

# Nature's gain

How gamebird management has  
influenced wildlife conservation

A report from The Game

Conservancy Trust

July 2005

[www.gct.org.uk](http://www.gct.org.uk)



THE GAME  
CONSERVANCY  
TRUST

# Credits

Author:  
Stephen Tapper BSc, PhD

Editorial assistance:  
Louise Shervington

Design & layout:  
Sophia Miles  
Natterjack Publications Limited  
Hansel Cottage  
Woodcutts  
Salisbury  
SP5 5RP  
01725 552685  
smiles@natterjackpublications.co.uk

Printing:  
Friary Press  
Bridport Road  
Dorchester  
DT1 1JL  
01305 265656



© The Game Conservancy Trust.  
July 2005. All rights reserved.

The Game Conservancy Trust  
Fordingbridge  
Hampshire  
SP6 1EF  
01425 652381

[www.gct.org.uk](http://www.gct.org.uk)

# Contents

Executive summary	4
Introduction – the world agenda	6
Conservation or protection – good taste but poor insight	8
Box – Wise use	10
Upland moor – a cultural landscape	12
Preserving moorland	13
Preventing deterioration	14
Over-grazing	14
Poor burning	14
Maintaining habitat	15
Bird life on grouse moors	16
Box – Grouse moor bird survey	17
Box – Birds of prey and grouse	21
Woodland – new life for an ancient asset	22
Pheasant woods today	25
Box – Woodland management and flowers and butterflies	27
Farmland – the forgotten Neolithic ecosystem	28
Rearing and releasing gamebirds	31
Box – The disappearance of undersowing	32
Restoring the cereal ecosystem	33
Box – Allerton Farm, Loddington – farming, game and wildlife	37
A final thought – the role of the gamekeeper	38
References	40

# The Game Conservancy Trust

The Game Conservancy Trust conducts scientific research into Britain's game and wildlife. We advise farmers and landowners on improving wildlife habitat and we lobby for agricultural and conservation policies based on science.

Many of our supporters take part in field sports. They invest in managing wildlife habitat in the countryside. This improves biodiversity and represents a philosophy of "Conservation through wise use".

The Game Conservancy Trust charitable objects are:

- o to promote for the public benefit the conservation and study of game species, their habitats and the other species associated with those habitats;
- o to conduct research into the ecology and biology of game species and their environmental requirements and to publish the useful results of such research;
- o to advance the education of the public in game biology and the conservation of game (especially, but not exclusively, in the conservation of game as a sustainable resource).

We employ some 14 post-doctoral scientists and 50 other research staff with expertise in such areas as ornithology, entomology, biometrics, mammalogy, agronomics and fisheries science. We undertake our own research as well as projects funded by contract and grant-aid from Government and private bodies. In 2004 we spent £2 million on research.

*Burgate Manor, Fordingbridge – headquarters of The Game Conservancy Trust. (Stephen Tapper)*



# Executive summary



*Cotton grass on Pennine blanket bog.  
(Stephen Tapper)*

- o Conservation is not about protecting nature from the hand of man, it is about managing our fauna and flora so that it sustains us physically and spiritually.

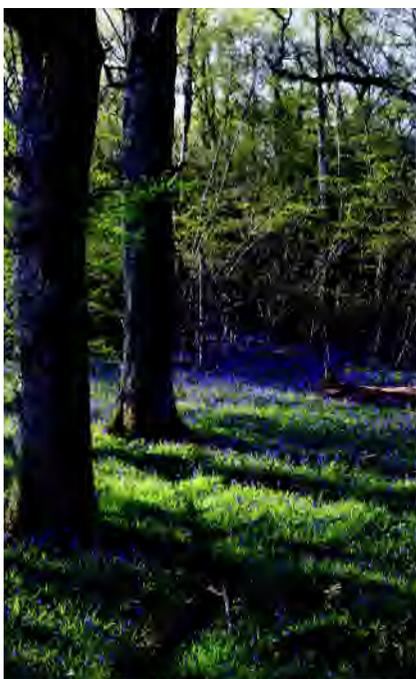
## **Moorland issues**

- o The scale of upland forest planting at the expense of heath and blanket bog would have been far longer had it not been for grouse shooting. This has been acknowledged by Scottish Natural Heritage.
- o On a landscape scale, grouse moors and deer forests are doing better than elsewhere at maintaining upland heath and mire.
- o Moors managed for grouse typically have five times as many golden plovers and lapwings as other nearby moors and about twice as many curlews.
- o Curlews are about 18 times more abundant in the North Pennines Special Protection Area, which is managed for grouse shooting, than they are in the Berwyn Special Protection Area, a large part of which is managed as a bird reserve.
- o Breeding golden plovers, dunlins, lapwings and curlews are disappearing throughout much of England and Wales. Only on grouse moors do breeding distributions remain relatively stable.
- o The merlin, Britain's smallest bird of prey, is almost twice as common on grouse moors as it is on other upland moors.

## **Woodland issues**

- o During the century from about 1870 to 1970, pheasant shooting was a key motive for retaining and managing woods in lowland Britain. This motivation was at its height in Edwardian England when around 25,000 professional gamekeepers were in full time employment (roughly five times as many as today). Without this motivation there is little doubt that the economic pressure exerted by governments through grants and tax concessions for forestry would have turned most decent sized lowland woods into conifer plantations.
- o 61% of properties that released pheasants also undertook new woodland plantings.
- o One case study showed that woodland managed by coppicing and ride cutting had a richer ground flora and butterfly fauna than woodland that had been neglected

*Hazel coppice with oak standards.  
(Sophia Miles/Natterjack Publications Limited)*



or managed solely for timber. Such management is typical of woodland kept for pheasant shooting.

- o The management of woods for pheasant shooting results in higher numbers of songbirds and woodland butterflies. Even the large numbers of pheasants put into release pens seem to only have a short-lived effect on the local ground flora.

#### **Farmland issues**

- o Game biologists were pioneers of wildlife research on arable land and were first to recognise the repercussions of the indirect effects of herbicides on the invertebrate and bird fauna.
- o Thousands of hectares of game crop and thousands of tonnes of grain put out for pheasants and partridges help many songbirds over winter.
- o Conservation headlands, invented to improve the survival of gamebirds, now offer the last hope for saving the ancient Neolithic flora of cereal fields on a wide scale. Thankfully they are now part of the Environmental Stewardship.
- o Our demonstration farm in Leicestershire, where modern farming is combined with conservation and game management, has shown the following in 10 years:
  - Autumn numbers of wild pheasants increased from less than 150 to over 600.
  - Numbers of brown hares increased by more than 10 times.
  - Overall songbird numbers more than doubled, while the trend in numbers on nearby farms continued to decline. As examples, between 1992 and 2001 the following increases in numbers of breeding pairs were recorded: wren 47 to 141; dunnock 46 to 144; robin 54 to 110; blackbird 66 to 143; song thrush 14 to 64; whitethroat 25 to 45; blackcap 19 to 38; chiffchaff two to 10; willow warbler 28 to 45; spotted flycatcher eight to 14; chaffinch 135 to 229.
  - Harvest mice have thrived in the field margins and especially in the beetle banks planted with the long-stemmed grass, cock's-foot.
- o The Game Conservancy Trust's Allerton project at Loddington illustrates how the abundance of nationally-declining farmland bird species can be doubled in less than five years. Farms that adopt this game management strategy will be able to deliver Defra's Public Service Agreement on a local scale.

*Mixed arable land at Loddington in Leicestershire.  
(Sophia Miles/Natterjack Publications Limited)*



# Introduction – the world agenda



Beavers, now abundant throughout Canada, are harvested in a highly regulated and sustainable fashion. (Stephen Tapper)

Any nature conservation that game management provides is, of course, largely incidental to the business of making sure that there are enough birds around for the shooting season. That said, shooting people are not oblivious to the wildlife that flourishes on their properties and most will do everything possible to encourage it. In reality the deepest pleasure that one takes from any field sport is a sense of being there, participating in life, and not being a spectator.

The concept of *conservation through wise use*, that we shall explain, is not a trumped up idea to justify shooting – it has strong international conservation roots. Developed in the early 1970s in an effort to conserve world biodiversity in the face of industrialisation and population growth, the first global initiative was the *World Conservation Strategy*. This was published in 1980 by the International Union for the Conservation of Nature and Natural Resources (IUCN) in collaboration with United Nations Environment Programme (UNEP), the World Wildlife Fund (WWF), the Food and Agriculture Organisation of the United Nations (FAO) and the United Nations Educational, Scientific and Cultural Organisation (Unesco). This set out three objectives:

1. **To maintain essential ecological process and life-support systems**. Clean air, water and soil – allowing biological systems to function and nutrients to re-cycle.
2. **To preserve genetic diversity**. Natural diversity like rain forests and coral reefs – but also the many varieties of crop and livestock that man has developed over millennia.
3. **To ensure the sustainable utilisation of species and ecosystems**. Fisheries, wildlife, forest and grazing resources - which are maintained and not depleted.

This strategy was built into the *Rio Convention on Biological Diversity* (1992) which included in Article 6 a requirement to develop national strategies for the “*conservation and sustainable use of biological resources*”. Actions were drawn up under a protocol called *Agenda 21*, and as in the convention, where wildlife conservation is referred to, it is accompanied by the phrase “*sustainable use*”. Thus the sustainable use of wildlife has been internationally recognised as a conservation principle for over a generation. It has gained acceptance because, fundamentally, all life on the planet is interdependent, and because giving wildlife a value can encourage its preservation – provided the uses are well defined through regulation or property rights. *Wildlife stays if wildlife pays*. Non-consumptive uses, like bird watching, are promoted by some as being more benign than consumptive uses, such as gamebird shooting. However, sometimes the reverse is the case because consumptive uses may have a higher value to local communities and leave a smaller environmental foot-print than non-consumptive uses.



Poorly regulated fishing has led to the chronic over-harvesting of many species. (Laurie Campbell)



For instance, a study by IUCN showed that trapping for furs by native Americans in Canada was a more sustainable use of wildlife than were monkey-watching tours in tropical rainforest.<sup>2</sup>

Although the Government has acknowledged that game management does contribute to conservation<sup>3</sup>, it has yet to embrace it as mainstream. This was evident in its progress report on *Agenda 21* for the Johannesburg Summit in 2002, which makes no mention of sustainable use<sup>4</sup>. This was a lost opportunity. In this report, we will show that:

- o Upland heather moor (a habitat of international importance) has been better conserved on properties that manage grouse for shooting than it has elsewhere.
- o Upland wading birds breed in much higher numbers on grouse moors than on other upland moors.
- o The EU Birds Directive, which requires the Government to designate Special Protection Areas (SPA) for important bird species, has resulted in all the main English grouse moor areas being designated as SPAs. Big national parks, on the other hand, like Dartmoor and the Lake District, where there is virtually no game management, simply don't have enough birds.
- o Pheasant shooting has been a key incentive for managing and retaining lowland woods over the last 100 years, and has prevented many from being ripped out for agriculture or replaced by conifer plantations.
- o The management of woods for shooting, with rides and glades, improves the numbers of butterflies and some songbirds.
- o Game crops planted for pheasants and partridges help sustain many farmland songbirds in winter as well.
- o Field margins managed for gamebirds provide a refuge for butterflies in the countryside, and help to conserve the last relics of an ancient Neolithic weed flora.

*Grouse shooting is sustained because of good management and a carefully calculated harvest for each moor annually. (Keith Sykes)*

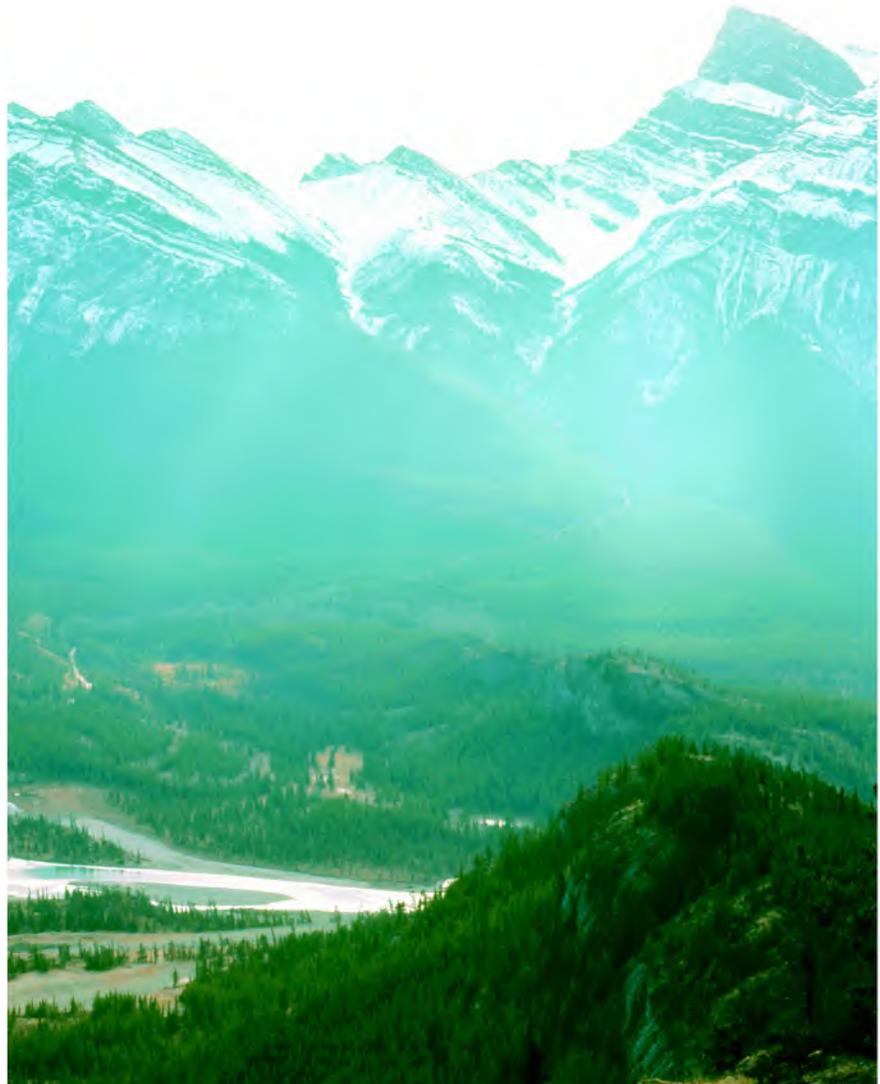
Although opportunities are lost, others present themselves. The new integrated agency *Natural England* gives the Government this new opportunity. We hope it will work with game interests to provide better conservation and not regard shooting as a land-use at odds with its objectives. Field sports get no government help, nor do they seek it. In the main they would prefer to be left alone. Regulations designed to protect wildlife sites and species must be framed with good reason and based on science. For the first time, probably since the war, a more benign agricultural policy, based on area payments and enhanced agri-environment schemes, is in place which does not reward unrealistic production. Farm payments and stewardship schemes are not there to support gamebirds – nor should they be. They are there for land management and nature conservation for the public good. The fact that prescriptions for nature conservation and game management often coincide is unsurprising as they are built on the same ecological principles.

# Conservation or protection – good taste but poor insight

In 1868, John Muir, a native Scot whose family had immigrated to Wisconsin when he was a child, set out to see the frontier lands of the American west. Travelling from the west coast of California across the Sierra Nevada and eventually into Yosemite, he was overawed by the landscape and the wildlife. This began a career of writing and travelling into many other wilderness areas, both in the United States and other parts of the world. For him, like Thoreau before him, the mountains of the American far west were a pristine world where Indians lived in balance with their natural surroundings. Through his writing he championed the cause of saving remnants of this wilderness before they were lost forever to encroaching civilisation. John Muir thus became the first conservation hero of modern times.

Although, without doubt, the setting up of national parks – especially in the sparsely inhabited regions of Africa and America – has been a conservation triumph in retaining diverse and spectacular fauna and flora, John Muir's essential premise that these parks are examples of pristine wilderness has turned out to be flat wrong.

This error has been explored by Stephen Budiansky<sup>5</sup>, who pointed out that in Yellowstone the park authorities are coming to the conclusion that their wildlife needs to be properly managed – something one wouldn't have expected if it were in a primeval natural balance. Actually John Muir should have been more perceptive. 65



*The Rocky Mountain continental divide west of the Big Horn River. Was this a pristine wilderness that white man discovered or a region that had lost its native people? (Stephen Tapper)*

years earlier, in 1803-5, when Lewis and Clarke led the first expedition into the Rocky Mountains, they made the first white contact with Shoshone Indians to secure horses for their portage across the continental divide<sup>6</sup>. As it was already known that the endemic American horses became extinct in the Pleistocene<sup>7</sup>; the horses in question were, of course, stock derived from Spanish settlers two and half centuries previously. Later Lewis and Clarke's encounters with the aggressive Blackfoot tribe were with natives armed with muskets that they had obtained from the Canadian North West Company. Thus trading between neighbouring tribes certainly changed Indian cultures generations before they met their first white men – and certainly long before John Muir encountered them.

The effect of trade, however, is of small consequence compared with the effect of disease. Archaeology in recent decades has revolutionised our understanding of aboriginal American cultures. Until recently it was thought that the aboriginal peoples of North America numbered some one million prior to Christopher Columbus. This implied a thinly dispersed human population with a very light imprint on the landscape – fitting entirely with John Muir's perception of the noble savage. Now we recognise that, for example, the lower Mississippi held a densely populated, extensively farmed, and sophisticated kingdom similar to that of the Inca or the Aztec. It now seems that 20 million is a more likely population figure for pre-Columbian North America<sup>8</sup>.

The largely unnoticed disappearance of some 19 million North American Indians clearly needs some explanation. Jared Diamond<sup>8</sup> in reviewing this evidence concludes that it was primarily European diseases like smallpox, that triggered the pandemics that swept through the Indian tribes of North and South America, sometimes years before their existence was even recorded for the western world. Although the exploits of Pizarro and Cortez are notorious, the effect of Spanish germs was far more deadly. In short, America was not a pristine wilderness before Columbus, but a developed land, supporting a substantial population.

America is not the only case. The fabulous East African game reserves and national parks of the Masai Mara, Serengeti and Ngorongoro are not the unaltered relics of a vast original savannah – the cradle of mankind as a hunter gatherer. They, too, appear to have once been more densely populated by Bantu tribes. Catastrophe befell these people in the 1890s when their livestock was wiped out by the viral disease, rinderpest, introduced in cattle imported from India into Somalia<sup>9</sup>. The disease swept southwards reaching the Cape after a few years. Throughout Africa, rinderpest decimated native wildlife and livestock leaving the tribes that depended on them starving to death. Some 5.3 million cattle died in South Africa alone – 90% of Kenya's buffalo were wiped out and the bongo nearly became extinct. The wide open plains of East Africa encountered by early 20th century white hunters and pioneer African conservationists like Bernhard & Michael Grzimek<sup>10</sup> were not therefore a pristine landscape left largely to nature, but one from which its native people had been recently decimated.

Wherever we look we find increasingly that the hand of man has been writ large on the landscape. More than this, it now seems likely that our farming activities have been altering world climate for at least the last 8,000 years, and to such an extent that if it hadn't been for our agriculture we would now be coping with a new ice age<sup>11</sup>.

More than 70 years ago, Aldo Leopold, the American father of game management as a science, tried to explain this idea to people who thought game stocks would look after themselves and all one needed to do was exercise care when hunting them. Leopold, as ever, was polite and to the point...

*“There are those who shy at the prospect of a man-made game crop as something artificial and therefore repugnant. This attitude shows good taste but poor insight. Every head of wildlife still alive in this country is already artificialised, in that its existence is conditioned by economic forces. Game management merely proposes that their impact shall not remain merely fortuitous. The hope for the future lies not in curbing the influence of human occupancy - it is already too late for that - but in creating a better understanding of the extent of that influence and a new ethic for its governance.”*

**Aldo Leopold** (1933). In: *Game Management*<sup>12</sup>



*Giraffe at Tarangire. Rinderpest wiped out the livestock in East Africa in the 1890s leaving a savannah deserted of native people and their cattle. (Stephen Tapper)*

The point of all this is that conservation is not about protecting nature from the hand of man, it is about managing our fauna and flora so that it sustains us physically and spiritually.

Following Leopold's thought, one such ethic is that of *conservation through wise use*. As it relates to game shooting in Britain, this ethic contains two essential elements.

The first element, expressed in the phrase *wise use*, is the idea that a harvest of wildlife can only be taken wisely if it is done in an optimum sustainable way. This is not an empty phrase, but a sound concept based on the science of population ecology. The theory is explained in *Wise use*, below, which shows why it is that wild populations can be culled year after year without harming their numbers, and also why managed game populations are often more abundant, even after they have been culled, than populations that are not managed and never culled.

The second element is embodied in the two words *conservation through*. This is an assertion that the game management put in place to support wise use acts to conserve not just the game, but elements of the wider environment too.

It is this second element, the game management link to the conservation of wildlife, that we explore in this report.

## WISE USE

The term *wise use* when applied to harvesting game populations for shooting should be based on the concept of the *optimum sustainable yield*. This is derived as follows:

- o Many animal populations are stable over time and have reproduction and death rates that exactly balance each other. This happens because natural resources (eg. food supply, nesting habitat) are limited and as these resources are used up and competition for them intensifies, the mortality rate increases (*density dependent mortality*) and fecundity reduces (*density dependent natality*). This *density dependence* maintains the population around a stable equilibrium level.
- o If such a population is subjected to regular hunting its numbers will be reduced, but this reduction will in turn free-up resources that either lower the natural mortality rate or increase birth rate. Thus, a regularly hunted population will also be stable, but at a lower level than otherwise would be the case.
- o As the proportion of the population that is killed by hunting is increased, the level at which the population stabilises becomes lower. With a lower population the number of breeding individuals is reduced – even though they may be breeding at a faster rate. Thus there are two opposing tendencies in operation, a shrinking breeding stock and rising productivity, which together determine the number of animals that can be killed sustainably at a given level of hunting.
- o Clearly the maximum number that can be hunted each year will be achieved when the largest number of birds is breeding at the fastest possible rate. This is termed the *maximum sustainable yield* and is most elegantly presented as one of the points on the curve in Figure 1.
- o Because of vagaries in ecological systems, culling and harvesting strategies are usually set at a rate somewhat lower than the maximum sustainable yield – this is the *optimum sustainable yield*.

The above explanation applies to most harvesting of wildlife populations whether they are fish, birds or mammals. It should also be noted in passing that other similar relationships also apply. For example it is common, especially in relation to fisheries, to relate the catch rate to fishing effort. Here, exceeding the maximum sustainable yield is termed *over-fishing* and is characterised by an increasing effort, a declining catch per unit of effort and a low and even declining stock.

### **Managed and unmanaged populations**

When populations are subject to game management some additional factors also apply.

- o Game managers (gamekeepers and others) try both to enhance the productivity by providing better breeding habitat and more food, and reduce the natural mortality due to predators and disease.
- o In Europe this has worked best with the resident game species, as a gamekeeper can protect his local population year round and because the economic benefits of a higher bag are also local.



Red grouse hen. Grouse on managed moors, where shooting takes place, are much more abundant than where they are not managed and not shot. (Laurie Campbell)

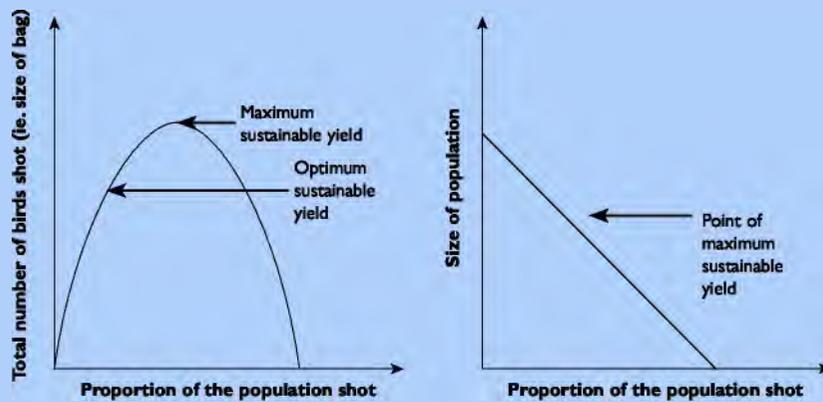


Figure 1

Graphs showing the relationship between the average annual bag and the proportion that is shot each year (left) and the same population showing the relationship of the breeding stock to the proportion shot (right).

In the left-hand graph the left side of the curve shooting a higher proportion of the population produces a higher bag. However, on the right side, beyond the point of maximum sustainable yield, increasing the proportion of the population shot leads to diminishing returns as the breeding stock is reduced further. Note however, that shooting beyond the maximum sustainable yield leads to low bags and low stocks – it does not necessarily lead to declining stocks, although it may. In the right-hand graph the stock is at maximum when none are shot and declines steadily with increased shooting until it is reduced to zero. This relationship is not always linear and the maximum sustainable yield not always at the mid point.

These graphs represent averages over years; they are not time series. So a population can remain stable at all points along the curve on the left and the straight line on the right – it is just that on the right-hand side of these graphs harvesting is very inefficient. Over shooting will only endanger the population if the proportion that is shot increases each year. Note that this will occur if the same number of birds are being killed annually while the breeding stock is declining.

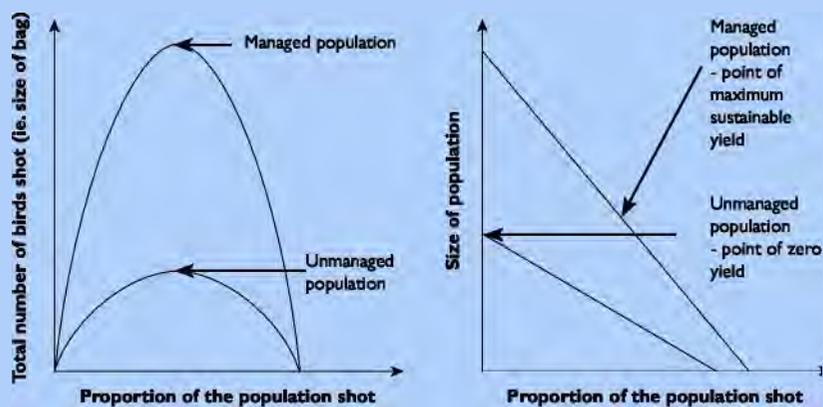


Figure 2

Graphs showing how the maximum sustainable yield differs between managed and unmanaged populations in relation to bag (left) and size of population (right)

In the left-hand graph increased productivity and reduced (non-hunting) mortality mean that yields of managed populations are much higher than unmanaged ones. The right-hand graph shows that further, in many instances, the managed bird populations are maintained at much higher densities – even after hunting – than are unmanaged ones with no hunting at all.

# Upland moor – a cultural landscape

The bulk of Britain's uplands are treeless. This contrasts with other parts of the world at similar latitudes where, with increasing elevation, mountains are generally forested up to a point where exposure, cold and wind hamper tree growth and forest gives way to alpine tundra. Although such habitats do exist in parts of the Cairngorms and are inhabited by typical alpine birds like ptarmigan and dotterel, the rest of our upland is mostly an ancient de-forested zone.

Deforestation by burning probably began in the uplands as early as the Mesolithic (9,000 to 4,500 years BC) and then may have included natural fires caused by lightning as well as those set by man<sup>13</sup>. So it is possible that fires were started by hunting people, rather than farmers, much in the way that Indians throughout North America set fires to improve accessibility for game hunting and to protect themselves from ambush<sup>5,14</sup>. Later, farming communities cleared the forest for grazing and many areas that are now entirely unsuited to anything other than extensive rough grazing were enclosed as farmland. The ancient 'Reeve field' systems of Dartmoor run through land that is now heather-dominated moor. There, it seems, that following forest clearance, a period of heavy livestock farming led to erosion, leaching soils and the formation of iron pans giving the acid podzols typical of this bare landscape<sup>14</sup>.

Thus our uplands became dominated by moorland plant communities of heath and mire<sup>15</sup>. Many of the characteristic plants such as heather (*Calluna*) are probably part of former shrub communities that are adapted to the forest floor or forest glades rather than open ground<sup>16</sup>. This open landscape has been largely maintained by grazing and burning for sheep and cattle. But, over the last century, most of the burning has been done by gamekeepers improving the habitat for grouse.

Professor Charles Gimingham of Aberdeen University, and a leading authority on moorland ecology, has described moorland as a "cultural landscape"<sup>16</sup> – emphasising the role of man in its creation and maintenance. Floristically interesting, it has become one of the most widely studied habitats in Britain – no doubt because it has been subject to less agricultural change than some of the others. The moorland plant communities and their associated fauna are now habitats of high nature conservation value. There are two main conservation issues in relation to moorland:

*From Grinton moor looking across Swaledale. In the foreground is a typical patchwork of heather stands produced by muirburn for red grouse. (Stephen Tapper)*

1. Preservation in the face of alternative land uses.
2. Appropriate management to prevent deterioration.



**Preserving moorland**

Since the Second World War, both upland and lowland moors have been eroded because they have been undervalued and, indeed, often regarded as virtually derelict land. Thus areas were fertilised for grazing, planted for forestry, stripped of their peat, built-on, or destroyed by excavation. Gimingham<sup>17</sup> shows as an example how the Dorset heaths have been whittled away to a fragment over the last 150 years. This loss has been pan-European. Some 60-70% of moorland has been lost in Denmark and Sweden<sup>17</sup>, and the Netherlands now has only 5% of the heather it had in 1835. Britain, almost alone, has been able to retain a substantial proportion of its moorland because of its importance for grouse shooting. Gimingham summarised it thus:

*“Only in regions where there was still a use for heathlands as grazing land or for sport (particularly Scotland and upland England) or where climate or terrain preclude conversion (for example in coastal regions of northern France) do extensive tracts of heathland survive.”*

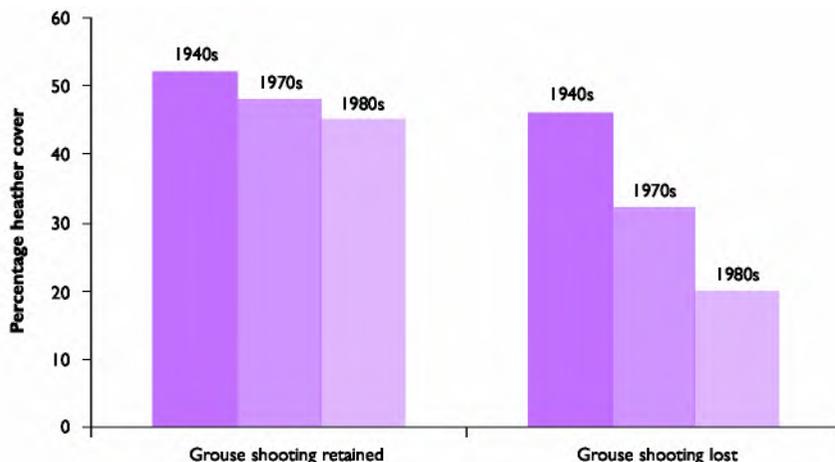
**Charles Gimingham** (1981) in *Conservation: European heathlands*<sup>17</sup>

What there has been of moorland preservation owes little thanks to government. Indeed up to the 1980s, successive governments were encouraging a switch in upland land-use, away from moorland managed for sheep and grouse, to one dominated by forestry. This was done both directly through the Forestry Commission and indirectly with tax-breaks to land-owners. Against this pressure, grouse shooting remained as the main economic alternative. Further, unlike farming and forestry, game management received no subsidy or public funding. Without subsidy, switching land from grouse moor to forestry was clearly uneconomic. It required high capital investment (nearly £ 1,000 per hectare at 1974 values) and produced a rate of return on capital of only 5.6% – very low in relation to interest rates at the time<sup>18</sup>. On the other hand, maintaining land as grouse moor not only provided annual rent, but an accruing capital value as well. This is because grouse moors are valued on the average number of grouse that can be shot annually expressed in pounds per brace. In 1974 these values were increasing at roughly 12.5% per annum<sup>18</sup>.

Because of subsidy, by the 1980s large areas of upland moor were being enclosed for forestry. Over a 30-year period, Scotland lost 18% of its heathland and 8% of blanket mire – some 62% of this to forestry<sup>19</sup>.

This loss can be illustrated by landscape changes that show up in aerial photographs. Figure 3 shows changes to the extent of heather in Scotland on land that has been retained as grouse moor and land that hasn't.

In the end, however, it was the proposal to plant massive areas of the Sutherland flow country that caused conservation groups to begin mounting serious resistance. The reaction of the Forestry Commission has been to promote a more bio-diverse and more landscape-sensitive approach to planting – even though it continues to seek government support. However, the rationale for this support has shifted from an argument based on economic investment, to one based on amenity, and on the curious notion that because most countries in central Europe have a lot of forest, Britain should too.



Nature's gain

There is little doubt that the scale of upland forest planting at the expense of heath and blanket bog would have been far worse had it not been for grouse shooting. This has been acknowledged by Scottish Natural Heritage<sup>21</sup>.

*“Without grouse-moor managers, most of our ‘better’ moorland areas would perish. Heather – and the very heaths and moors which we now cherish – would peter away.”*

**Magnus Magnusson** (1995), then Chairman of Scottish Natural Heritage. In: *Foreword to Heaths and Moorland: Cultural landscapes*<sup>21</sup>

**Figure 3**

An analysis of aerial photographs from the National Countryside Monitoring Scheme in Scotland. A random sample of sites photographed in 1940 showed that 49% were being managed as grouse moors, of these, 57 sites remained as active grouse moors and 46 had given up grouse management by the 1980s. Over this 40 year period the grouse moors lost 24% of their heather cover, whereas where the grouse shooting was lost, the heather cover had been reduced by 41%. From a study by Robertson, Park & Barton<sup>20</sup>.

### Preventing deterioration

The increasing ecological interest in moorland plant communities followed Sir Arthur Tansley's classic work on Britain's vegetation<sup>15</sup>. These studies culminated in 1991 with the completion of a detailed national classification of plant communities financed by the Nature Conservancy Council and later by the Joint Nature Conservation Committee (JNCC). This classification, edited by John Rodwell, recognised two basic types of moorland plant community; mires and heaths<sup>22</sup>. The former are water-logged areas and characterised by the accumulation of peat over time. The latter are dry, typically have little or no peat, and have grey leached podzols usually with an iron pan some inches down the soil profile. Within these broad categories there are 38 different communities of mire and 22 communities of heath. By no means all of these are found in the uplands – but many are. Communities are given names based on the predominant plant species they contain; thus a common heath community is *H9 Calluna vulgaris – Deschampsia flexuosa* – taking its name from heather and the wavy hair grass. Among the mires *M 19 Calluna vulgaris – Eriophorum vaginatum* is basic blanket bog where water-logged peat is covered by heather and cotton grass. This large range of plant communities not only encouraged concern about their potential loss, especially to forestry, but also how they should be managed in future. As a consequence the *Upland Heathland – Habitat Action Plan* was launched in 2000.

The Action Plan identified two factors particularly, which would cause the deterioration of existing shrub heath; over-grazing and poor burning.

### Over-grazing

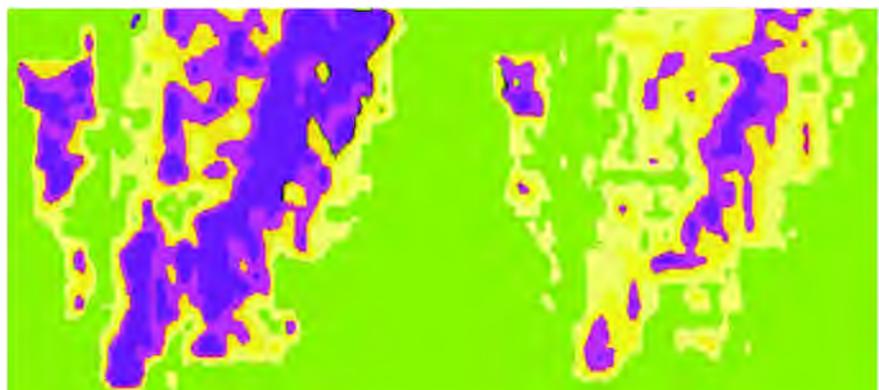
This typically causes a shift from shrub-dominated heath to grass-heath often dominated by mainly unpalatable matt grasses such as *Nardus*. This not only reduces the moor's wildlife interest but the farming use as well. Steve Redpath and Simon Thirgood show a good illustration of this at Langholm Moor in south Scotland<sup>23</sup>. Heavy grazing by sheep, especially during winter when they were fed with hay along the lower hillside slopes, killed off the heather so that, over time, the line between grass and heather gradually retreats up the hill. At Langholm this caused a 48% loss of heather over a 40-year period (see Figure 4).

### Poor burning

The Action Plan claims that too large and too frequent burning causes a loss of habitat structure and lower plant species (mosses and lichens) that can lead to peat erosion. Although some burning is done by graziers, most heather burning – called muirburn – is done as part of grouse moor management. Gamekeepers burn heather in small (25-metre wide) strips every few years so that the moor takes on a patchwork of different aged stands of heather<sup>24</sup>. A gamekeeper will aim to burn heather stands before they reach knee height and before the plants become old and woody. This burning rotation ensures that there is always enough of different ages of heather for grouse to feed on and nest in. There are two main reasons for not allowing plants to become old. Firstly, when they are eventually burnt they fail to regenerate from the root stock and so the burnt area must grow again from seed – which can take some time. Secondly, because old plants are woody they carry a high fuel load and any fire will be very hot and could set alight and destroy the peat substrate. Stands of long

**Figure 4**

Heather cover on Langholm moor in 1948 (left) and 1988 (right) assessed from aerial photographs. Purple colours represent more than 50% heather cover, yellow to green less than 50%. Adapted from Redpath & Thirgood<sup>23</sup>.





*Most burning takes place in a short spring season when conditions become just dry enough to burn safely. (Laurie Campbell)*

*Heather will regenerate from seed or from the root stock, provided the plant is not too old or the burn has not been too hot. (Laurie Campbell)*

heather therefore represent a fire hazard, especially in areas with public access, and are best avoided through regular cool burns.

Currently English Nature has classified over 30% of the upland Sites of Special Scientific Interest as being in unfavourable condition because of poor burning<sup>25</sup>. Most of this land is owned and managed for grouse. Thus, at present, there is a genuine difference of view between what the statutory conservation agency wants and what the grouse moor manager is seeking to achieve.

#### ***Maintaining habitat***

In broad terms grouse moors are retaining upland shrub heath better than upland areas elsewhere. The Habitat Action Plan calls for dwarf shrub cover to be increased to at least 25% cover where it has previously been reduced or eliminated. Figure 5 shows the distribution of this habitat based on land cover maps published in the Government's Countryside Information System<sup>26</sup>. This illustration shows shrub-dominated montane heath (mainly heather) compared with rough grass. All the important grouse-producing, and, in Scotland, deer stalking areas, are mostly dominated by the shrub heath, whereas in other districts this shrub heath remains only in small fragments or has otherwise degenerated to rough grass sheep-walk. Peter Hudson<sup>27</sup> obtained data from 206 properties that shot grouse in the Scottish Highlands, 51 in the Southern Uplands, 80 along the Pennine chain including the Peak District and Bowland fells, 12 on the North York Moors, but only five in the whole of Wales and none at all in the Lake District or South West England. A more recent survey of upland grouse moor and deer forests, led by Julie Ewald<sup>28</sup>, included 229 in Scotland, 139 in England and only three in Wales. In considering the Habitat Action Plan objective of retaining 25% cover of shrub heath it is worth comparing in Figure 5 the Lake District National Park, where this is no grouse shooting, with the North York Moors National Park, which is almost entirely made up of grouse shoots.



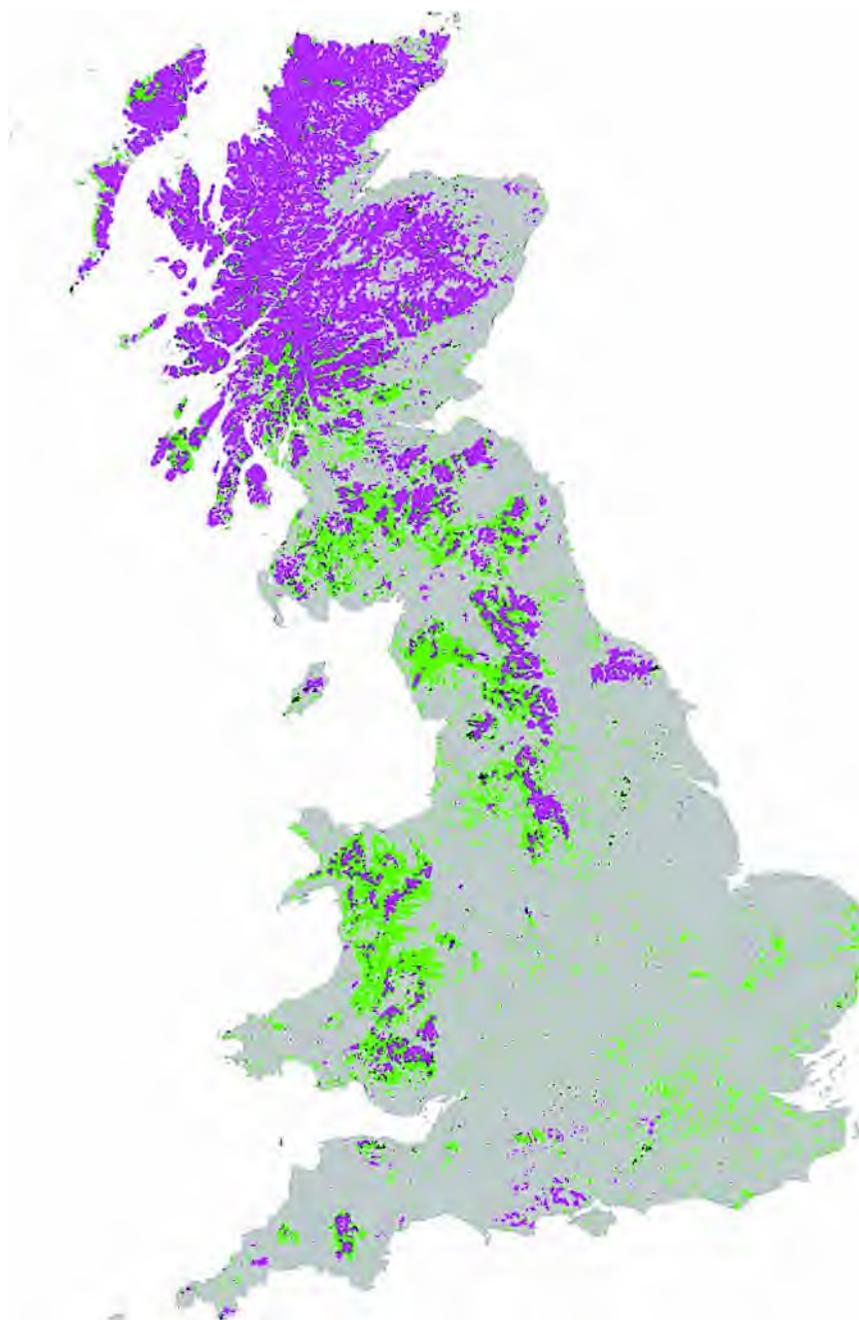
**On a landscape scale, grouse moors and deer forests are doing better than elsewhere at maintaining upland heath and mire.**

**Figure 5**

Montane heath that has been maintained at more than 25% cover (purple) compared with rough unimproved grass. Map calculated from the Countryside Information System using the 2000 land cover map and habitat classification<sup>26</sup>.



*Cotton grass – a typical plant of wet blanket bog.*  
(Laurie Campbell)



#### **Bird life on grouse moors**

Although advocates of grouse moors have long argued that the uplands provide habitat for a range of bird species, this is not a universal view. In a review of the evidence available up to the early 1990s, Andy Brown and Ian Bainbridge suggested that the evidence, at best, seemed to be equivocal<sup>29</sup>. They acknowledged that although grouse shooting had certainly been instrumental in retaining moorland, they could find no species that depended uniquely on grouse management. Indeed some birds like the hen harrier clearly fared less well on grouse moors. They concluded that the view “...grouse-moor management maintains the internationally important upland breeding bird interests in Britain may be misplaced”<sup>29</sup>. This is a conclusion that seemed to be almost immediately negated by the actions of the conservation agencies which, when selecting the best areas for upland birds as EU Special Protection Areas, chose most of the English grouse moors. Brown and Bainbridge did, however, acknowledge the lack of studies on the issue.

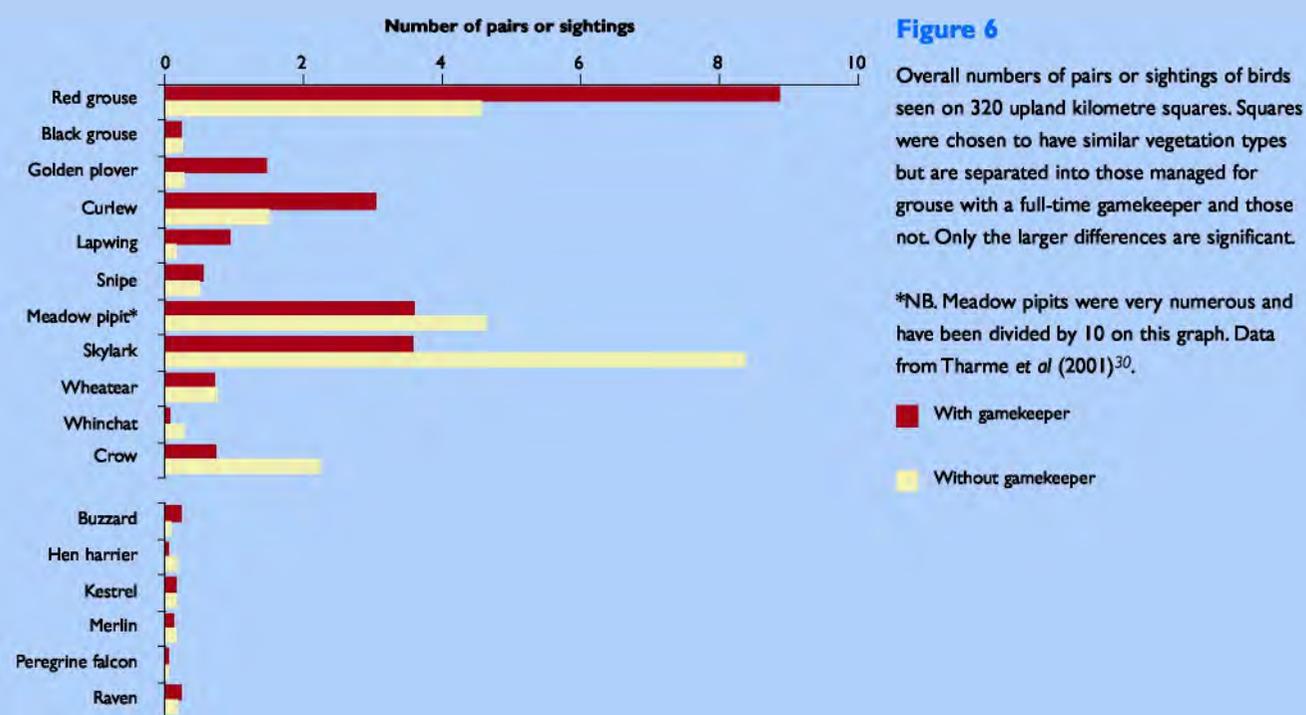
Since then, a systematic field study led by Andy Tharme<sup>30</sup> (see *Grouse moor bird survey*, page 17) has demonstrated that waders are distinctly more abundant on grouse moors than on nearby unmanaged moor. None of the waders can be described as common and some have undergone significant national population

## GROUSE MOOR BIRD SURVEY

In 1995 and 1996 Andy Tharme of the RSPB, in collaboration with The Game Conservancy Trust and grouse moor owners, conducted a series of breeding bird counts in upland areas where grouse shooting was the dominant land-use<sup>30</sup>. He visited 122 properties in the north-eastern Highlands, the Cheviot Hills, the North Pennines and the North York Moors. He then surveyed 320 kilometre squares of upland habitat both on and off grouse moors.

The raw counts of birds on and off grouse moors are shown in Figure 6. Many of the differences are not very large and not significant. However, there are some big differences – unsurprisingly red grouse are more numerous and crows less numerous on grouse moors. Some of the species, like meadow pipit and skylark, were less abundant on grouse moors – perhaps because of subtle habitat differences due to grouse moor management not picked up in the analysis. The fewer whinchats may be related to the taller shrubs on some of the unmanaged moors. However, three of the four wader species (golden plover, curlew and lapwing) were all much more abundant on grouse moors. Of the raptors only the hen harrier was significantly less frequent on grouse moors, indeed buzzards were seen more frequently. The lower number of hen harriers is likely to be related to their breeding success and survival being reduced by grouse moor keepers as shown by RSPB in an earlier study<sup>31</sup>.

The analysis was complicated by the fact that some regions (like the North York Moors) were so dominated by grouse management that it was difficult to find comparative sites within the region.



declines; so this finding is important. Apart from the rare hen harrier, which we consider in *Birds of prey and red grouse* (page 21), most of the other species that are less abundant on grouse moors, such as crows, meadow pipits and skylarks are very common anyway. Tharme's study raises two important questions:

- 1 What causes the difference? Is it habitat management or predator control?
- 2 Because the study was confined to sites within regions where grouse shooting was widespread, and because we know predator control by gamekeepers can have a regional impact as well as a local one<sup>32</sup>, is the true effect on waders not larger than the one shown by Tharme?

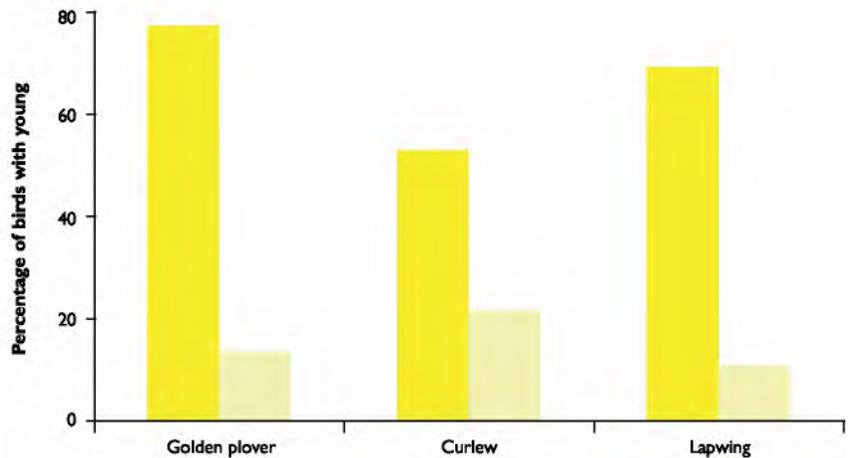
Tharme believed the answer to the first question was predator control, but because his study compared sites with different habitat, he could not prove it. A more definite answer will only come by experiment. Such experiments are expensive and time consuming. However, they are essential to a proper understanding, so The Game Conservancy Trust is conducting one at Otterburn in Northumberland. This experiment, which began in 2000, will run for nine years and involve four gamekeepers' beats – two with predator control and two without. No firm conclusions can yet be drawn, but at the half way stage in 2005 the waders on the beats with predator control are certainly breeding more successfully than on those without (see Figure 7).

Moors managed for grouse typically have five times as many golden plovers and lapwings as other nearby moors and, about twice as many curlews.

**Figure 7**

Experiment at Otterburn. The percentage of waders that successfully rear at least one chick on beats with and without predator control. Average of four areas over four and five years. See Fletcher<sup>33</sup> for details of the study so far.

With predator control ■  
Without predator control ■



To answer the second question we need to look at how waders are doing on a much wider scale. Some of these waders are listed within the EU Birds Directive and the UK is required to take special measures to protect them, including the designation of special sites where they are conserved. These sites are what the Commission refers to as Natura 2000 sites and in Britain they are the Special Protection Areas (SPA) for birds. The Joint Nature Conservation Committee (JNCC) chose these areas on the basis that they had the highest concentrations of birds of conservation concern.

Table 1 shows a list of all the main upland SPAs in Britain. What stands out is that the key areas for waders are all along the Pennines and the North York Moors. As it happens, most of this is privately owned grouse moor, not owned by English Nature, public bodies or conservation organisations.

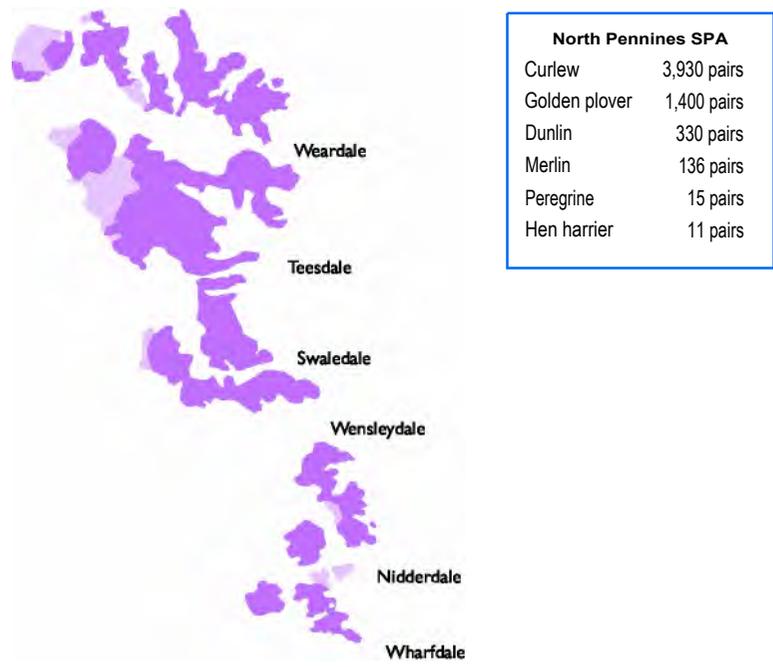
In Julie Ewald's survey 17 out of 22 properties on the North York Moors SPA shoot grouse and they employ 43 gamekeepers. On the much larger North Pennines SPA 67 of 73 properties shoot grouse and employ 149 grouse keepers. As all the properties in Ewald's survey were mapped into a Geographical Information System it is possible to calculate the area of SPAs that are managed in this way. In England 74% of the overall area of the four upland SPAs is managed as grouse moor. In some, like the North York Moors and the North Pennines, this proportion is higher (see Figure 8).

A comparison between the upland SPAs managed for grouse and those that are not is instructive. In the North Pennines, dominated by grouse shooting, there are some 3,930 pairs of curlews. Although there are no recent data on curlew numbers in the Welsh Berwyn SPA where there is no driven grouse shooting, numbers can be roughly calculated using the data from the Lake Vyrnwy reserve, which represents some 26% of this SPA<sup>34</sup>. From these data, it seems that the Berwyn may have only

**Figure 8**

The North Pennines Special Protection Area for birds and the numbers of pairs of birds listed in the designation. The two largest pieces of moor not managed for grouse are the RSPB reserve at Geltsdale in the north west and the English Nature owned moor of Moorhouse. Data from Julie Ewald's (unpublished) survey conducted in collaboration with the National Gamekeepers' Organisation.

Grouse moor ■  
Other moor ■



**Table 1**

The main upland Special Protection Areas for birds in Britain and the bird numbers on which the designation is based. Small SPAs and candidate SPAs have been omitted.

Special Protection Area	Listed birds	Number of pairs	
<b>Wales</b>			
Elenydd Mallaen	Merlin	7	
	Peregrine	15	
	Red kite	15	
	Berwyn	Hen harrier	14
		Merlin	14
Peregrine		18	
	<b>England</b>		
	Bowland fells	Hen harrier	13
		Merlin	20
		Lesser black-backed gull	13,900
South Pennines	Merlin	77	
	Peregrine	16	
	Short-eared owl	25	
	Golden plover	752	
	Dunlin	140	
	North Pennines	Merlin	136
Peregrine		15	
Hen harrier		11	
Golden plover		1,400	
Curlew		3,930	
Dunlin		330	
North York Moors		Merlin	40
	Golden plover	526	
	<b>Scotland</b>		
Drumochter Hills	Merlin	7	
Cairngorms	Dotterel	70	
	Golden eagle	12	
	Osprey	2	
	Peregrine	12	
	Merlin	14	
	Capercaillie	125	
	Crossbill	50	
	Dotterel	240	
Ben Wyvis	Dotterel	20	
Bein Dearg	Dotterel	22	



Golden plover, curlew and lapwing. These birds breed in large numbers on grouse moors, but are declining elsewhere. (Laurie Campbell)

about 35 pairs of curlews. Even correcting for the fact that the North Pennines SPA is six times the size of the Berwyn, it still means that curlews are more than 18 times as common in the Pennines as in the Berwyn. Although not an SPA, the Dartmoor National Park appears now to have only about five pairs of curlews left<sup>35</sup>. For golden plover the comparison is more difficult to calculate because the birds are so uncommon away from the grouse moors. The two Pennine SPAs have between them some 2,152 pairs of golden plovers. In the whole of Wales – everywhere, not just the SPAs – there appear to be only some 80 pairs left<sup>34</sup>.

It is sometimes argued that bird abundance is less important than the compliment of bird species – the so called ‘bird assemblage’. In other words what is important is whether the bird is present.

The simplest way to check this is with the British Trust for Ornithology’s bird atlases<sup>36,37</sup>. Each species is mapped into a 10 by 10 kilometre Ordinance Survey grid. Two atlases have been published – the first covering the 1970s and the second the 1990s. In the second atlas, the BTO has also mapped the gains and losses for each

Curlews are about 18 times more abundant in the North Pennines Special Protection Area, which is managed for grouse shooting, than they are in the Berwyn Special Protection Area, a large part of which is managed as a bird reserve.

**Table 2**

Percentage losses in breeding range of three moorland birds in different regions where grouse shooting has been retained (N England) compared with areas where it has been lost (Wales and SW England). Data from BTO Bird Atlases for 1970s & 1990s<sup>36,37</sup>.

	N England	Wales	SW England
Red grouse	-13	-36	-66
Dunlin	-7	-25	-75
Golden plover	-8	-32	-50

species. So, it is simple to tally up the losses and gains and work out the balance. Table 2 shows this for the red grouse and the two wader species that confine their breeding to upland areas. This shows that the loss of range (or loss of this species from the local bird assemblage) has been small in the North of England compared with the South West of England or Wales where the losses have been huge. The tie up between the fate of the grouse and the two waders is striking.

For waders that breed in upland and lowland habitats, such analysis is more difficult. However, a recent BTO study of lapwings<sup>38</sup> found that the highest regional percentage declines were in Wales and the South West (-77% and -64%) whereas the lowest was in the Yorkshire Humberside region (-28%) – a region which includes the North York Moors and the bulk of the Pennine chain.

A recent study of the lapwing decline in Scottish uplands associated the decline with agricultural change, but also noted that other studies had found much higher predation rates in areas with more foxes<sup>39</sup> – something that had previously been illustrated in the North of England<sup>40</sup>.

**In summary**

The financial investment in grouse shooting makes a huge contribution to nature conservation in the uplands. It has protected and conserved the plant communities, and it has produced the best areas for upland waders in mainland Britain. On any criterion, grouse shooting provides a highly sustainable form of land use. By contrast what we might question is the lack of management on upland areas that are not grouse moors. In some of the National Parks, where emphasis is placed on outdoor recreation, it may be at the expense of nature conservation.

In the spring grouse moors are alive with peeping waders and displaying grouse, birds that are disappearing fast from the rest of the country.

Breeding golden plover, dunlin, lapwing and curlew are disappearing throughout much of England and Wales. Only on grouse moors do breeding distributions remain relatively stable.



*The Joint Raptor Study (1992-1997) showed that hen harriers can reduce grouse stocks to such an extent that driven grouse shooting becomes impossible. (Laurie Campbell)*

## BIRDS OF PREY AND GROUSE

The UK Raptor Working Group<sup>41</sup>, in seeking to find solutions to raptor predation problems, noted that most birds of prey had expanded in range and numbers over the last 30 years. The buzzard, which was reduced to the western fringes in the 19th century, had now spread back into most English counties. The red kite, for so long just holding on in mid-Wales, now has substantial populations thanks to a translocation and re-introduction programme. Peregrine falcons have probably never been so numerous, and the numbers of sparrowhawks have bounced back to such an extent that they may be running out of food in some areas. This has come about because of legal protection and the banning of organo-chlorine pesticides, which decimated many species in the 1950s.

In most situations gamekeepers find that they can tolerate losses to raptors, but one species, the hen harrier does represent a serious threat to grouse shooting. Harriers were wiped out from most of Britain in the 19th century and the population recovery since the 1970s has brought them into increasing conflict with grouse moor interests. Currently the harrier population seems to be increasing and spreading except, noticeably, on English grouse moors, where they are mostly absent.

To determine the effect of raptors on grouse stocks, several organisations set up the Joint Raptor Study, which was conducted mainly on Langholm moor between 1992 and 1997.

By watching bird of prey nests and counting the grouse chicks killed by harriers and brought back to nest, Steve Redpath and Simon Thirgood were able to assess the extent of predation by raptors on the grouse stock. By monitoring the grouse population at the same time, they could work out the proportion of grouse being killed and calculate the effect. For the years 1995 and 1996 they calculated that about half of the autumn stock was being killed by birds of prey and this had a knock-on effect to the next year so that the difference was compounded in successive years. During the study the harrier population was building up and the grouse population going through a cyclic low. The combination meant that the grouse population was unable to withstand this loss, it continued to decline instead of recovering, grouse shooting was suspended and the gamekeeping effort largely stopped<sup>42,43,44</sup>.

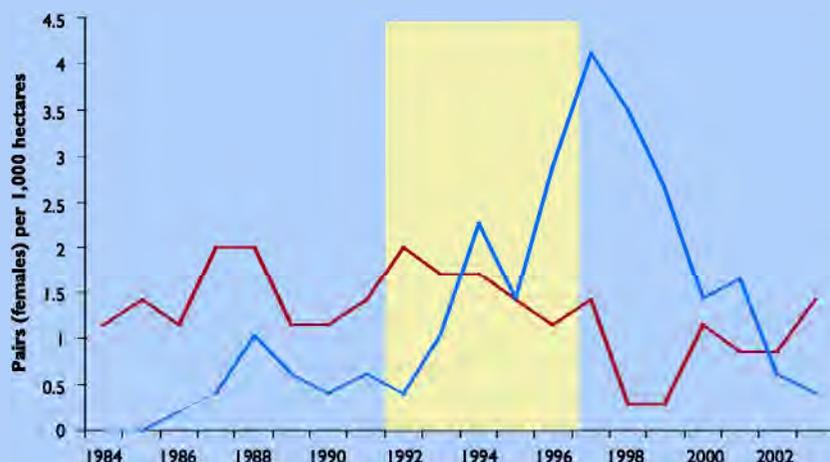
Work carried out by Adam Smith and others confirmed that many grouse moors had similar characteristics to Langholm and about half of all grouse moors would face the same demise if harriers built up in numbers the way they had at Langholm<sup>45</sup>.

The Game Conservancy Trust argued that grouse moors should be able to cope with a limited number of hen harriers and, in fact, probably as many as would occur on unmanaged moor without gamekeepers<sup>46,47</sup>. Figure 9 shows that when the harrier breeding density at Langholm reached its peak it was about four times the density on the RSPB bird reserve at Lake Vyrnwy – part of which is an SPA designated for hen harriers. It is also worth noting that before 1992 Langholm was a highly productive grouse moor even with a limited population of harriers. Now there is no grouse shooting, no gamekeeping and certainly no more hen harriers.

Not all raptors do badly on grouse moors. Some, like the merlin, actually do a lot better. Table 1 on page 19 shows merlin designations for the SPAs. Taking account of the different sizes of these SPAs there are about five pairs of merlin for every 10,000 hectares on the unkept Berwyn, whereas there are about nine for every 10,000 hectares on the intensively kept North York Moors and North Pennines SPAs.



Ground-nesting merlins benefit from the fox control carried out by grouse keepers. (Laurie Campbell)



Merlins are almost twice as common on grouse moors as on other upland moors.

Figure 9

Contrasting changes in hen harriers.

- Changes in breeding harriers at Langholm moor
- Changes in breeding harriers at the RSPB reserve at Lake Vyrnwy
- Period of the Joint Raptor Study