, 1981. In England and Wales, although they can be shot throughout the year on enclosed land, on moorland or unenclosed non-arable land, they can only be shot between 11th December and 31st March. In Northern Ireland, they can be shot between 12th August and 31st January. In Scotland, until March 2021, the killing of both mountain and brown hares was controlled using

a closed season licence for hare culling, allowing mountain hares to be shot between 1st August and 29th February. However, since July 2021 a licence for the culling of mountain hares is required. Intentionally or recklessly killing, injuring or taking a mountain hare in the closed season is an offence under the amended Wildlife & Countryside Act 1981.

Concerns have been expressed that large-scale culls on grouse moors are contributing to population decline of mountain hares in Scotland. In 2019, following the publication of a study by Watson & Wilson (2018) suggesting steep long-term mountain hare declines, particularly in areas managed as grouse moors, organisations such as the RSPB in Scotland called for a complete ban on culling of mountain hares (RSPB, 2019). However, when considered in more detail, the results from this study appear inconclusive (GWCT, 2021b). It is important to note that there is a natural 10-year cycle of mountain hare population levels and it is notoriously difficult to count mountain hares as they are well-camouflaged and elusive, with the Mammal Society noting: "No systematically-collected information is available on long-term changes in numbers of mountain hares over and above the usual periodic 10-year fluctuations." (The Mammal Society, 2021). The Watson & Wilson (2018) study did not compare data that had been collected in a controlled way, at the same time of day, using the same method and or researchers and sometimes comparing areas up to five kilometres away from each other (GWCT, 2021b). Some studies analysed in the Watson & Wilson (2018) counted hare numbers during the day, which is problematic as mountain hares are active at night and tend to rest during the day in forms and scrapes, sometimes making burrows in the earth or in snow, particularly when young (The Mammal Society, 2021), making them very difficult to spot in the day. Therefore, comparing studies with counts at different times of the day could very easily result in incorrect population assumptions.

A three-year study responding to the need for a standard monitoring system to allow effective monitoring of mountain hare numbers found that:

"i) counts of mountain hares along transect lines at night with the aid of a high-power lamp (and to a similar degree, thermal imaging equipment), and ii) dung accumulation rates can both be used to provide simple and easy to use indices of mountain hare density. These indices can be applied at the local scale to obtain indices of mountain hare density to inform local mountain hare management."

(Newey et al, 2018)

Hesford et al (2019) found that on average there were stable numbers of mountain hares in Scotland and they were more abundant on grouse moors managed for driven grouse shooting than anywhere else.

## References

<sup>331</sup> Source: interview with S. Denny on 12th May 2020.

<sup>332</sup> Example cited in 'Real Wilders', GWCT (2023) p. 9 <https://www.gwct.org.uk/media/1384480/Real-Wilders-LR.pdf>

<sup>333</sup> <https://www.moorlandassociation.org/2021/03/moors-hit-targets-for-carbon-capture/>

<sup>334</sup> <https://www.gwct.org.uk/wildlife/research/mammals/mountain-hare/>







#### References

<sup>335</sup> What the Science Says? A conservation fact-checking website has produced a full analysis of the science relating to mountain hare numbers on grouse moors that can be accessed at <https://www.whatthesciencesays.org/has-the-number-of-mountain-hares-fallen-on-grouse-moors/>

Hesford *et al* found that, over a 20-year period, trends in mountain hare abundance indices varied with region and grouse management intensity. Although in southern Scotland there were range contractions, there was no change in north east Scotland. In north west Scotland their range expanded by 61% in areas where there was driven grouse shooting but declined by 57% in areas of walked up grouse shooting, remaining low but stable in areas with no grouse shooting interest. The study concluded that: "Hare indices were higher and relatively stable on moors where driven grouse shooting was practised relative to lower indices and declines on moors where grouse were either walked-up or not shot. . . enhanced habitat management and control of generalist predators seem to be the most parsimonious explanation for higher abundances indices of mountain hare on driven grouse moors." The researchers believed that no relationship between culling of mountain hares and contraction in their range was evident and that the rises in numbers of hares killed over earlier surveys was likely to reflect natural population cycles and that other factors such as changes in habitat and management may be responsible for the reductions (Hesford *et al*, 2019, 2020)<sup>335</sup>.

The balance of evidence is that driven grouse shooting does involve legal killing of mountain hares, but that mountain hare distribution and density is closely associated with driven grouse shooting. To put it another way, without the management activities associated with integrated moorland management, including driven grouse shooting, there would be very many fewer mountain hares.

*This argument deployed by those opposed to driven grouse shooting fails to acknowledge, firstly, that killing mountain hares at certain times of the year is legal, and secondly, that mountain hare populations are largely dependent on the management of moorland for, among other uses, driven grouse shooting.*

## 6.2 Opposition To Driven Grouse Shooting: Conclusion

Opposition to driven grouse shooting can be on ethical grounds. Other opponents state that they are not opposed to all sports shooting, but believe that driven grouse shooting is not sustainable and should be replaced with a less intensive alternative. There is a high level of conflict between those for and against shooting and, although conflicts that may appear at first to concern wildlife, in reality they are part of a wider debate concerning land use, land ownership and governance of natural resources (Hodgson *et al*, 2018).

The methods used by opponents are varied, organised and sometimes aggressive, utilising tools such as social media with expertise, which those who take part in driven grouse shooting do not feel confident to use to dispel mistruths and inaccurate perceptions of their pastime (Latham-Green, 2020b). The use of selected evidence and misrepresentation of evidence, including in parliamentary debates, along with the failure of policy makers to accept the recommendations of independent review committees in relation to driven grouse shooting and other shooting regulation, exacerbates the feeling of helplessness and resentment among many people involved in shooting, and increases the conflict between those for and against driven grouse shooting. This potentially increases the risk of gamekeeper abuse, which research has shown is an increasing problem which can negatively impact the mental health and well-being of individual gamekeepers, their families and others within traditional upland, moorland communities where moor management for grouse shooting is practised.

If the arguments deployed by those opposed to driven grouse shooting are considered against the current research-based evidence, it is concluded that they are not supported. The eight arguments against driven grouse shooting are individually contradicted by the evidence available. Moreover, these arguments collectively fail to consider the definition of sustainability used by the IUCN, and this report. Opponents of driven grouse shooting take little – or no – account of the economic or social impacts of driven grouse shooting which, as this report has shown, are significantly positive to the mainly remote locations in which driven grouse shooting is practised. It is important that those opposed to driven grouse shooting understand the holistic nature of 'sustainability' before advocating for it to be banned.

7.0

# Alternative uses of Moorland

At the risk of repetition, driven grouse shooting is not practised in isolation. The remote upland areas of the UK have been characterised by sheep farming, forestry, and game shooting for over 150 years. More recently, policy makers, landowners and pressure groups have suggested that upland areas should have other objectives, such as tourism and conservation, provision of drinking water, alleviation of downstream flooding and carbon sequestration, including offsetting (Sotherton, May & Ewald, 2009). Britain's uplands are not untouched wildernesses, but cultural creations shaped by millennia of past human activity (Ibid). Additionally, viewed from an international perspective, temperate moorland is globally rare (Fenton, 2023).

Upland regions are a nationally significant resource for people in the UK; most have landscape protection status (eg. AONB), special conservation designations (eg. SSSI, SPA and SAC), and separate local governance arrangements. These upland regions are mainly sparsely populated rural areas with LFA status (Defra, 2011). As previously noted, the IUCN has stated that: "The core of mainstream sustainability thinking has become the idea of three dimensions, environmental, social and economic sustainability." (Adams, 2006). It is suggested that

these three dimensions need to be addressed by anyone wanting to change the *status quo*, so that any alternative land use is at least as beneficial against the three dimensions as that currently in place. Many parts of upland areas of the UK have been managed to facilitate driven grouse shooting for over a century. This report has reviewed the current evidence for the economic, environmental, and social impacts managing moorland to facilitate driven grouse shooting. The diverse activities that take place in many areas where driven grouse shooting takes place have been described. However, not all moorland is managed as 'grouse moor,' and there are a number of alternative land-uses that are practised. These alternative uses need to be discussed and their impacts on economic, environmental and social sustainability examined. Importantly, these land-uses do not all necessarily preclude shooting (Crowle et al, 2022). The key point to note is that land use choices are not either driven grouse shooting *or* an alternative use, or uses, but which mix of activities can deliver the optimal social, economic, and environmental benefits. However, as some people and organisations suggest that driven grouse shooting should be replaced by alternatives, it is appropriate to examine the evidence for the impacts of these alternatives.





#### References

<sup>336</sup> Source: Country Life, 11th January 2023

<sup>337</sup> The National, 13th April 2023 [www.thenational.scot/news](http://www.thenational.scot/news)

A 2019 report for the Scottish Government looking at uses for upland areas noted the following possible alternatives to traditional integrated moorland management (adapted from Thomson, McMorran & Glass, 2018):

- Agriculture, primarily in the form of livestock production
- Afforestation
- Renewable energy, primarily in the form of on-shore wind energy
- Rewilding
- Tourism
- Conservation/NGOs

These alternatives are not exclusive, and some of them include measures to offset carbon emissions that occur away from upland areas and measures taken with the intention of maintaining (or perhaps increasing) natural capital.

To these six alternative activities must now be added 'natural-capital'. This term, currently imprecisely defined, is a recent phenomenon and increasingly the reason why individuals or organisations are buying estates, including upland estates. Savills estate agents report that in 2022, 27 estates in Scotland were offered for sale. These estates consisted of 246,496 acres in all (how many acres were in moorland areas is not specified), and 69% were sold to: "An active pool of committed 'natural-capital buyers', the majority of whom were UK based."<sup>336</sup> Oxygen Conservation, a company based in Exeter, used around £20 million of funding from Triodos Bank to buy about 23,000 acres with the aim of tackling "climate change and the biodiversity crisis". The company said it will use the land to generate a "positive economic return as a result of its work, not its purpose", and will "engage in a 'diverse range of projects' to do this, including species reintroduction, regenerative

agriculture, woodland creation, renewable energy generation, sustainable housing, eco-tourism, can carbon sequestration through woodland and peatland restoration"<sup>337</sup> This range of activities has very strong similarities with those carried out by a number of estates on which driven grouse shooting is part of what this report calls 'integrated moorland management'. Of course, increasing or maintaining natural capital can include driven grouse shooting, as shown in Section 5.3, as well as agriculture, afforestation, some types of rewilding and conservation. What the new owners will do with their land and the outcomes will, no doubt, be a topic of interest to researchers in the future. At present there is insufficient evidence to consider the impacts of the outcomes of differing re-wilding regimes.

The main difficulty in considering the other six alternative land uses is the complex nature of upland management. Staff employed in managing the land to facilitate grouse production may also be involved in other elements of a diversified, rural enterprise unrelated to grouse shooting (GMMRG, 2019). For example, sheep are often grazed on the heather moorland and used as 'tick mops' to reduce tick-borne disease instance in grouse (Thomson, McMorran & Glass, 2018) and the maintenance of tracks by grouse moor estates is also beneficial and necessary for tourism to ensure public access (Denny & Latham-Green, 2020). Moreover, as noted previously in this report, many estates are engaged in forestry, alternative energy production and, of course, tourism. driven grouse shooting is a high-value form of tourism.

This section looks at potential alternative uses of upland estates, in addition to reviewing walked-up grouse shooting, considering the advantages and disadvantages of each option.

It should be noted that for all these alternative uses there would be negative consequences in terms of

the social impacts, compared with those provided for individuals and communities from driven grouse shooting. In the absence of driven grouse shooting there would no longer be a seasonal, participatory activity linked to individual and community heritage and positive well-being outcomes. It should also be noted that for some alternative uses of moorland there is relatively little scientific evidence of the long-term impacts.

### 7.1 Livestock Production

The Lake District is the only upland area in England where driven grouse shooting is not carried out and where the predominant agricultural use is livestock farming, predominantly sheep (Denny & Latham-Green, 2020). To maximise returns, upland livestock farmers have traditionally used a variety of methods including the re-seeding of grasslands, use of pesticides and artificial fertilisers, increased use of machinery, enlargement and levelling of fields, drainage of land and the switch from hay to silage production to increase the available grass for grazing on upland areas, with consequential negative environmental impacts (Clark, Scanlon & Hart, 2019). A 2019 report found that, even using these methods, without subsidy no upland farms could maintain profitability when the focus is solely on increasing production, noting that if only naturally available grass was used (thereby minimising negative environmental impacts and maximising eco-system services) a combination of increased meat prices, better asset management and farm diversification would be necessary to enable profitability without subsidy (Clark, Scanlon & Hart, 2019). The authors of this report concluded that without changes to the *status quo* in upland, livestock farming areas there would be "fewer, larger farms in the uplands with little connection to place or community, that are dependent upon an intensive, high-input, nature-poor business model" (Clark, Scanlon & Hart, 2019, p.4).

Paid employment from livestock farming in the uplands is limited. Upland hill farming on the 'average' farm of 600 ewes and nine suckler cows can provide work for 1.3 FTE employees per 668 hectares. It should be noted that most upland farmers supplement the work with unpaid labour from within the family, yet they still fail to make a profit without subsidy. On average 580 ha of land managed for sheep farming creates one FTE post (Thomson, McMorran & Glass, 2018). Sheep farming can provide an integral part of an integrated management system on a moorland habitat managed for grouse (Thomson, McMorran and Glass, 2018; Denny and Latham-Green, 2020), but as a stand-alone alternative, the evidence suggests that it is not currently economically (or socially) viable as an alternative to integrated moorland management, incorporating driven grouse shooting. Indeed, the viability of agriculture in upland areas is increasingly uncertain given the confusion over the move to the ELM scheme and dramatically rising costs. In a 2023 survey conducted by the National Farmers Union (NFU): "88% of respondents said that they were being detrimentally affected by input costs such as energy, fuel, and fertiliser, whereas 82% said that the shake-up of subsidies following Brexit is 'negatively impacting their business confidence.'"<sup>338</sup>

### 7.2 Afforestation

Broadly speaking, the afforestation of the UK consists of two types of forestry: commercial plantations that usually consist of fast growing, often non-native species such as Sitka spruce; and mixed woodland expansion of a variety of native, slower-growing species, most usually found in areas where conservation is prioritised over financial return. As much of the uplands are privately-owned and therefore need to provide a reasonable return on investment, commercial afforestation is considered here.

If upland heather moorland areas were given over to commercial forestry, there would be very significant impacts on biodiversity. These impacts would have international importance as a significant amount (probably most) of the world's upland, heather moorland is found in the UK. Many of the species that thrive on heather moorland would be detrimentally affected – or could even disappear – if heather moorland habitat was lost, although there could be other species that might benefit.

Commercial forestry is usually comprised of fast-growing conifer species. The non-native Sitka spruce is the most widely used commercial forestry species, with the Forestry Commission (FC) reporting that Sitka spruce accounted for around one half (51%) of the UK conifer growing stock, followed by Scots pine (15%) and larch (10%) in 2020 (FC, 2020).

#### References

<sup>338</sup> Source: Country Life, 10th May 2023



Densely packed coniferous plantations reduce the light available to the forest floor which negatively impacts a variety of species (Burton et al, 2018). Sitka spruce dominated closed canopy sites have very low numbers of ground flora and a lack of species diversity (Burton et al, 2018; Wallace, Good & Williams, 1992). Although diversity can be improved with lower planting densities, allowing a greater amount of light through to the forest floor (Wallace & Good, 1995; Wallace, Good & Williams, 1992), reductions in density can negatively impact the yield or financial return for the commercial forestry enterprise.

Dense conifer planting of non-native tree species negatively impacts the presence and breeding performance of some bird species such as ravens and golden eagles (Burton et al, 2018; Douglas et al, 2020). More recent changes in design of plantations to include lower planting densities, riparian buffers, areas of broadleaf woodland and open space may not impact these species in the same way (Burton et al, 2018), but these changes to planting density and additional planting requirements have costs that impact profit margins. Ground-nesting birds in particular, such as the curlew and hen harrier, are particularly impacted by the removal of heather moorland habitat in favour of conifer plantation, with hen harriers in particular favouring heather moorland for breeding (Potts, 1998; GWCT, 2019). A 1998 Scottish study noted that hen harrier breeding success is highest in heather moorland, which is declining in the uplands due to over-grazing and afforestation, noting that hen harrier future success “may become increasingly dependent on moorland, where heather is maintained for grouse” (Redpath et al, 1998).<sup>339</sup>

Conifers require a large amount of water to grow effectively thus can be useful in alleviating flooding, predominantly in the avoidance of flash flooding. Conversely, their high water demands can produce

a negative effect on water yield during periods of dry weather (Burton et al, 2018). Forest canopies can reduce run-off by up to 20%, but clear felling has the opposite impact, meaning that uncoordinated forestry practices can potentially exacerbate flooding (Allen & Chapman, 2001). There is evidence to suggest that coniferous plantations can have an acidification effect on soils and freshwater due to their effectiveness at scavenging acid pollutants (Burton et al, 2018; Rees & Ribbens, 1995; Allen & Chapman, 2001).

In terms of carbon sequestration and climate change, afforestation can be a useful tool on open habitats and croplands (Alonso et al 2012), with coniferous species like Sitka spruce recommended for their fast growth and high carbon uptake (Cannell, 1999). However, it is important that afforestation does not take place on areas of peatland, as peat-based soil may dry out, releasing large amounts of carbon, especially in the early years of plantations (Alonso et al 2012). Friggens et al (2020) showed that even planting native tree species (*Betula pubescens* and *Pinus sylvestris*) onto heather moorland in Scotland did not lead to an increase in net ecosystem carbon stock either 12 or 39 years after planting. Rather they found that plots with trees had great soil respiration and lower carbon levels than control plots that were heather-dominant. They hypothesise that tree planting dramatically alters underground mycorrhizal fungi communities, leading to a net loss of carbon.

The length of time between planting and clear felling is also important as the longer trees are standing, the more carbon they can capture. The final destination of the timber is also a factor to consider when comparing forests with other carbon sequestration tools, such as renewable energy use from wind and solar farms. If the timber is used for wood burning then carbon is released and although not adding to net emissions, payback times until the carbon is reabsorbed can be long (Crane, 2020).

The influence on climate of afforestation is wider than just the carbon cycle. Other factors such as albedo<sup>340</sup>, evapotranspiration<sup>341</sup> and aerodynamic surface roughness length<sup>342</sup> can mean that the net effect of forest plantation can be negative (Crane, 2020; Burrascano et al, 2016). However, at UK latitudes the evidence for whether the overall climate effect is positive or negative are contradictory (Montenegro et al, 2009).

In England afforestation in the form of new woodland creation attracts subsidies both from the Government<sup>343</sup> and from other organisations eg. The Woodland Trust.<sup>344</sup> The fact that subsidies exist clearly demonstrates that it is difficult to ascertain the viability, or profitability, of forestry without subsidy. A 2016 study found that without subsidy, exchanging upland sheep farming for forestry would not be

economically viable (Hardaker, 2018). However, a 2014 comparison between the viability of hill farming and forestry estimated that for 20,000 hectares in Eskdalemuir the surplus before grants would be £149 per hectare. It should be noted that this comparison was produced for the Confederation of Forestry Industries (Confor), the industry body that promotes forestry and wood (Bell, 2014). In spite of various FC grant schemes over the past decades to encourage woodland expansion, the target planting levels have not been met, with reasons for this failure including social barriers, lack of information and bureaucratic application processes (Burton et al, 2018). In terms of employment, forestry can provide continuous employment in management and deer control, with a larger labour force needed at harvesting and felling times (Confor, 2018). It has been estimated that one FTE post is created for every 422 hectares (Thomson, McMorran & Glass, 2018).

In terms of public response, there has been some opposition in Ireland and Wales<sup>345</sup> to large-scale afforestation, expressing fears that large-scale plantations are creating ‘ecological dead zones’ and destroying the habitats of birds such as curlew and hen harriers in order to meet carbon sequestration targets (Colwell, 2018). The loss of productive agricultural land to forestry inevitably reduces food production and thus erodes food security, an issue increasingly important since the Russian invasion of Ukraine. Although “land use is not a straight choice, optimal use of moorland must include food production, climate change ambitions and biodiversity enhancement”<sup>346</sup> and not assume that planting trees is a panacea.

Increasingly, private equity companies are investing in forestry taking advantage of the new market in carbon off-setting. One such company, Foresight, created a forestry-based investment trust<sup>347</sup> with the aim of producing a 5% return to investors and sequester approximately four million tonnes of carbon through the planting of new trees, which would enable investors to claim off-setting credits. The impact of such large-scale private investment on local communities and biodiversity will, no doubt, be the subject of study in the years to come.

The evidence suggests that commercial afforestation can provide some employment (Thomson, McMorran & Glass, 2018), be financially profitable (Bell, 2014), but most likely only with the support of government subsidy (Hardaker, 2018), and on balance it may not offset CO2 emissions, despite what private equity companies claim. It also has the potential to hamper biodiversity conservation (Burrascano et al, 2016), especially if other important habitats are lost to make way for plantations. Afforestation on or near peatlands does not just negatively impact biodiversity on the forested site itself, but also on neighbouring open peatland adjacent to planting sites (Crane,

2020). Environmentally, it is important that landscapes on peat soils are not replaced with forestry, as the carbon released from peat is greater than the benefit gained from the plantation of forests (Cannell, Cruickshank & Mobbs, 1996; Alonso et al, 2012).

### 7.3 Renewable Energy Production

The UK is the best location for wind power in Europe and one of the best in the world. By 2023, the UK had over 11 thousand wind turbines with a total installed capacity of 28 gigawatts (GW): 14 GW onshore and 14 GW offshore, the sixth largest capacity of any country. Wind power generates increasing amounts of UK electricity, having surpassed coal in 2016 and nuclear in 2018. It is the largest source of renewable electricity in the UK.<sup>348</sup> In the first three months of 2023 c. a third of the UK’s energy came from wind farms, and wind replaced gas as the main generator of electricity for the first time.<sup>349</sup>

Upland areas can make ideal sites for onshore wind turbines, as they are exposed locations free from obstacles, such as buildings and trees that can potentially interfere with turbine performance. Turbines need be located in areas with adequate wind speeds and not all UK areas are suitable. Particularly suitable wind speeds are found in Scotland, Northern Ireland and Wales (Grantham Research Institute on Climate Change and the Environment (GRICCE), 2020). Scotland was the location for 12 out of the 14 largest sites with a planned installed capacity of more than 50 MW and majority (56%) of the 32 sites currently under construction are also located in Scotland (GRICCE, 2020).

The UK Government has committed to reach net zero carbon emissions by 2050 (Walker, Mason & Carrington, 2019) and onshore wind must play a role in the achievement of this target (UK Government, 2020b). Although offshore wind energy has previously been the key focus, in March 2020 the Government announced subsidies would be available for onshore wind-farm projects, for the first time since 2015 (UK Government, 2020a). The subsidies will take the form of government contracts that guarantee a price for the energy the wind farms will create after they have been built, reducing investment risk (Hitchings-Hales, 2020), for which businesses will be able to compete at an auction late in 2021 (Ambrose, 2020). It has been argued that the lack of subsidy for onshore wind farms meant investors were being asked to take high risks with capital, gambling on future energy prices, making investment in onshore wind unattractive, and thereby negatively impacting the UK Government’s goal of increasing energy production from renewables (Grubb, 2015). Subsidies influence the amount of jobs available from wind farm developments, with over 2,000 Scottish jobs being lost in the four years from 2016 to

#### References

<sup>339</sup> For more details of how grouse moor management and hen harrier success in the UK can be combined please see Section 6.1.10.

<sup>340</sup> Albedo relates to the ability of land to reflect or absorb heat. Light surfaces, like open snowy areas, reflect heat having a cooling effect whereas dark areas, like densely planted coniferous forests absorb heat more easily having a warming effect.

<sup>341</sup> Evapotranspiration is the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants

<sup>342</sup> “Aerodynamic roughness length is usually defined as the height where the wind velocity is equal to zero. It is an important aerodynamic parameter and reveals the exchange between the atmosphere and land surfaces” (Zhang et al, 2017)

<sup>343</sup> For example, in 2021 government subsidy was £1.28 per tree, up to a maximum of £6,800 per hectare.

<sup>344</sup> <https://www.woodlandtrust.org.uk/plant-trees/woodland-carbon-farmers-and-landowners/>

#### References

<sup>345</sup> See, for example <https://www.walesonline.co.uk/news/wales-news/carbon-ofsetting-companies-uk-calculator-22464381> and <https://www.bbc.co.uk/news/uk-wales-61039303>

<sup>346</sup> Andrew Connon, NFU Scotland vice president, 22nd December 2021.

<sup>347</sup> <https://www.foresightgroup.eu/news/announcement-of-foresight-sustainable-forestry-company-plc-s-launch-of-initial-public-offering>

<sup>348</sup> [https://en.wikipedia.org/wiki/Wind\\_power\\_in\\_the\\_United\\_Kingdom](https://en.wikipedia.org/wiki/Wind_power_in_the_United_Kingdom)

<sup>349</sup> <https://www.bbc.co.uk/news/science-environment-65557469>

2019 when subsidies were cut (Burns, 2019). A 2019 report noted that onshore wind, including direct and indirect employment accounted for 5,800 FTE, but direct employment had fallen from 3,600 (in 2016) to 2,300 in 2019 (STUC, 2019). The authors noted the majority of decreases were in the manufacturing and construction industries relating to the building of turbines, with factors influencing the reduction including the cut in government subsidies for onshore wind-farm installations including feeder-in tariff reductions (STUC, 2019). This would suggest that direct employment from wind farms does not remain high in the long term, as most of the roles relate to the building and installation of the turbines themselves. A 2012 report considering economic impact of onshore wind regionally/nationally (based on a 25-year lifespan) noted that of the 4,509 total direct and supply-chain jobs created at the time via onshore wind, just 782 or 17% related to the 'operations and maintenance phase', with the remainder relating to development and construction (BiGGAR Economics, 2012).

Onshore wind energy has both positive and negative environmental impacts. The IUCN has recognised that although renewable energy can reduce carbon emissions it can also negatively impact biodiversity and any negative impacts need to be mitigated (IUCN, 2021; Bennun et al, 2021). The use of renewable energy contributes towards the UK's 2050 carbon neutral target, potentially reducing overall CO2 emissions. However, this is dependent upon the sites used for two reasons. Firstly, wind speed, with areas of Scotland, Northern Ireland and Wales having the optimum wind speed, recognising that the areas chosen to house turbines need to be free of obstacles such as buildings and trees that can interfere with turbine performance (GRICCE, 2020). Secondly, and most importantly when considering as an alternative to grouse moor management, the type of land habitat they are built upon. Following extensive research, scientists believe that the building of wind farms on peatlands should be avoided (Smith, Nayak & Smith, 2014, 2012). This is because layers of accumulated peat that represent a large stock of soil carbon are lost when peatlands are drained to construct wind farms. Early research suggested that wind farms sited on peatlands can reduce net carbon emissions if strictly managed for maximum retention of carbon, but a 2014 study showed that, due to projected changes in the proportion of fossil fuels used to generate electricity, even with careful management of construction, by 2040 building wind farms on most un-degraded peat sites will not reduce overall carbon emissions (Smith, Nayak & Smith, 2014). Therefore "future policy should avoid constructing wind farms on un-degraded peatlands unless drainage of peat is minimal and the volume excavated in foundations can be significantly reduced compared to energy output" (Smith, Nayak

& Smith, 2014). The Scottish Government has created a calculator to assess the suitability of building wind farms on peatlands (The Scottish Government, 2018).

There can also be negative impacts from wind turbines on birds (especially raptors) and bats, with turbine density being a strong predictor of collision mortality (Heuck et al, 2019). There is a risk from collision for both bats and birds, with bird species using artificial (such as farmland and urban areas) and grassland habitats having a significantly higher collision rates than species using other habitats (Thaxter et al, 2017). Raptors, many of which are slow to reproduce and have at risk populations, are the most vulnerable birds (Thaxter et al, 2017). It has been concluded that: "Building fewer, large turbines may actually reduce the risk of collision for birds for a given amount of energy generated, although turbines with a capacity over 1.25MW were associated with higher collision rates for bats." (British Trust for Ornithology (BTO), 2017, para.4). Wind turbines can interrupt the migratory pathways of some species, particularly soaring birds (Marques et al, 2020). A 2020 study found that functional habitat may also be lost, as soaring birds change their flight trajectories to avoid wind turbines, which could "lead to functional habitat loss, as suitable soaring areas in the proximity of wind turbines will likely be underused" (Marques et al, 2020). In January 2023 plans for a major wind farm near Moffat in Scotland were scaled back, from 75 to 60 turbines, amid concerns they could have an impact on golden eagles. The RSPB had objected to the original proposals due to concerns about the collision risk and habitat loss for the birds<sup>350</sup>. One Member of the Scottish Parliament, Edward Mountain, has suggested (in January 2023) that NatureScot data on the number of raptors killed as a result of collision with onshore wind turbines might be the "tip of the iceberg" given the difficulties of collecting full and accurate information. He said: "These new figures are alarming and show the real dangers wind farms present to our endangered and iconic bird of prey species."<sup>351</sup>

There are concerns about the impact of wind farms socially, the visible presence of onshore wind farms is not universally accepted (Toke, 2005; Harper et al, 2019). Since 2015 all wind turbine applications, including commercial wind farms, have had to go through local planning processes and government guidance states that: "Applications should not be approved unless the proposed site has been identified as suitable for wind energy development in a Local or Neighbourhood Plan." (GRICCE, 2020). The suspension of subsidies for onshore wind farms came as a result of a 2015 election pledge by the Conservative Government. A 2019 study found that the closer an area is to urban centres the less likely planning is to be granted for a wind farm. The likelihood of neighbourhood support for onshore



wind farms is reduced if the population has a higher than mean average age (Harper et al, 2019), which is the case in the upland communities in England (Denny & Latham-Green, 2020) or the population has higher than average education levels (probably due to the ability to organise campaigns opposing developments) (Harper et al, 2019). When local people agree to wind farms onshore, there have been short-term benefits to local residents in the form of community grant schemes that can fund community organisations and projects and investment in local infrastructure such as access roads. New wind-farm construction also creates potential for wildlife and habitat management, with wind-farm developers contributing to ecological projects which can help to enhance the local area and support further employment, and sometimes visitor centres, which can be tourist attractions for an area (BiGGAR Economics, 2012).

Concerns have been expressed around decommissioned wind turbine blades, with news stories highlighting the existence of large burial sites for turbines (BBC, 2020c). Research suggests that the best option is refurbishment, resale, and reuse, thereby extending the lifespan of the turbines albeit with reduced efficiency. However, removal, refurbishment and relocation of wind turbines has been recognised as a challenge due to transport difficulties. Wind turbine blades are challenging to recycle with limited uses for any processed material recovered, an increasingly pertinent issue as in Europe alone, as at 2016, 50,000 tonnes per year of wind turbine blade material was predicted to reach the end of its life by 2022 (Beauson & Brøndsted, 2016).

The sparsely populated, remote, exposed nature of Scottish Islands, such as the Shetlands, means they are ideal for onshore wind, as the geographic characteristics of the habitat and wind speeds are ideal (GRICCE, 2020) and access can be difficult to explore other options. However, most of the upland areas of England in particular do not have

the most optimum wind speeds (GRICCE, 2020) with many areas located on peatland. The building of wind farms on areas comprised of un-degraded peat habitat is advised against by scientists, as this would most likely result in increased carbon emissions (Smith, Nayak & Smith, 2014, 2012). The evidence also suggests government subsidies are required to encourage large-scale onshore wind developments (Grubb, 2015) and that high levels of employment both direct and indirect are not long-lasting, predominantly related to the supply and installation of turbines, with only an estimated 17% of FTE direct and indirect jobs created being sustained during the operations and maintenance phase of a wind farm's 25 year life span (STUC, 2019; BiGGAR Economics, 2012). Environmentally, bats and bird species, particularly raptors, can be negatively impacted through collisions with turbines (Thaxter et al, 2017) and reductions in the amount of functional habitation through interruption of migratory pathways (Marques et al, 2020). Socially, wind farms are not universally accepted and planning regulations in England in particular require local neighbourhood support, which can prove a barrier to investment in the planning process by prospective wind energy companies, with the likelihood of planning being approved being further from urban areas and in areas where there are higher than average mean age population with higher than average qualifications (Harper et al, 2019). It has been suggested therefore that the majority of future onshore wind projects agreed will most likely be in Scotland, as is currently the case (Hitchings-Hales, 2020).

Driven grouse shooting and onshore wind farms can, and do, co-exist. There is no 'either – or' choice between the generation of power from wind and driven grouse shooting. It is not possible, or desirable, to cover all land used for driven grouse shooting with wind turbines. Many estate owners are actively involved with alternative energy projects. The birds most likely to be negatively affected by wind turbines are not low-flying grouse, but raptors and other

#### References

- <sup>350</sup> [https://www.bbc.co.uk/news/uk-scotland-south-scotland-65425033?utm\\_source=All+Contacts&utm\\_campaign=8340cb9256-Morning+Briefing+020523&utm\\_medium=email&utm\\_term=0\\_dd843c5cb6-8340cb9256-27564919&mc\\_cid=8340cb9256&mc\\_eid=1da0a5cac3](https://www.bbc.co.uk/news/uk-scotland-south-scotland-65425033?utm_source=All+Contacts&utm_campaign=8340cb9256-Morning+Briefing+020523&utm_medium=email&utm_term=0_dd843c5cb6-8340cb9256-27564919&mc_cid=8340cb9256&mc_eid=1da0a5cac3)
- <sup>351</sup> <https://www.heraldsotland.com/news/homenews/23224495-wind-turbines-threat-endangered-scots-birds-prey/#:~:text=Onshore%20wind%20turbines%20are%20providing,turbines%20in%20Scotland%20since%202019>



higher-flying birds. It is concluded that, to suggest that renewable energy is an 'alternative' to driven grouse shooting is incorrect.

## 7.4 Rewilding

Ever since the stone age, people have impacted and influenced the natural landscape, with increasing influence from the 15<sup>th</sup> century onwards when global travel and settlement increased (Mooney & Dennis, 2016). Archaeological evidence indicates that anthropogenic transformations have created novel ecosystems worldwide for millennia (Boivin et al, 2016). As population sizes increase, there is an impact on natural systems and what was once normal, such as the habitation of the UK by wolves for example, had a much lower impact on humans thousands of years ago, when populations were smaller and there was more land available, than now when populations are larger and people live in closer proximity to historically 'wilder' areas.

Originally used to describe the creation of 'wildlife corridors' in core wilderness areas of North America, the use of the term 'rewilding'<sup>352</sup> has now expanded to cover a wide range of ecological restoration and human-nature relationships (Hall, 2019). Consequently, consideration of rewilding is inevitably difficult, as although there are some broad areas of consensus, there is considerable divergence concerning the desired ends and means of rewilding, especially about the place of people and cultural artefacts within 'wild' land, and the relative merits of intervention and non-intervention (Deary & Warren, 2017; Carver et al, 2021). A spectrum of rewilding models can be discerned ranging from a complete absence of ongoing human management and human population at one end of the spectrum, to co-habiting and co-shaping by humans at the other end, an approach that Rewilding Britain seems to favour<sup>353</sup>. It seems that the concept has become plastic, 'signifying everything' (Deary & Warren, 2019). Even in Scotland where landowners are actively seeking to enhance wildness, priorities and values differ (Deary & Warren, 2019). It is, perhaps, the ability

of rewilding to mean whatever somebody wants it to mean that makes it so effective at catching the imagination of so many people; in December 2021 Highlands Rewilding, a project that aimed to restore (but to what?) more than 2,000 acres in Aberdeenshire and Inverness raised more half of its £500,000 crowd-funding target from 239 investors in just three weeks.<sup>354</sup>

There are practical considerations about how rewilding happens in the UK as it occurs in a crowded island that has been shaped by human activity over millennia. The questions "Rewilding to what? And when?" have not always been satisfactorily answered, although the work of Carver et al (2021) provides a useful unifying definition and set of guiding principles, including the key point that understanding the context of rewilding projects is key to success. Trade-offs between rewilding ideals and what is socially and politically feasible will have to be made. In addition, rewilding costs money, either through government subsidy or donations from organisations and individuals. It is not clear how long-term the current levels of interest and excitement about rewilding will last and how sustainable the current funding models will be. Moreover, attractive though some elements of the concept are, there is little known about the likely outcomes, or the time-scales over which ecosystem recovery might occur. For example, some models of rewilding will involve either a reduction in livestock grazing or its complete removal. However, even long-term monitoring of sites where permanent plots with – and without – sheep grazing were established (between 1954 and 1967) show no significant differences have yet resulted in soil properties, above-ground biomass, and nutritional status of the vegetation (Marrs et al, 2018). The outcomes of rewilding will probably not be apparent for many decades, if not centuries. Additionally, it must be recognised that although studies show that protected areas prevent habitat loss, there is a lack of evidence for their effect on species' populations: existing studies are at a local scale or use simple designs that lack appropriate

controls (Wauchope et al, 2022). It seems that active management is important if animal and plant populations are to thrive, a point perhaps especially true for severely threatened or declining species. It is also worth observing that there is no guarantee that rewilding (using, in this instance, Rewilding Britain's definition) is the best land management model for maximising natural capital and ecosystem services across the board. For example, beavers do slow the flow and prevent flooding downstream from where they build their dams, but they do not (cannot) consider human habitation or agricultural land when they choose to select a dam location; there is a time and place for beaver. In contrast, human experts can select the best points in a catchment to implement natural flood management that mitigates flooding impacts on people, agriculture and industry, etc.

It is interesting to see examples of possible rewilding initiatives in the UK, as defined by Rewilding Britain.

The concept includes:

- Protecting, expanding and connecting ancient woodlands to enable a diverse range of wildlife to establish and disperse, and increasing carbon storage
- Reducing high populations of grazing animals to help trees and other vegetation grow
- Removing fishing pressure and creating proper marine protection to stop dredging and bottom trawling so that sea life can recover and flourish
- Restoring wetlands and introducing beavers to boost biodiversity, store carbon and help flood prevention<sup>355</sup>
- Bringing back missing species to plug crucial gaps in the ecosystem, and re-forge key relationships between species (for example, between predators and prey and scavengers)
- Restoring key marine ecosystems such as kelp forest, seagrass and oyster beds to boost biodiversity, suck in carbon and get natural processes working
- Removing dams so that fish can move freely and the forces of erosions and deposition are allowed to re-establish themselves
- Reconnecting rivers with floodplains, restoring their natural course to slow the flow, easing flooding and creating habitats for fish and other aquatic and wetland wildlife
- Connecting up habitats and providing wildlife bridges so wildlife can move and disperse naturally, helping them adapt to climate change and build resilience
- Setting aside large areas for nature so that nature can truly evolve on its own terms, maximising biodiversity, carbon storage and essential eco -benefits

- Creating a wildlife-friendly garden and helping wildlife move through it to help nature on a smaller scale

(Rewilding Britain, 2021a, para.3)

Many, if not all, of these initiatives are potentially attractive, especially if local communities are engaged and support their local schemes. Nearly all of the initiatives imply that management is active, rather than absent, recognising that: "If you leave things to Nature, you can never be sure."<sup>356</sup> Some of these activities, although not all (especially those that are marine based!), are seen in some areas where driven grouse shooting is practised. Although it is not suggested that driven grouse shooting is a rewilding strategy, it often takes place in areas where grazing has been reduced, red-listed species are re-occurring, and flood control measures have been taken (see Section 5.1.2). Different approaches to managing the UK's uplands can coexist, it does not have to be a case of either/or.

There are some similarities between the ways some landowners and tenants practise integrated moorland management and the new guiding principles for rewilding. These principles include that rewilding requires local engagement and support. By contrast, rewilding projects that local communities perceive to be imposed on them from outside a region, and which fail to take account of local interests, can cause resentment and resistance meaning they are likely to fail (Lorimer et al, 2015; Pellis, 2019; Hall, 2019). Upland communities where moorland is managed for grouse include residents who believe that participation in driven grouse shooting is important to their community (Denny & Latham-Green, 2020), with individuals who took part in driven game shooting of all types in any role expressing a strong link to rural identity and sometimes intangible cultural heritage (Latham-Green, 2020). Any changes to the current practices in these areas would need to consider the views of local communities carefully before discontinuing a practice that many feel is integral to their identity, and which has a positive impact on their health and well-being (Haslam et al, 2009; Latham-Green, 2020). Rewilding involves utilising a range of different land management techniques with the aim of minimising negative environmental impacts and maximise positive impacts, although there is little evidence, and no long-term research, into whether or how best this aim can be achieved. However, it may improve environmental outcomes to the detriment of economic and social impacts which are given lower priority. It is suggested that some of the activities associated with rewilding are already part of an integrated approach to the management of moorland for driven grouse shooting. These activities are funded through a combination of private estate funds and sometimes government-funded subsidies related to agriculture and conservation.

### References

<sup>352</sup>The word 'rewilding' dates back to the 1980s but gained real traction in the late 1990s, under Michael Soule's and Reed Noss's three Cs – Cores, Corridors and Carnivores. They suggested we needed core habitats, such as national parks, linked up via ecological corridors of viable habitat, and keystone species, primarily carnivores, driving trophic cascades (indirect ecological interactions that can alter entire ecosystems). See, for example <https://www.citizenzoo.org/CZ/whatisrewilding/>

<sup>353</sup> See, <https://www.rewildingbritain.org.uk/why-rewild/what-is-rewilding/an-introduction-to-rewilding/defining-rewilding>

<sup>354</sup> Source: Scottish Field, 21st December 2021

### References

<sup>355</sup> However, if beavers build dams near arable areas there is a risk of localised flooding leading to significant soil and carbon loss, as well as a possible risk to some human settlements. Beavers are not a universally applicable solution.

<sup>356</sup> Quote from Stanford, J.K. (1954) A Bewilderment of Birds, Rupert Hart-Davis, London

These activities utilise the expertise and equipment of the landowners and their experienced staff, including gamekeepers. If some views of rewilding were to prevail and replace driven grouse shooting there would be negative economic consequences, in terms of direct and indirect income from shooting both for estates, local communities and the wider local and national economy, as well as social consequences for those no longer able to take part in driven grouse shooting including, in particular, all those employed on a casual basis such as beaters and pickers-up. However, as already stated, the idea that there is either driven grouse shooting or rewilding is a false dichotomy (although, as this report makes clear, there is more evidence about the impacts of driven grouse shooting in the UK than there is about rewilding in the UK). The upland areas of the UK can be managed in ways that are not exclusive, in many cases.

### 7.5 Tourism

Tourism is often provided as an economic justification for rewilding (Hall, 2015, 2019). However, there is a lack of specific studies of rewilding and tourism (Hall, 2019). Although tourism and recreation can provide important contributions to the economy of an area, they are not a panacea. Tourism is fickle, unpredictable and generally highly seasonal. In addition, tourist expenditure does little to manage the landscape and infrastructure that tourism requires (Rotherham, 2008). Even when areas have

been devoted to natural conservation with the aim of promoting local economic development, the evidence is that the development of tourism is not consistent (Duvivier, 2021).

Tourism is currently supported by grouse moor management through the maintenance of a mainly accessible and diverse mosaic-type landscape that is attractive to millions of visitors a year and visitors to the uplands who take part in driven grouse shooting are, of course, 'high value' tourists who visit at the end of the main tourist season and into the 'shoulder' season of the autumn months. They will often stay in local hotels that are of a high standard, eat in restaurants, buy sporting attire and equipment from local businesses, and spend additional monies during their stay in the area, as explored in Section 5.1.2. To encourage tourists to an area the appropriate infrastructure, facilities and attractions are needed. Open heather moorland, with its purple foliage, and the associated biodiversity is already a key attraction. The North Yorkshire Moors for example, hosts the Moors National Park Centre<sup>357</sup>, which offers a range of ways to enjoy the moors free of charge. It is located in a former shooting lodge on the banks of the river Esk. The centre provides information about the National Park's villages, historic attractions, and tranquil moors and dales including moorland stories, heritage and wildlife displays, general visitor information, a gift shop, local crafts, ale and food and a country café with garden seating. There are grounds where people can picnic and other highlighted, outdoor attractions such as a riverside sculpture trail, indoor climbing wall, outdoor adventure playground, the story-telling chair in Crow Wood and a woodland trail to the bird hide. There is also an art gallery (Welcome to Yorkshire, 2019). This is funded by the National Parks Authority. These tourist enterprises co-exist with the grouse moor management. The moors are managed using the methods described in Section 5.2 and 5.3 to maintain a patchwork of different sizes of heather (GWCT, 2019), which results in the purple heather landscape many people travel to the moors to visit, as publicised by the National Parks (North Yorkshire Moors National Park, 2021). If this management was to stop, the purple heather would be lost, and the biodiversity would change. The maintenance of access pathways would need to be funded from alternative sources or would gradually degrade.

It is interesting to note that the only upland area in England that does not rely on management of land for grouse moors is the Lake District. This area is heavily reliant on tourism with a less diverse range of employment opportunities compared with those areas managed as grouse moors, and has the highest proportion of second homes of all of the National Parks, as was noted in a 2020 comparative study (Denny & Latham-Green, 2020). The study found that communities in areas where integrated moorland



management is practised, both those in National Parks and those outside them, have weathered the coronavirus storm more robustly than those in moorland and upland communities in areas where there is a very high reliance on tourism (Denny & Latham-Green, 2020).

To replace one kind of tourism with another takes time. The amount of money spent by any alternative tourists that could be encouraged to an area cannot be quantified in advance. The amount of money currently spent by those coming to shoot grouse is discussed in Section 5.1 and this would cease if no shooting took place.

To summarise, moorland management for driven grouse shooting exists as part of a complex web of activities that supports tourism in the form of biodiversity enhancement (See Sections 5.2 and 5.3), track maintenance and landscape shaping. Shooting only takes place between 12th August and 10th December each year, but throughout the whole year the land managed by estates for driven grouse shooting, and the resultant benefits of this in terms of landscape, access and biodiversity is available free of charge for non-shooting tourists in the uplands. The suggestion that tourism could replace driven grouse shooting is, perhaps, naïve and ignores key points: driven grouse shooting is tourism, and the landscape that results from driven grouse shooting is that which currently attracts tourists to many of the upland areas of the UK.

### 7.6 Alternative Uses: Conclusion

The current system for moorland management means that conservation work resulting in positive ecosystems impacts for people and a wide range of animal species, as detailed in Section 5.3, is carried out using the expertise and resources of moorland estates, supplemented in some case by government subsidies. If driven grouse shooting was to cease, moorland owners would have to generate income from different uses of their land. As we have indicated, the current evidence is that alternative uses of moorland are not likely to be as economically, environmentally, and socially sustainable as integrated moorland management.

Although the 2019 report for the Scottish Government noted several possible alternatives to traditional integrated moorland management (which involves driven grouse shooting) the current report suggests that these 'alternatives' all have their place in the management of moorland, both in Scotland and the rest of the UK, along with driven grouse shooting. There is no one 'right' approach to land management, especially on marginal land such as moorland. Delivering social, economic and environmental sustainability from the UK's upland areas is complicated. Policy makers, landowners, conservation organisations, pressure or interest groups and individuals should remember that, as H. L. Mencken said: "For every complex problem there is an answer that is clear, simple, and wrong."

#### References

<sup>357</sup> Other National Parks have visitor centres of course. See, for example <https://www.peakdistrict.gov.uk/visiting/visitor-centres/edale>



# Overall Conclusions

The British uplands have undergone constant change for at least five thousand years (Gimingham, 2002). They are not a pristine wilderness but areas of extensive moorlands, grasslands and (in some places) peatlands. They are capable of providing economic, environmental and social benefits, that can be sustainable. However, at present we do not know enough to say that the ways the British uplands are currently managed, or ways in they could be managed, will deliver optimum levels of the three pillars of sustainability. More research and a shared vision for the uplands is urgently required, and more toleration of the beliefs and practices of others is called for.<sup>358</sup>

## ECONOMIC SUSTAINABILITY

Any statements regarding the sustainability of driven grouse shooting, and its replacement with alternative land uses, must take into account the full range of economic benefits that result to people, businesses and communities that accrue as a result of integrated moorland management. The impacts of integrated moorland management, which includes driven grouse shooting, on the agriculture sector through financial facilitation; on tourism through the creation of a unique, accessible, and attractive landscape; on human and animal health through exercise and tick and bracken control; and on carbon sequestration and flood control through moorland management and restoration practices are immense. Moreover, their long-term financial impact is clearly important not only for local communities, but for the wider UK population.

If landowners and tenants were fully rewarded for the direct and indirect economic benefits that integrated moorland management, including driven grouse shooting, generates<sup>359</sup> there would be no question about the economic viability of this form of land management.

In the absence of a holistic reward system for all economic impacts, integrated moorland management (including driven grouse shooting) will continue to depend on a complex, holistic, model of economic management and, in some cases, on landowners and tenants being prepared to invest their money without expectation of a return from shooting.

Detailed studies of the economic impacts of moving away from current management practices to re-purpose grouse moors for alternative uses

have not yet been carried out. It is unlikely that the alternative uses that are proposed by some groups for the moorlands would deliver the same positive economic impacts, at least for many generations. Driven grouse shooting is an important part of a mosaic of income-generating activities that sustain upland communities and deliver important benefits to the wider UK population.

## BIODIVERSITY SUSTAINABILITY

The management of moorland for driven grouse shooting, when it is part of the integrated moorland management mix, results in an increasingly rare assemblage of plants, animals and invertebrates being supported and enhanced to the benefit of the UK and Europe. This assemblage is different from alternative habitats and typically provides a net gain in diversity and abundance over similar but unmanaged moorland. Some species do not do so well in moorland managed for activities including driven grouse shooting, but this is true of all choices made in ecosystem management. Compared with upland areas where grouse shooting does not take place, the biodiversity of 'grouse moors' seems to be at least as rich, if not richer.

If people, both the public and governments, continue to value heather moorland landscapes, then they will need to be actively managed to be maintained. The current model of integrated moorland management, which includes as part of the economic and social mix driven grouse shooting, is a sustainable approach to maintaining such landscapes. It is not clear what other management regimes would deliver the same result.

There are environmental threats to the sustainability of the current integrated moorland management model. Rising temperatures, changing patterns of rainfall and habitat change typical of lower intensity management means the increasing numbers of ticks, and the increasing number of dangerous diseases they transmit, could pose a significant problem for humans and other animals that venture onto the moors. In addition, there is always the risk of existing grouse disease control measures becoming ineffective, or new diseases emerging for which treatment is not available. Finally, if environmental changes lead to increased populations of heather beetle, then the sustainability of the heather-clad moorland, and the grouse, will be seriously compromised. Of course, all alternative uses of moorland face future threats.

The biodiversity impacts of integrated moorland management, including driven grouse shooting are sustainable and should be maintained. Some landowners could do more to improve biodiversity on their land. However, the long-term sustainability of the model is threatened by rising temperatures and disease.

## NATURAL CAPITAL AND ECOSYSTEMS

The natural capital concept and the ecosystem services model are important (especially in a period of climate change), but the data about how differing moorland management regimes impact on climate change, water quality and flood risk, and wildfire mitigation is simply not robust.

It is not possible to say with any assurance that integrated moorland management, including the practices associated with grouse shooting, is more or less sustainable in terms of the ecosystem services it provides (carbon emission and sequestration, water quality, flood mitigation and as noted above biodiversity) than alternative uses of moorland. It is important that the management of the upland areas of the UK is site-specific, rather than generic. It is also important that it is recognised that upland management strategies do not have to be either/or, integrated moorland management (as currently practised by many estates) includes energy generation, carbon sequestration, habitat restoration, flood control, forestry, etc.

New, multi-site, long-term research projects would help assess the impacts on ecosystem services provision resulting from differing moorland management regimes. However, such projects are expensive and slow to deliver. However, in the interim, structured data gathering by moorland managers (citizen science) linked to adaptive trial managements would be invaluable in adding to the evidence base (and could be co-informed, overseen and actively supported by scientists as to be robust, meaningful and holistic).

Nearly all 'grouse moors' have multiple functions. The landscape on which driven driven grouse shooting takes place is utilised for a range of income-generating activities including livestock production, alternative energy production, and forestry, as well as tourism and leisure. Although some landowners control all these activities themselves, many have to collaborate and co-ordinate with multiple stakeholders, including graziers and farmers. Moreover, driven grouse shooting takes place on both owned and leased land. Gathering valid and reliable evidence about the ecological sustainability of 'grouse moors' will involve studying driven grouse shooting as a part of the complex and holistic mix that is integrated moorland management, not as an isolated phenomenon.



Upland landowners are able to deliver public goods, which are the basis for receiving support from the ELM scheme. The challenge they face is to work with scientists to establish and implement practicable and effective systems that measurably deliver ecosystem benefits in a very complex and integrated ecosystem. It is a challenge that needs to be met by all landowners who want to demonstrate that the way in which they use their land is sustainable, and who would like to be rewarded for increasing natural capital.

## SOCIAL SUSTAINABILITY

Driven grouse shooting, unlike walked-up shooting, involves a wide range of individuals from a variety of backgrounds, not just those shooting, but also beaters, pickers-up, drivers, flankers, caterers, supporters and others, facilitating contact between individuals from different backgrounds and maximising the potential for social impacts. Moorland management regimes that facilitate driven grouse shooting enable people to take part in activities, both as part of driven grouse shooting and separate to it, result in positive impacts on social and work lives and the physical and mental health and well-being of individuals and communities. It is possible to calculate the indicative values of some of these activities to individuals, and to groups of people, and these values are often significant. Individuals, communities, and the state benefit from many of the social impacts of driven grouse shooting. As is noted in the introduction to this document, sustainability

### References

<sup>358</sup> Those interested in the future of the British uplands are strongly recommended to study the six glimpses of the future listed by Gimingham (2002).

<sup>359</sup> Calculating the overall economic impacts is, of course, not possible at the present time.



## References

<sup>360</sup> Rt Hon Sir Robert Goodwill MP, Chairman of the House of Commons Environment, Food and Rural Affairs Select Committee, quoted in the Foreword to Real Wilders, GWCT 2023 <https://www.gwct.org.uk/media/1384480/Real-Wilders-LR.pdf>

has three dimensions; economic, environmental, and social. The evidence from the existing literature is that in terms of social impacts, driven grouse shooting should be seen as sustainable. Alternative uses of moorland will deliver different social impacts, but these have not yet been fully identified. Any decisions about the implementation of these alternative uses must take into account the potential loss, or gain, in social impact.

The conclusions of this report, detailed above, are supported by the currently available evidence. However, there is a danger of legislation being driven by public (non-evidence based) perceptions of issues such as animal welfare, controlled burning, rewilding, etc. It is important that policy makers are presented with evidence, in a form that they find useful. This report will help in the production of this useful evidence.

### OPPONENTS OF DRIVEN GROUSE SHOOTING

Opposition to driven grouse shooting can be on ethical grounds by individuals who are against all shooting of live quarry, as is the case for organisations such as the League Against Cruel Sports, Animal Aid and the RSPCA. Other opponents state that they are not opposed to all game shooting but believe that driven grouse shooting is not sustainable and should be replaced with a less intensive alternative. There is a high level of conflict between those for and against shooting. Conflicts that may appear at first to concern wildlife are in reality often part of a wider debate concerning land use, land ownership and governance of natural resources (Hodgson et al, 2018). Given the arguments associated with raptors and grouse moors, it would be nice to see data collected more regularly, used with more objectivity, and placed in context.

The methods used by opponents are varied, organised and sometimes aggressive. Some opponents utilise tools such as social media with expertise. Many people who participate in driven grouse shooting do not feel confident in

their ability to use media, including social media, to dispel mistruths and inaccurate perceptions of their activities (Latham-Green, 2020a; b). The use of selected evidence and misrepresentation of evidence, including in parliamentary debates, along with the failure of policy makers to accept the recommendations of independent review committees in relation to driven grouse shooting and other shooting regulation, exacerbates the feeling of helplessness and resentment amongst many involved in driven grouse shooting. Abuse of, and attacks on, gamekeepers and their families are increasing. Gamekeepers are increasingly reporting negative mental health and well-being.

The opponents of driven grouse shooting are clear about their desire for the practice to stop. At present they are less clear about what the impacts on sustainability – economic, social and environmental – would be if their desires were met. It is to be hoped that, at least some, opponents will engage more actively with the evidence base to understand the complexities involved in integrated moorland management.

### ALTERNATIVE USES OF MOORLAND

A number of alternative uses have been considered in this report but there is insufficient evidence in the research base at present to assess the full impact of exchanging the current moorland management system for any of the, often suggested, alternatives. Any changes would have economic and ecological impacts. The social impact of stopping driven grouse shooting would be particularly high, even if all other forms of grouse shooting were to be allowed, as the range of individuals involved in driven grouse shooting is far wider, involving people from all social backgrounds, compared with many other forms of shooting. It is stressed that the choice does not have to be as simple as driven grouse shooting or something else. "There is plenty of room for different approaches to coexist."<sup>360</sup>

• That those opposed to driven grouse shooting, and those advocating alternative uses for grouse moors, should base their arguments on evidence.

The crucial point about evidence is that it should cover the IUCN's three 'pillars' of sustainability: economic, environmental and social. Considering one or two of these pillars alone is not acceptable; they are an integrated, holistic structure – a three-legged stool. Bad policy, poor management, and illogical opposition will result from ignoring one or more of the legs of the stool, and economic, environmental and social sustainability will be diminished.

Based on this logic, the following recommendations are restated:

• Any decision about the future of driven grouse shooting and alternative uses of moorland currently used for driven grouse shooting should use the Six-Order Economic model to identify the economic impacts and sustainability of these other options. Those who propose alternative uses of the UK's moorlands should demonstrate that the economic impacts of their preferred options deliver outcomes that are at least as valuable as those delivered by integrated moorland management, and that are sustainable.

• The maintenance of a mosaic of moorland vegetation (both, in age and composition) as a result of grouse moor management delivers a uniquely diverse habitat and biodiversity. Those advocating alternative uses for grouse moors should demonstrate that their chosen option(s) deliver the same or higher levels of biodiversity.

• Landowners and tenants practising integrated moorland management should invest more resource into recording the levels of biodiversity on their land and develop and implement plans to enrich it.

• Landowners and tenants should invest resources to work with scientists to establish, implement and monitor practicable and effective systems that measurably value and enhance the services delivered by their very complex and integrated ecosystems. This challenge needs to be met by any moorland owner who wants to demonstrate that the ways in which they use their land is sustainable, and to be rewarded for increasing natural capital.

• Those advocating alternative uses for grouse moors should invest resource in identifying and valuing the ecosystems services delivered by their chosen option(s) and demonstrate that they will deliver the same or higher values than integrated moorland management, including driven grouse shooting.

• Alternative uses of moorland will deliver different social impacts, but these have not yet been even partially identified. Any decisions about the implementation of these alternative uses must take into account the potential loss – or gain – in social impact when compared with the significant social impacts arising from driven grouse shooting.

• Those involved in driven grouse shooting, those with a stake in the way moorlands are used, and those opposed to driven grouse shooting should engage with each other to develop positive dialogue and mutual understanding.

## 9.0 Recommendations

The work done to produce the second edition of this report has confirmed the three important overall conclusions reached by the first edition:

• That any decision by policy makers about the sustainability of driven grouse shooting should be informed by a clear understanding of all the

evidence; linked to an assessment of limitations/robustness/reliability,

• That integrated moorland management regimes practised by landowners and tenants should be informed by evidence, and changes made where necessary; and ideally linked to monitoring,

## 10.0

# Limitations of this Report

Any report, such as this one, which attempts to be a literature review will, inevitably, omit material that is relevant. This edition of the report has tried to be as up-to-date as possible, and omissions are not deliberate. Moreover, new and relevant material is being published all the time and, in consequence, any literature review is immediately behind the times.

The review is the work of one author who, like all people (even academics) has conscious and unconscious biases. It is hoped that the peer-review process to which the report has been subjected has countered these biases and resulted in a more objective document.

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# Abbreviations used in this report

BASC	British Association for Shooting & Conservation
BGA	British Game Assurance
CA	Countryside Alliance
Confor	Confederation of Forestry Industries
Defra	Department for Environment, Food & Rural Affairs
ELM	Environmental Land Management (scheme)
FC	Forestry Commission
FLF	Future Landscape Forum
FSA	Food Standards Agency
GL	General Licence
GMMRG	Grouse Moor Management Review Group
GWCT	Game & Wildlife Conservation Trust
HEAT	Health Economic Assessment Tool (devised by WHO)
IUCN	International Union for Conservation of Nature
LSA	Less Favoured Area
MA	Moorland Association
MMH	Mountains, moorlands and heathlands
NFU	National Farmers Union
NGDA	National Game Dealers Association
NGO	National Gamekeepers' Organisation
NIHR	National Institute for Health Research
NRW	National Resources Wales
ONS	Office for National Statistics
RSPB	Royal Society for the Protection of Birds
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SAC	Special Area of Conservation
SFRS	Scottish Fire & Rescue Service
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UNESCO	United Nations Educational, Scientific & Cultural Organisation
WHO	World Health Organisation



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