

The Intensification of Grouse Moor Management in Scotland

Andy Wightman & Dr Ruth Tingay



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Summary

Providing medication targeted at red grouse, in open, complex semi-wild natural habitats is **a major line that arguably should never have been crossed** without full consideration of the ethical and environmental implications.

These rapid changes in the uplands have taken place with **no effective scrutiny** or policies in place to ensure that such practices are safe, sustainable or in the wider public interest.

Grouse shooting has been carried out in Scotland for over 150 years. Historically, it has been associated with high levels of wildlife persecution but in recent years, a wider range of environmental impacts has emerged. These include carbon emissions, erosion, road building, lead accumulation, fencing, impacts on other wildlife populations and on the landscape. This has led to growing concern about the negative impacts of a land use that is subject to minimal oversight and regulation.

These concerns are slowly beginning to be noted and addressed by public authorities such as the Cairngorms National Parks Authority and Scottish Natural Heritage but, as evidenced by the ongoing level of raptor persecution for example, many operators of grouse moors appear oblivious to the fact that modern techniques of intensive management pose significant threats to the environment. Providing medication targeted at red grouse, in open, complex semi-wild natural habitats, for example, is a major line that arguably should never have been crossed without full consideration of the ethical and environmental implications.

The questions highlighted in this paper arise at a time when the killing of grouse is increasing in popularity, in profitability and when the area of land devoted to it is growing ever more extensive. At the same time, it appears that agricultural subsidies will increasingly be available to subsidise what is essentially a non-agricultural activity that requires no public subsidy.

The wider social impacts have been no less troubling. In many parts of Scotland, agricultural tenancies are being terminated and the estate owner is taking over agricultural operations. This facilitates the management of a sheep flock to act as tick-mops, the claiming of farming subsidies and the construction of roads that are defended on the grounds that they are to support agricultural activity. In the case of one estate at least, tenants claim that financial inducements and intimidatory pressure were deployed to persuade them to give up their tenancies (Watson 2013a).

The intensive methods highlighted in this report together with the social and economic changes that have accompanied them have been developed on a relatively few grouse-shooting estates over the past 20 years. They are now being introduced to a steadily expanding area of land across the uplands of Scotland. The driver for this is a combination of growing demands to kill red grouse and the financial capital available to engineer this transformation.

Modern grouse moor management has created landscapes more akin to game reserves or farms. These rapid changes in the uplands have taken place with no effective scrutiny and there is clear evidence that the impacts of intensive management have never been properly assessed. Red grouse are a public resource but managed within a framework dominated by private landowning interests.

Grouse moor management is now out of control. An urgent review of all of these impacts is required together with a moratorium on further intensification. ■

Recommendations

The following detailed recommendations reflect the urgency of the matter and should be implemented immediately.



- 1** All grouse moors should be registered with the Scottish Government as part of the existing system of agricultural administration.
- 2** Guidance on moor burning should be reviewed in light of the latest scientific evidence and be made statutory for all grouse moors.
- 3** All roads across grouse moors should be subject to a full planning consent process.
- 4** No further medication should be administered in the open air before a full environmental impact assessment has been carried out.
- 5** Lead ammunition should be banned.
- 6** A moratorium on the culling of mountain hares should be implemented for three years in order to allow for a study of the species' population status.
- 7** All agricultural subsidy payments to the owners and occupiers of grouse moors should be made public in map-based form so that the public can be made aware of the sums of public money involved and the purpose to which they are being put.
- 8** The current National Game Bag Census which is voluntary and has only 25% of estates taking part should be made mandatory.

Introduction

Highly modified habitats managed to encourage high populations of one species, red grouse, that can be killed in the course of recreational shooting.

A range of new management techniques are being introduced with very little oversight or scrutiny. Electric fencing, road construction, medication, culling of other species such as mountain hares and unrelenting illegal persecution of raptors are all features of a management framework that has intensified with very little public scrutiny or debate.

Red grouse (*Lagopus lagopus scoticus*) is a subspecies of the willow grouse (*Lagopus lagopus*). It is unique to the British Isles and lives mostly on a diet of heather (*Calluna vulgaris*). For over 150 years, moorland in Scotland has been managed for red grouse-shooting. During this period, Scotland's upland landscapes were transformed by the construction of access infrastructure, burning of heather moorland and the extermination of species such as white-tailed eagle (*Haliaeetus albicilla*), goshawk (*Accipiter gentilis*) and red kite (*Milvus milvus*) through poisoning, trapping and shooting. The resultant heather moorlands that are sometimes regarded as an iconic part of the Scottish landscape are, in reality, highly modified habitats managed to encourage high populations of one species, red grouse, that can be killed in the course of recreational shooting.

By 1850, with the introduction of breech-loading shotguns and the expansion of the railway network, driven grouse-shooting became very popular. Driving grouse involves a line of "beaters" disturbing the grouse and causing them to fly towards a line of "butts" in which shooters use shotguns to attempt to kill as many of the birds as possible. Early introduction of modified management of moorland involved heather burning to provide an enhanced habitat for breeding and the almost total elimination of predators. These techniques led to a rapid increase in the red grouse population with record numbers of over 2000 birds killed in a single day.

These early interventions of intensive management were accompanied by dramatic fluctuations in numbers of birds due to outbreaks of disease. This led to the introduction of regular moor burning which continues today over the one million hectares of land devoted to grouse moors (Scottish Land and Estates 2013). Despite regular burning and the killing of predator species such as foxes and crows, the fluctuations in grouse populations have continued and have been the subject of a number of detailed studies (Kerlin et al. 2007) which have attempted to isolate the process by which such fluctuations in the population occur.

In recent years, the management of grouse moors has intensified significantly with higher levels of intervention on both the habitat and the population of red grouse. A range of new management techniques are being introduced with very little oversight or scrutiny. Electric fencing, road construction, medication, culling of other species such as mountain hares and unrelenting illegal persecution of raptors are all features of a management framework that has intensified with very little public scrutiny or debate.

This report identifies these interventions, analyses their impacts and draws conclusions on how those developments should be addressed in light of the widespread concerns that have emerged. ■

Legal framework

The Red Grouse in Law

The red grouse is a wild bird. In law it is *res nullius*. It belongs to no-one until it is taken or killed, and is thus a public resource. Historically, grouse were defined in law as a game bird and were the subject of a legislative framework that had been in place since at least the 18th century and the Game (Scotland) Act 1772. In 2011, however, this status was repealed by the Wildlife and Natural Environment (Scotland) Act 2011 which ended the distinct legal category of game species and added the species to Schedule 2 Part 1 of the Wildlife and Countryside Act 1981 as a bird that may be killed or taken (captured).

The management of red grouse is predominantly under the control of those who own the land upon which the bird nests and feeds. The state only has a role in regulating matters such as the species that can be killed, the seasons and the hunting method together with some regulation of management activities such as moor burning. This contrasts with approaches in other countries where the state either regulates or owns hunting rights directly (e.g. France, Estonia and Sweden).

Beyond specific legislative provisions in relation to the species and wider environmental and wildlife law, there is no distinctive body of law on grouse shooting as an activity or land use. Any owner or occupier is free to manage moorlands to encourage large populations of grouse that can be shot for recreational purposes.

Ownership and Tenure

The vast majority of the one million or so hectares of grouse moors in Scotland are owned as part of relatively large landholdings or sporting estates that were established in the 19th century for hunting. The core extent of ground managed for the killing of driven grouse is in Strathspey, the eastern Cairngorms, Highland Perthshire, the Angus Glens and the Lammermuir and Lowther Hills.

Grouse moors have traditionally been owned by established landed families such as the Earls of Seafield, Roxburghe, Mansfield and Dalhousie. These moors typically form a part of a much larger landholding that includes low-ground farming. Over the past 50 years or so, an increasing amount of grouse shooting has been rented to paying clients in order to try and cover the costs of managing grouse moors and until around 2000, this was the typical profile of driven grouse moors in Scotland.

Selection of prominent grouse moor estates

Estate	Owner	
Buccleuch Estate	Buccleuch Estates Ltd., Selkirk	X
Burncastle Estate	Duke of Northumberland, Northumberland	
Cawdor Estate	Cawdor Trusts, Nairn	X
Corrybrough Estate	Tinsley (Branston) Farms Ltd., Lincoln	X
Dorback Estate	Salingore Reals Estate Ltd., Bahamas	
Drumochter Estate	Alasdair & Eira Drysedale, Newtonmore	X
Farr & Glen Kyllachy	Newbie Salmon Fisheries (Scotland) Ltd., Tomatin	X
Glendye Estate	Leased to Glen Dye Grouse Moor Syndicate	
Glenfiddich & Cabrach	Golden Lane Securities Ltd., London	X
Glenloch Estate	Umena Management Ltd., St Vincent, The Grenadines	X
Glenogil Estate	Baron Ferdinand von Baumbach, Munich, Germany	X
Invercauld Estate	Farquharson Trust leased shooting tenants	X
Invermark Estate	Dalhousie 2006 Trust, Brechin	X
Leadhills Estate	Marquess of Linlithgow, Linlithgow	X
Millden Estate	Millden Sporting LLP, Glasgow	X
Moy Estate	John MacKintosh, Tomatin	X
North Glenbuchat	North Glen Estate Limited, Turks & Caicos Islands	X
Raeshaw Estate	Raeshaw Holdings Ltd, Jersey	X
Roxburgh Estate	Roxburghe Trusts, Edinburgh, Guernsey & Bermuda	
Seafield Estate	Earl of Seafield & Trusts, Buckie	X

X = estates where wildlife crime has been recorded in recent years.



Location of Prominent Grouse Moor Estates

This new cadre of grouse moor manager has introduced a more aggressive and intensive approach to management designed to increase grouse yields.

Since the year 2000, two important developments have taken place. Firstly, some grouse moors that were formerly part of larger holdings have been sold, creating new landholdings dedicated to grouse shooting. Secondly, some of the grouse moors on traditionally-owned estates have been let on long leases of between 10 and 20 years to shooting tenants (e.g. on Seafield and Invercauld Estates).

This change in the ownership and management of grouse moors has resulted in an influx of new money mainly from the financial sector. Hedge fund managers, investment bankers and merchant bankers who were earning multi-million pound salaries and bonuses, were drawn to the conspicuous consumption of grouse moors. In 2006, research had shown that an estate bought 20 years previously would have generated a better return than the stock market (Independent 2006). Scotland was the destination for some of the £2 billion bonus pot distributed to City workers that year, as Andrew Rettie from Strutt and Parker noted at the time,

"Fuelled by record bonus payments to investment bankers and other City personnel, the demand for estates in Scotland during 2006 has been the highest I have witnessed for a long time. Not everyone working in the City wants to buy a Scottish estate, but if you are in your 50s and your children have left home and been educated, then you might want to indulge your passions. And if it's game shooting or salmon fishing then what better place than Scotland?"

(Scotsman 2006).

Money has been the principal driver for the intensification of grouse moor management as new owners and tenants seek to overcome the cyclical nature of red grouse populations and secure a sustainable population surplus that can be killed by recreational shooting.

This new cadre of grouse moor manager has introduced a more aggressive and intensive approach to management designed to increase grouse yields and boost profitability as illustrated by the case study below.

Grouse shooting estates are not required to provide any statutory financial or other returns other than as required by company law where relevant. It is difficult therefore to ascertain much in the way of details about management policies and financial performance. One estate, however, that has attracted some attention has been Glenogil Estate in Angus and the following provides an insight into the contemporary affairs of an intensive grouse-shooting estate.

John Dodd, co-founder of Artemis fund managers, acquired Glenogil Estate in Angus in 2003 from the Earl of Woolton for £6.3 million. Dodd hired grouse moor management consultant Mark Osborne to “restore” the moor and boost the grouse numbers. (1) This involved the construction of an electrified fence along the boundary of the estate to keep red deer out and sheep in, intensive road construction, the widespread use of medication for wild grouse and the killing of predators.

Associated with this intensification of management has been a catalogue of recorded incidents on Glenogil Estate involving illegal persecution of raptors although it is not proven that any of these were the responsibility of the estate.

2006 Poisoned rabbit bait (Carbofuran). No prosecution.

2006 Poisoned rabbit bait (Carbofuran). No prosecution.

2006 Poisoned woodpigeon bait (Carbofuran). No prosecution.

2006 Traces of Carbofuran found in estate vehicles & on equipment during police search. No prosecution.

2007 Disappearance of radio-tagged white-tailed eagle Bird N coincides with tip off to police that bird been shot. No further transmissions or sightings of the bird.

2008 Thirty-two poisoned meat baits on fenceposts (Carbofuran, Isophenfos, Bendiocarb). No prosecution.

2008 Poisoned meat bait on fencepost (Carbofuran). No prosecution.

2009 Poisoned buzzard (Carbofuran). No prosecution.

2009 Poisoned buzzard (Carbofuran). No prosecution.

2009 Poisoned white-tailed eagle 89 (Carbofuran). No prosecution.

2010 Poisoned buzzard (Chloralose). No prosecution.

2010 Poisoned buzzard (Carbofuran). No prosecution.

2010 Poisoned pigeon bait (Carbofuran). No prosecution.

2010 Poisoned pigeon bait (Carbofuran). No prosecution.

Although managed as a grouse shooting estate, Glenogil receives agricultural subsidies from the Scottish Government. The presence of a sheep flock is sufficient to qualify the estate as an agricultural holding and as an agricultural activity. In 2010, the estate received £368,787 in public funds and in 2011, £346,757.

In 2008, the farming subsidy was cut by £107,000 by the Scottish Government after poisoned baits were found on the estate. It was the largest civil penalty imposed under EU cross-compliance legislation, which makes protection of wildlife a condition of subsidy.

In 2013, John Dodd sold the estate for £19 million to Baron Ferdinand von Baumbach from Munich, Germany. This represents a £10 million real-terms increase in value from the £6.3 million (£9.1 million at 2013 prices) acquisition price in 2003. Detailed accounts are not available although Glenogil Ltd. publishes very modest trading accounts. It is reasonable to suppose, however, taking account of ongoing public subsidy of around £300,000 per year and costs associated with the grouse shooting enterprise, that the estate has yielded a very handsome return on capital. ■

Management Impacts

There are major concerns about the single-species focus of this management and negative impacts on other species and habitats in the National Park.

A management system that has lasted for 150 years may now be **no longer sustainable** in light of recent research.

Introduction

The intensification of grouse moor management is causing increasing concern to a number of public authorities with responsibilities for aspects of countryside management. A report on moorland management prepared for the Cairngorms National Park Authority noted that,

“The way in which moorland management is carried out has a significant influence on delivering a range of National Park Partnership and Cairngorms Nature outcomes and priorities.”

Noting that intensification of management was designed to “maximise production of red grouse”, the paper argued that “there are major concerns about the single-species focus of this management and negative impacts on other species and habitats in the National Park.”

In cautious and diplomatic language, the paper then notes detailed concerns over habitat management, wildlife persecution, culling of mountain hares, hill tracks and fencing (Cairngorms National Park Authority 2014).

This section of the report examines some of these specific issues arising as a result of intensification practices.

Peatland & Burning

Burning heather has been a longstanding practice on grouse moors to provide fresh young heather for feeding and longer heather in which grouse can nest and hide from predators. This has led, however, to unforeseen problems. Soils have deteriorated, peatland has eroded and every time heather is burnt, nutrients are released from the plants and the ash may be blown or washed away. A management system that has lasted for 150 years may now be no longer sustainable in light of recent research.

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

Professor Joseph Holden, from the School of Geography at the University of Leeds, and a co-author of the study said:

“Altering the hydrology of peatlands so they become drier is known to cause significant losses of carbon from storage in the soil. This is of great concern, as peatlands are the largest natural store for carbon on the land surface of the UK and play a crucial role in climate change. They are the Amazon of the UK.”

The consequence has been the construction of thousands of kilometres of tracks in often sensitive upland environments.

In June 2015, the UK statutory advisory Committee on Climate Change published its report to parliament and noted that,

“Wetland habitats, including the majority of upland areas with carbon-rich peat soils, are in poor condition. The damaging practice of burning peat to increase grouse yields continues, including on internationally protected sites.”

(Committee on Climate Change 2015)

Other studies that have mapped the burning of moorlands have confirmed a wide range of negative environmental impacts and concluded that policies to reverse these damaging effects must be implemented as a matter of urgency (Douglas et al. 2015).

Tracks and Roads

Private tracks constructed for agriculture or forestry use have been allowed under Permitted Development Rights since 1947. (2) This has allowed tracks to be constructed without application for planning permission, the satisfaction of minimum standards, or any need to inform local authorities, statutory bodies, or the general public. The consequence has been the construction of thousands of kilometres of tracks in often sensitive upland environments. Since 1980, planning consent has been required for tracks above 300m in National Scenic Areas but this has not prevented many unauthorised tracks being constructed. Recent studies have documented the extent of damage caused by inappropriate vehicular tracks, often crudely constructed, causing significant environmental damage and causing fierce public controversy (Watson 2011; Brown 2013).

Tracks have proliferated in areas where the principal use is clearly game shooting (a land use not covered by Permitted Development Rights) but which have been constructed under the guise of agricultural operations. In December 2014, following a string of high profile damaging cases, the Scottish Government introduced secondary legislation requiring prior notification of the design, construction or route of tracks built for agricultural or forestry purposes (HMSO 2014).



Machinery at work burying historic Firmouth (Grid Ref. NO494875)
Photo: James Carron



New grouse butt construction with Firmouth and Scottish Rights of Way sign indicating junction between the ancient Firmouth and Fungle routes (Grid Ref. NO499853) Photo: James Carron

Grouse moor management has been a major contributor to the proliferation of hill tracks. Despite Permitted Development Rights never having been available for game shooting, many of these tracks have either been built unlawfully or with the pretence that there is an agricultural operation being carried out (most frequently this has been the keeping of a flock of sheep to act as tick mops). In recent years, as grouse management has intensified, the scale of the damage has increased as typified by the example of Millden Estate in the grey box.

Millden Estate in Angus is owned by Millden Sporting LLP, a limited liability partnership of Richard Hanson and Millden Holdings Ltd. (a company wholly owned by Richard Hanson). Hanson is the Chairman and co-founder of fund managers, Doughty Hanson & Co. The estate was acquired for £6.3 million in 2004. Since then it has been the subject of intensive management for grouse shooting. One of the Directors of Millden Holdings Ltd. is Nicholas Baikie, a grouse management consultant who is a partner in BH Sporting LLP, specialists in "grouse moor recovery". In 2010, over 3000 brace of grouse were killed on Millden Estate, compared with the 90 year average of 2,352 brace. Part of the intensification has involved the construction of new and upgraded hill tracks and electric fencing.

The Firmouth is an ancient route that traverses the Mounth from Glen Tanar to Tarfside on the border between Aberdeenshire and Angus. The route dates back to medieval times and was more recently a much-used drove road for cattle. It is a designated heritage path and popular with walkers. In recent years, however, much of the historic route has been damaged by bulldozers upgrading the track for vehicular access. By 2010, the estate had constructed 36.9km of new tracks and upgraded 43.9km of existing tracks including the obliteration of the ancient Firmouth (Heritage Paths; Watson 2011). As one journalist wrote when discovering the works for the first time in 2012,

"It is a great pity that the old Firmouth has been bulldozed out in such a fashion. Gone is a wonderful old hill track. In its original state, it was an integral part of the landscape. Weathered and overgrown, the heathery highway lay hidden amongst the hills. Now, sadly, it is an all too obvious scar of grit and gravel"

(Carron 2012)

Coating grit with medication derived from Flubendazole and spreading it on the moors has been the principal means of administering the medicine.



Dug-out mound with grit placed on top July 2015.
Photo: Andy Wightman

Medication

As early as 1911, a Parliamentary Committee of Inquiry had identified a parasitic threadworm as the principal cause of disease in red grouse.

"After investigating nearly two thousand cases of death from other than natural causes, and the facts surrounding circumstances of over two hundred outbreaks of disease, the Committee have arrived at the conclusion that the Strongyle worm, and the Strongyle worm alone, is the immediate cause of adult grouse disease."
(Lovat 1911).

A parasitic worm (the nematode worm, *Trichostrongylus tenuis*, a gut parasite causing strongylosis) is known to play a role in population fluctuations of red grouse (Hudson et al. 2003). In order to try to encourage a consistently high population density of grouse available to kill, one of the intensification methods adopted over the past 20 years has been the use of medication to try and reduce the incidence of the worm. Grouse naturally ingest mineral grit to assist the digestion of heather. Coating grit with medication derived from Flubendazole and spreading it on the moors has been the principal means of administering the medicine.

Another technique used is to administer medicine to red grouse by catching them and administering a drug orally. It is an offence to take or kill a red grouse in the close season but the Wildlife and Natural Environment (Scotland) Act 2011 introduced Section 2(3C) of the Wildlife and Countryside Act 1981 allowing for the taking of red grouse in order to administer medication with the intention of releasing it within 12 hours. This provision was introduced to the Act with no formal public consultation. In order to take a red grouse for the purposes of medication, it is an offence under the EU Birds Directive and the Wildlife and Countryside Act 1981 to use any artificial lighting or dazzling device. To by-pass this prohibition, statutory provision has been made to do this under a General Licence from Scottish Natural Heritage (SNH 2015).

Medicating the wild red grouse population appears to have had some success in reducing mortality and ensuring high numbers of grouse. However, signs of resistance have appeared leading to the use of higher super-strength medications (up to twenty times the concentration of the original wormer drug) (Osborne 2013). More recently, a new disease has been reported in red grouse - respiratory cryptosporidiosis (*Cryptosporidium baileyi*).

The distribution of a pharmaceutical drug across the landscape and into the food chain represents a level of intensification that transforms moorland from a semi-natural environment into a quasi-domesticated farmed environment.

As a recent scientific paper noted,

“Respiratory cryptosporidiosis is a new and rapidly spreading disease in red grouse. Density-dependent natal dispersal by juveniles and driving birds for several kilometres during shooting may have contributed to high rates of disease spread”

(Baines et al. 2014).

In addition, contaminated peat may be transferred between areas on the wheels of vehicles, boots and equipment (Osborne 2014). Although well outside of the maximum recorded dispersal distance of grouse, the first confirmed record in Scotland was reported in 2013 from the Lammermuir Hills in southern Scotland (Baines et al. 2014).

Other diseases such as Pox and possibly Microplasma are thought to already have been found in some grouse. The leading authority on intensification, red grouse consultant Mark Osborne, has observed that such diseases

“are easily transmittable between birds of the same species and all diseases thrive where large numbers of birds or animals live close together”

(Osborne 2013).

Wider questions remain about the potential impacts on other wildlife of placing a veterinary medicine in the open air in the natural environment. No assessment has been made of the impacts on invertebrates or on the predators of grouse. The distribution of a pharmaceutical drug across the landscape and potentially into the food chain represents a level of intensification that transforms moorland from a semi-natural environment into a quasi-domesticated farmed environment. Recent research has revealed that the Veterinary Medicines Directorate (DEFRA) has failed to undertake any national screening of shot red grouse for pharmaceutical residues for at least the past five years (Raptor Persecution Scotland 2015c).

Sheep are dipped with an insecticide, acaricide, and they then mop up the ticks and reduce the scope for infection of red grouse.



A new 20km long electrified fence on Glenavon Estate, Cairngorms
Photo: Dave Morris

Ticks and Fencing

Ticks are small, blood-sucking arthropods related to spiders, mites and scorpions. They can transmit pathogens to a wide range of birds and animals, including the bacterium *Borrelia burgdorferi* (which causes Lyme disease in humans). They are also a vector for louping ill virus which infects humans but readily infects grouse, killing some 80% of infected individuals, and causing illness and sometimes death in livestock such as sheep (Reid 1978).



Electric fencing and gate on Millden Estate, Angus.
Photo: Chris Townsend

To reduce the impact of ticks, an increasing number of grouse shooting estates are constructing electric fencing to keep wild red deer out and to contain flocks of sheep that are used as "tick-mops". Sheep are dipped with an insecticide, acaricide, and they then mop up the ticks and reduce the scope for infection of red grouse. The success of this technique in boosting the population of grouse to be killed is well understood but the broader impact of this practice is yet to be properly assessed. As the Cairngorms National Park Authority noted in 2014,

"Whilst fencing can be beneficial in assisting habitat enhancement and can be a short-term measure, there are also concerns about cumulative impacts on habitat, deer welfare, access and sensitive upland landscapes. There is a significant risk that deer fenced out on some moors only exacerbates habitat management problems elsewhere. Inappropriately designed and located fencing to manage livestock and deer, just as fencing for other objectives, can impact negatively on the landscape and ability for people to access upland areas."

(Cairngorms National Park Authority 2014).



Discarded mountain hare carcasses,
Glenogil Estate, 2012
Photo: Raptor Persecution Scotland

A further controversial approach to reducing the impact of tick disease on red grouse has been the widespread and unregulated culling of mountain hares (*Lepus timidus*) on Scottish grouse moors. This began in the 1980s and has been widespread since the late 1990s. Large-scale culls have been reported in Inverness-shire, Moray, Banffshire and Nairnshire (Watson 2013a), Aberdeenshire (Edwards 2013), the Angus Glens (Raptor Persecution Scotland 2013) and the Lammermuirs (Edwards 2014). Thousands of mountain hares are believed to be killed each year in an attempt to control pathogen transmission between the hares and red grouse, despite a study which has indicated there is no compelling evidence to support the supposition that mountain hare culling increases the density of red grouse (Harrison et al. 2010).

The large-scale culling of mountain hares is not illegal per se (though this depends on the timing and method employed), but the species has European protection and as such, Scottish Natural Heritage has a statutory duty to maintain the population in a favourable conservation status. The species' current population status is unknown. In 2014, Scottish Natural Heritage called for grouse shooting estates to undertake "voluntary restraint" in relation to their large-scale culls due to concerns about sustainability. In 2015, ten wildlife conservation organisations called for an immediate three-year ban on culling until safeguards are in place to inform sustainable management (RSPB Scotland 2015). Discussions with the Scottish Government are believed to be on-going at the time of writing.

Lead Ammunition

Grouse are killed with shotguns using lead shot. Lead is a highly toxic metal that occurs naturally but has been widely distributed by human activity. There is no safe blood lead level below which harmful effects cannot be detected. With most of the previously significant sources of lead in the environment now having been eliminated (such as lead-based paints and leaded petrol), lead-based ammunition is the most significant unregulated source of lead deliberately emitted into the environment in the EU.

In response to growing concerns about the effect of poisoning on humans and wildlife from lead ammunition (e.g. Group of Scientists 2014), the DEFRA and the Food Standards Agency-commissioned Lead Ammunition Group was formed in 2010 with a remit to identify and assess key risks (Lead Ammunition Group 2015).

Almost certainly some **10,000 children** are growing up in households where they could regularly be eating sufficient game shot with lead ammunition to cause them neurodevelopmental harm and other health impairments in the UK.

The Group's findings are due to be published later in 2015 following peer review but a summary of the report (Swift 2015) includes the following statements:

- > Lead is a highly toxic hazard and presents risk at all levels of exposure. It is especially dangerous as a neurotoxin for both young people and for wild animals.
- > Some 6,000 tonnes of lead from ammunition used in shotgun and rifle shooting are being discharged every year. At least 2,000 tonnes of shot used for game and pest shooting are irretrievably and unevenly deposited on or close to the soil surface where it is available for ingestion by birds. It probably becomes unavailable to them quite quickly, though it remains in the soil and substrates for a long time with as yet unknown consequences.
- > Lead from ammunition can (and does) get into wildlife by several routes, mainly by ingestion by many species of bird in mistake for grit or food items, or in scavenged dead animals, or as the prey of some raptors. In areas of intensive shooting lead is taken up by some plants and soil microfauna getting into the food chain, but the research studies that have been done on this latter route are limited.
- > Lead from ammunition causes harm to wildlife and certainly kills some birds. Numbers are hard to be certain about, but almost certainly at least tens of thousands to hundreds of thousands annually in the UK. The welfare effects in these animals, and the larger numbers that ingest sub-lethal doses, are sufficient to cause illness and can be very severe and prolonged for them.
- > Lead shot and bullet fragments can be present in game meat at levels sufficient to cause significant health risks to children and adult consumers, depending on the amount of game they consume.
- > Almost certainly some 10,000 children are growing up in households where they could regularly be eating sufficient game shot with lead ammunition to cause them neurodevelopmental harm and other health impairments in the UK. Tens of thousands of adults are also exposed to additional lead by eating game as part of their normal diet, and this could cause a range of low level but harmful health effects, of which they will not be aware.
- > For human health there is no evidence that existing advice from FSA and other stakeholders has so far reached target groups or affected game eating habits.
- > There is currently no evidence to suggest that the will, funding or resources exist, or are being planned, to develop measures that will ensure that game and venison containing lead levels above those permissible for red meat and poultry do not enter public markets as food.
- > For small game, no proposals have been made to the Group for any measure, short of lead shot replacement, that would ensure that small game entering the food chain do not have elevated lead concentrations.
- > Safer alternatives to lead ammunition are now available and being improved and adapted all the time for use in different shooting disciplines. There is considerable experience from other countries where change has already been undertaken.
- > There is no evidence to suggest that a phase out of lead ammunition and the use of alternatives would have significant drawbacks for wildlife or human health or, at least, none that carry the same scale of risks as continuing use of lead; though there are procedural, technical and R&D issues still to work on and resolve.
- > There is no convincing evidence on which to conclude that other options, short of replacement of lead ammunition, will address known risks to human health, especially child health.

There is no peace here, just a desperate madness to protect the grouse from something that is not really apparent.

Disturbance

Another controversial management technique that has emerged over recent years is the deployment of propane powered gas guns on grouse moors. These are claimed by the CEO of Scottish Land and Estates to be “targeted and proportional” in their use to scare flocks of juvenile ravens (*Corvus corax*) deemed to pose a threat to red grouse (Raptor Persecution Scotland 2015a). However, the use of these bird scaring devices has developed in the absence of any guidance or oversight and there are considerable concerns that their deployment could unlawfully disturb specially protected (Schedule 1 and Schedule 1A) birds, particularly the nesting attempts of hen harriers (*Circus cyaneus*).

As one writer (who supports grouse shooting) observed:

“There is no peace here, just desperate madness to protect the grouse from something that is not readily apparent. Every other second a scarecrow banger goes off somewhere on the grouse moors of Millden estate, but there are few carrion crows and fewer ravens in this part of the glen, certainly not enough to warrant this wartime barrage of gunnery noise.”

(Adam 2015).

There is further concern that their use in some Special Protection Areas, without written consent from SNH, is in contravention of SPA management guidelines. SNH has committed to investigate their use and provide guidance as appropriate (Raptor Persecution Scotland 2015b).



Propane gas gun bird scarers on Hopetoun Estate (Leadhills)
Photo: Raptor Persecution Scotland

Raptor Persecution

There has been a long and well-documented association between raptor persecution and grouse moor management in the UK uplands, dating back to the mid-1800s and continuing to the present (e.g. Anon 2000; Whitfield et al. 2003; Lovegrove 2007; Amar et al. 2012; Avery 2015).

By the early 1900s, the combined effect of persecution on grouse moors (traditionally by poisoning, trapping, shooting and nest destruction) as well as persecution by other groups such as skin and egg collectors (Mearns & Mearns 1998; Cole & Trobe 2000) resulted in dire consequences for many raptor populations. Several species became extinct in Scotland including the white-tailed eagle (Love 1983), goshawk (Marquiss & Newton 1982), red kite (Evans et al. 1997) and osprey *Pandion haliaetus* (Brown & Waterston 1962). Other species in Scotland managed to avoid extinction but suffered severe range contraction as a direct result of persecution, including the hen harrier (Watson 1977), peregrine *Falco peregrinus* (Ratcliffe 1993), golden eagle *Aquila chrysaetos* (Watson 1997) and buzzard *Buteo buteo* (Tubbs 1974).

Full legal protection for all raptors followed with the enactment of the Protection of Birds Act 1954 (with the exception of the sparrowhawk, *Accipiter nisus*, which was afforded protection in 1961). Following a change in society's perception of raptors over the following 60 years, several raptor recovery projects took place in Scotland including white-tailed eagle (Love 1983; 2013) and red kite (Evans et al. 1997) reintroductions.

Further legislation to protect raptors was also introduced during this period including a complex array of Scottish, UK and European-specific laws. These afforded raptor species the high level of legal protection they have today, making it an offence to poison, shoot, trap, destroy nests or recklessly or deliberately interfere with a nesting raptor. Nevertheless, despite progressive societal attitudes and increased legislative protection, raptor persecution continues in the twenty-first century, as evidenced by the long-term data (Table 1)

published by the RSPB and RSPB Scotland (RSPB 2014; RSPB Scotland 2006; 2007; 2008; 2009; 2010; 2011; 2012a; 2013) and more recently by the Scottish Government (Scottish Government 2013; 2014).

These data are routinely challenged by those within the grouse shooting industry as being "exaggerated" (Carrell 2006), "unofficial" (Scotsman 2009) and "speculative" (Scottish Gamekeepers' Association 2013) and one MSP stated in Parliament that the Scottish Conservatives did not accept that raptor persecution was widespread and that he considered it to be "a part real, part imaginary crime" (Raptor Persecution Scotland 2010). Conversely, others have argued that these raptor persecution data can be considered the most accurate, detailed and consistently collected in comparison to other wildlife crime recording in Scotland and that the recording method is scientifically legitimate with a clear indication of interpretative limitations (Tingay 2015).

The full extent of raptor persecution in Scotland is difficult to determine. Wildlife crime in general is widely recognised as being under-recorded (Gavin et al. 2009; Wellsmith 2011) and is accepted as such in Scotland (Scottish Government 2008; 2013; NWCU 2014; Tingay 2015).

The under-recording of raptor persecution crime is largely due to the remoteness of some of the crime locations, especially those in rural areas (i.e. grouse moors) where geographic constraints severely limit the number of potential witnesses. Indeed, what is usually found is the aftermath of a crime, as opposed to the witnessing of a crime in progress. Most evidence, often in the form of victims of the crime, are found purely by accidental discovery (e.g. by passing walkers). It is also known that some perpetrators take extra measures to prevent the detection of their crimes, e.g. by removing injured or dead birds from the crime scene and relocating them elsewhere (e.g. Raptor Persecution Scotland 2011; RSPB Scotland 2012b).

Table1: Number of confirmed poisoning incidents, and number of confirmed and probable incidents of other types of persecution in Scotland 2005-2014.

Incident type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	10yrs total
Confirmed (poisoning)	17	45	35	24	34	26	14	4	8	7	214
Confirmed (other)	17	15	16	12	10	17	14	25	24	15	165
Probable (other)	20	23	25	28	20	11	18	23	10	8	186
Total	54	83	76	64	64	54	46	52	42	30	565

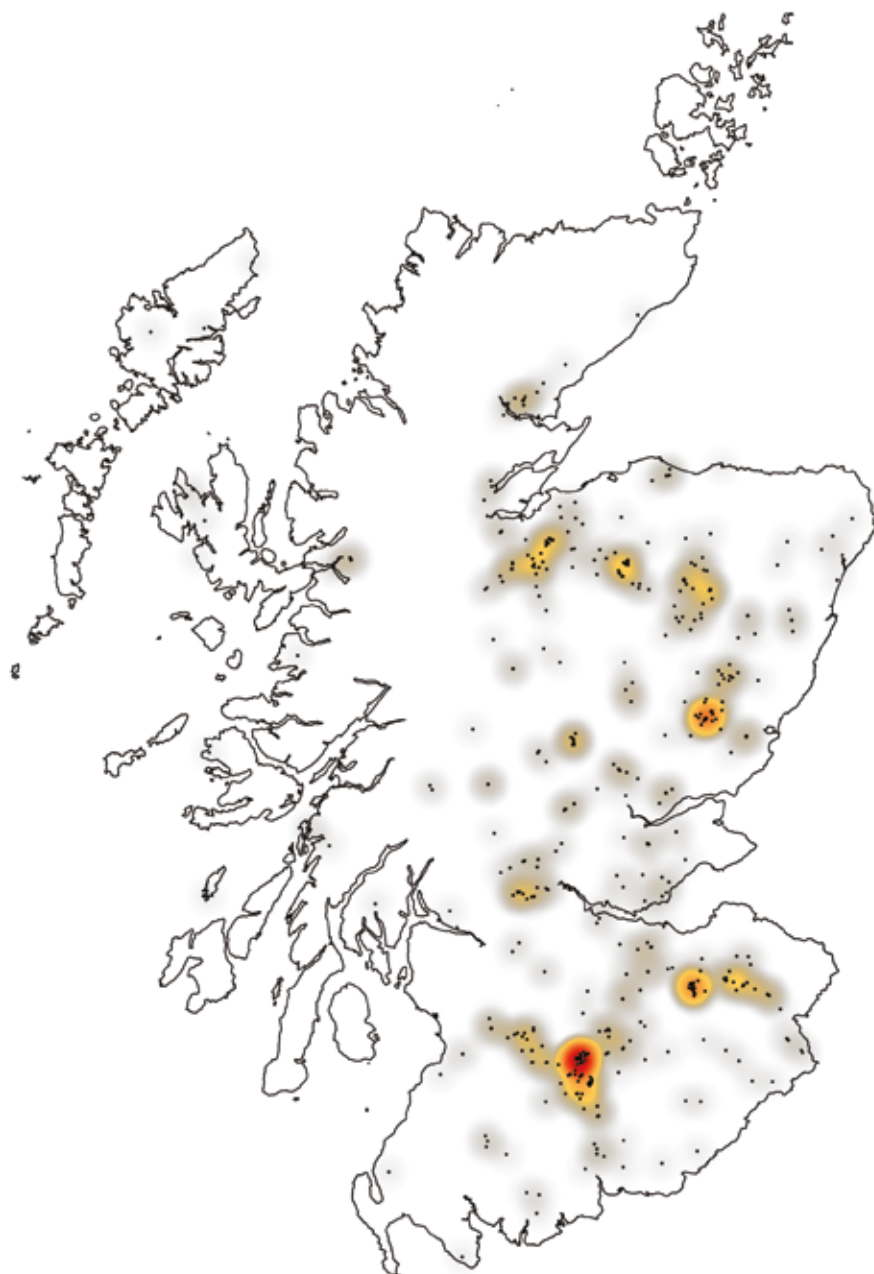
Search efforts that are reliant on such a limited, ad hoc basis, coupled with the social and cultural pressures inhibiting certain sectors of the rural community from reporting persecution incidents will inevitably result in an (unknown) quantity of undetected crimes against raptors.

Raptor persecution crimes that are recorded are often described as representing 'the tip of the iceberg' (e.g. RSPB Scotland 2013), a claim vigorously disputed (Carrell 2006; Scotsman 2008; Edwards 2011) when used to describe the extent of raptor persecution on land managed for 'driven' grouse shooting (grouse flushed towards a static line of shooters). However, there is a significant weight of scientific evidence supporting the contention that those detected represent only a proportion of crimes committed (e.g. McMillan 2011), particularly when the extent of persecution is considered sufficiently high to be constraining the populations of some species at the local, regional and/or national level.

An award-winning scientific study (Smart et al. 2010) highlighted this low probability of detection by demonstrating the number of illegally-killed red kites in a sub-population in northern Scotland. Using population modelling techniques the authors calculated that a total of 166 red kites had been illegally poisoned between 1999 and 2006, but only 41 poisoned carcasses were actually found.

Other peer reviewed scientific studies (based on data collected by the award-winning monitoring efforts of the Scottish Raptor Study Group, (SNH 2009)) have also helped to inform an estimate of the extent of raptor persecution on Scottish grouse moors by examining the severe effect of sustained persecution on the population dynamics of several raptor species. These include the golden eagle (Watson & Whitfield 2002; Whitfield et al. 2004a; 2004b; 2007; 2008; Watson 2010; Watson 2013b); goshawk (Petty & Anderson 1996; Marquiss et al. 2003; Kenward 2006); hen harrier (Etheridge et al. 1997; Green & Etheridge 1999; Summers et al. 2003; Sim et al. 2007; Anderson et al. 2009; Fielding et al. 2011; Hayhow et al. 2013); peregrine (Hardey et al. 2003); and red kite (Carter et al. 2003).

Collectively, these studies render the dispute about the exact number of raptor persecution incidents inconsequential because clearly, raptor persecution on grouse moors in Scotland is sufficiently widespread and prevalent to be causing population-scale impacts. ■



Heatmap of Confirmed and Probable Raptor Persecution Incidents 2005-2014

Using population modelling techniques the authors calculated that a total of 166 red kites had been illegally poisoned between 1999 and 2006, but only 41 poisoned carcasses were actually found.

Economics & Finance

2640

full-time equivalent jobs

average salary of

£11,401

Grouse-shooting is part of a wider shooting economy and whilst there is little doubt that shooting has an economic impact on the Scottish economy, the key question is how much. Wider economic impact studies have been undertaken by Public and Corporate Economic Consultants, the most recent being in 2014 (PACEC 2014).

That report is described as the “*mainstay of the defence of shooting in the UK*” and, in an email to those in Scotland invited to complete it, the Scottish Land and Estates’ Moorland Group Director claimed that,

“The benefits of this new survey will be greatest for Scotland because this time it is combining a study of shooting and stalking related tourism in Scotland. We know that VisitScotland now recognises country sports and we want to press that home to politicians with comprehensive facts.”

If you are a participant in shooting sports, or if you are involved in organising or providing shooting activities, then any information you can give us will be invaluable. The survey can be found here...”

However, the results of this survey relied on self-selected informants (most of whom have a vested interest in securing favourable economic impact results) and the data are not open to independent verification. Economists have pointed to the lack of assessment of displacement and deadweight issues and questioned the reliability of such economic data (Cormack and Rotherham 2014). The authors are aware of a number of individuals who completed the most recent PACEC survey (multiple times in a few cases), none of whom has any involvement in shooting sports, but whose submission was nevertheless recorded with no requirement to prove their identity.

In relation to employment, recent studies have shown that grouse shooting contributes 2640 full-time equivalent jobs and £30.1 million in wages (Scottish Land and Estates 2013). This equates to an average salary of £11,401 which is below the level of the national minimum wage.

Grouse moor management is popularly portrayed as an endeavour that costs considerable sums of money and which inevitably runs at a loss. This is true in a number of instances but it is not a particular revelation to discover that a recreational activity such as this costs money in just the same way as other expensive pursuits such as sailing, horse-racing or motor-sport. But the observation masks the reality which is that grouse shooting is often a profitable business.

It is likely that public subsidies are contributing to this profitability.

The estate agency, Knight Frank publishes an annual Sporting Property Index (SPI). The latest data show that over the ten years 2004 - 2014, grouse moors have outperformed all other sporting properties (deer forests, salmon rivers etc.). The average capital value of a grouse moor over this period increased by 49% which equates to a 4.1% return on capital. The survey noted that returns from a

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

(Knight Frank 2014).

In terms of annual profitability, the most recent study by the Fraser of Allander Institute shows that the percentage of landholdings whose grouse moors made a profit rose from 2.1% in 1994 to 17.6% in 2001 and 42.6% in 2010. Given that many grouse moors are not managed as businesses but as personal recreational assets, it is probable that the majority of grouse moors in Scotland are now operating at a profit (Fraser of Allander Institute 2010).

It is likely that public subsidies are contributing to this profitability. As part of the new system of public subsidies for agriculture paid under the EU Common Agricultural Policy, the Scottish Government sought to exclude sporting estates from being eligible for the area-based basic payments scheme in cases where shooting was carried out and agricultural activities did not account for the majority of the applicant's income. However, the EU rules on the so-called 'negative list' (which typically includes land such as airports and sports grounds) do not at present allow such a move. Sporting estates and grouse moors are eligible for payment of an annual basic payment provided they meet minimum qualifying criteria for agricultural activity.

Grouse shooting estates are therefore eligible for farming subsidies and, since managing a sheep flock is an agricultural operation (even though its principal purpose is mopping up ticks), many should be eligible for substantial subsidies. In the case of Glenogil Estate (see Box on page 10) this exceeds £300,000 per year in public subsidy and other estates are likely to be eligible for similar amounts. Such agricultural operation can then also be used to justify the necessity for more extensive and intrusive roads being constructed in the hills. ■

Notes

- (1) For an account of this process, see <http://www.fieldsportsmagazine.com/Shooting-Grouse/grouse-religion-at-glenogil.html> (accessed 16 September 2015).
- (2) Permitted Development Rights represent a statutory exemption from the requirement to obtain planning consent for certain classes of development.

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