



**'HUNTING for Sustainability' –  
A summary of research findings  
from the Scottish case study**

# HUNTING for sustainability – Can hunting be a force for good?

Hunting (in the broadest sense of the word) involves millions of people, over huge land areas and contributes significantly to local and national economies. It occurs in a range of ecosystems and is embedded in social structures. However, in some cases there can be conflicts because of the potential impact hunting can have on the status of species of conservation importance and in the past there are obvious examples of the lack of sustainability of some hunting practices. However, in an increasingly human dominated environment, hunting management often involves the preservation of natural or semi-natural habitats and the biodiversity they contain.

HUNT is an interdisciplinary international research project, financed by the EU's 7th Framework programme. Using case studies across seven countries, researchers from the social and natural sciences have worked with stakeholders to look into the wider meaning of hunting in the 21st century and its relationship with biodiversity conservation.

A major driver of research in Europe is the concern over how to halt the loss of biodiversity. In many cases we have failed to reach targets for the condition of species and their habitats. The latest European initiative is the EU Biodiversity Strategy to 2020<sup>1</sup>. Essentially, there is broad agreement that biodiversity is under increasing pressure from human activities such as land-use change driven by both climate and policy objectives. However, there is little consensus on how land can be managed to halt this biodiversity loss whilst ensuring the sustainable livelihoods of those who depend on the natural environment.

Traditionally, a major tool used for conservation is the designation of land as protected areas such as the Natura 2000 sites promoted by the EU Habitats Directive. However, only a limited area of land can be managed this way and therefore, as the directive states, most of our biodiversity is on land in the wider countryside and is therefore managed for private land owner interests (which often include hunting). Thus the success of achieving biodiversity objectives has to take into account the social, economic and cultural objectives of those who influence land-use and these include hunters.

In this project we aimed to use our case studies to explore the cultural meaning of hunting; the institutions around, and governance of, hunting activities; the values people put on the hunting experience and the consequences of hunting for biodiversity.

This booklet provides a summary of the research we carried out in relation to our Scottish case study. Because of the multidisciplinary approach, the results provide a more holistic understanding of hunting and its relationship to biodiversity. This demonstrates that those involved in hunting management see themselves as conservationists – legitimately managing populations and habitats that might otherwise deteriorate. Hunters often value the environment they hunt in, not just the shooting opportunity. Our work also recognizes that hunting activities can have biodiversity benefits and that the intensity with which hunting occurs varies across the landscape. This heterogeneity contributes to the biodiversity of our landscapes.

Thus, as well as regulating against unsustainable hunting activities, we need to recognize that best practice in hunting and shooting can be a valuable tool in helping to halt the loss of biodiversity.

**Justin Irvine**  
'HUNT' Project Coordinator

<sup>1</sup> <http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm>  
<http://fp7hunt.net>





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# On the meanings of shooting and stalking for hunters and non-hunters

**Anke Fischer**

## Background

In Scotland, shooting, stalking and the associated land management practices are currently subject to a public debate over the 'right' way to manage the countryside. Such debates are often addressed from economic and ecological angles, neglecting what fieldsports actually mean to people – both to those who are actively engaged in stalking or shooting, and those who are not. Our research aimed to investigate these meanings, not only in Scotland, but also in four other European and two eastern African countries.

## Research questions

- What does hunting (shooting, stalking) mean to those who hunt and those who do not?
- How do people argue to support their views on (different types of) hunting?

## Method

We used the same qualitative methods across study sites in all seven countries. This included focus group discussions and interviews with (a) people who hunt, (b) people who do not hunt and (c) people known to have anti-hunting views. In Scotland, 37 individuals participated in the study, including 19 who are involved in stalking or shooting. The overall sample size across all countries was 364. The data were analysed in a grounded fashion, that is, no theories or concepts were a priori imposed on the data. For the final steps of our interpretation, we used discourse analysis to examine how recurrent patterns in the debate are used to shape people's ways of thinking about hunting.

## Key findings

- In all seven countries and across all three groups of participants (“hunters”, “non-hunters”, “anti-hunters”), discussions tended to be differentiated, distinguishing between types of hunting rather than talking about hunting per se.
- Without prompting, many participants across all groups paid a lot of attention to their perceptions of the legitimacy of hunting. They tended to distinguish between acceptable and unacceptable hunting based on three types of criteria: (i) characteristics of the animal hunted, (ii) the technique used to hunt and (iii) the motives of the hunter.
- Across all groups, these arguments resembled each other. For example, many hunters and non-hunters in Scotland argued that shooting and stalking was absolutely acceptable if the game meat was eaten, but unacceptable if the carcasses were discarded.
- Motives for hunting tended to be regarded as legitimate if they were considered ‘moderate’ or ‘under control’, but the same motive would be evaluated as illegitimate if it was considered ‘excessive’ or out of control. For example, fieldsports for recreational purposes might be regarded as legitimate where the hunters’ motive was the enjoyment of nature, but widely seen as unacceptable where the motive was suspected to be an “adrenaline rush” or “thrill”. Similarly, game management was seen as positive where it took care of nature in a considerate and moderate way – where it was seen as exaggerated interference with nature, or as “playing god”, it was regarded as unacceptable.

## Lessons learnt for best practice

- Perceptions of the legitimacy of different types of hunting are an important part of discourses over game management, and should thus be made more explicit in the public debate.
- Especially in Scotland, many people involved in fieldsports and non-hunters might share more similar views than popularly portrayed.
- These commonalities could be used as a starting point for ‘education on the countryside’ that is often called for by game managers.

(De-)legitimising hunting – discourses over the morality of hunting in Europe and eastern Africa, Fischer, A., Kereži, V., Arroyo, B., Mateos-Delibes, M., Tadie, D., Lowassa, A., Krange, O. and Skogen, K. [Manuscript in Preparation]

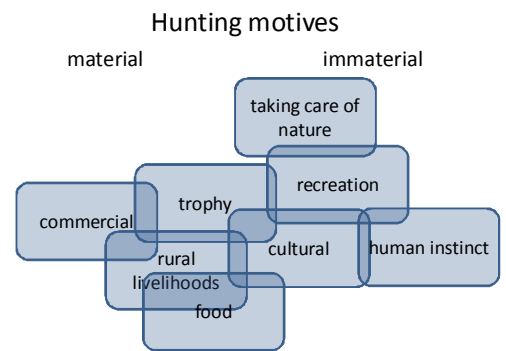


Fig.: Overview of motives for hunting discussed by study participants in 7 countries to either legitimise or delegitimise hunting

“I think the other thing which is really important to remember is that the vast majority of the people that are working the estates are not doing it for the money. They do it because it is a way of life, and it is part of their culture and heritage ... When or if the sporting interest deteriorates or starts to fade away in parts of Scotland, part of our heritage will be lost”  
(STALKER, IN HIS THIRTIES)

“Killing something for food seems reasonable. Killing something for population control seems reasonable. Killing something for fun just doesn't seem right to me.”  
(NON-HUNTER, IN HIS FORTIES)



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# Large scale policy changes and their impacts on sporting and game management discourses

**Liz Dinnie and Anke Fischer**

## **Background**

A large part of the Scottish countryside is traditionally managed for shooting and stalking. However, recent policy changes at both national and European levels reflect an increasing diversity of both public and private land management objectives. This has resulted in the creation of new formal institutions (i.e. rules) governing land and game management, and the inclusion of actors from both the public sector and NGOs who have previously not had much say in countryside matters.

## **Research questions**

- What is the interplay between traditional and newly emerging institutions governing game management?
- How do game managers respond to these policy changes?

## Method

This study builds on a combination of (a) a policy analysis, (b) a document analysis of six relevant organisations' responses to the Wildlife and Natural Environment (WANE) Bill consultation<sup>1</sup>, and (c) interviews and group discussions with 19 individuals active in fieldsports and game management.

## Key findings

- New institutions governing wildlife management, such as the Convention on Biological Diversity, EU directives and their translation into national policy, seem to have developed *in parallel* to the formal and informal institutions that have previously governed game management in Scotland. They appear poorly reconciled with existing institutions, such as property rights to the land, and are thus not necessarily effective.
- Game managers and their organisations consider public interests to be increasingly influential.
- Some of them feel “under siege” and see their activities threatened and their rights compromised by growing public claims to the countryside and its wildlife.
- Game managers argue that recent policies for game management are generated by international, non-local or urban actors who lack ‘true’ knowledge of the way the countryside works. They contend that they, as game managers, hold the appropriate knowledge – a knowledge that cannot be acquired, e.g., through college studies.
- Some game managers argue that recent policies might not be based on the right knowledge. However, this line of thinking has an exclusive and irrefutable character: because appropriate knowledge cannot be obtained by outsiders, they are by definition not (and will never be) entitled to have a say in countryside matters.
- This line of argument unites individuals across different types of estates and sporting activities.

## Lessons learnt for best practice

- The lack of reconciliation between traditional and more recent institutions combined with a strong discourse that asserts knowledge-based claims of game managers could explain why recent conservation policies have so far had a comparatively limited influence on Scottish land management. Both factors need to be addressed if tensions between sporting and institutionalised conservation are to be resolved.

*“People in other parts of the world have indigenous rights ... I sort of feel the same thing should apply here, it is part of our way of life”*

*“You can just sense the way we look, the way we walk, you know, the way we think, the way we plan, it's just there. ... Either you've got it or you haven't. Very few can get it today so there is more who haven't got it. They still go to Thurso College which is the shooting school, gamekeeping school and haven't got it”*

Private property rights and discursive claims to knowledge: the challenge of widening public interests in environmental governance in Scotland, Dinnie, E., Fischer, A. and Huband, S.  
[Manuscript in Preparation]

<sup>1</sup> Including the Association of Deer Management Groups; the British Deer Society; the Scottish Gamekeepers' Association; British Association of Shooting and Conservation; Scottish Land and Estates; Game and Wildlife Conservation Trust (Scotland).



## 8 Developing a 'new vision' for deer management: 'From species management to an ecosystem approach'

**Annie McKee, Liz Dinnie and Justin Irvine**

### **Background**

This research was prompted by recent and ongoing policy and institutional reform in Scotland surrounding the sustainable management of all deer species. This includes the merger of the Deer Commission for Scotland and Scottish Natural Heritage, the passage of the Wildlife and Natural Environment (Scotland) Act 2011 (WANE), the continuing importance of 'Wild Deer: a National Approach' and Best Practice Guidance, as well as likely implications of the Land Use Strategy and forthcoming CAP reforms. These policy changes reflect an increasing diversity of both public and private land management objectives. However, opinions are divided on the necessity for formal institutional change (including new regulatory frameworks) to ensure competing objectives are balanced effectively.

### **Research questions**

- To identify and discuss the uncertainties of institutional change that influences sustainable deer management and all actors involved;
- To develop governance scenarios for future deer management; and
- To suggest principles and strategies that should be considered by policy-makers and other interests, when deer and wider natural resource policy is developed.



## Method

We posed these research questions through a series of ‘scenario workshops’ (see Figure 1). Similar workshops were held in other HUNT partner countries. The Scottish workshops were attended by representatives of a range of national level member organisations and public agencies with an interest in deer management, field sports and conservation. A set of ‘future history’ style scenarios were co-constructed by the stakeholder group and research team, and through an analysis of the strengths, weaknesses, opportunities and threats of each scenario, formed the basis for the identification of future policy strategies.



Figure 1: Stages in the scenario workshop method

## Key findings

- Participants agreed that deer management must be considered in the context of wider species and ecosystem scale objectives, alongside socio-economic implications.
- Effective policy development needs to promote collaboration between public and private interests to deliver wider public benefits.
- Policies need to promote conflict resolution processes and balance effective voluntary approaches with regulatory enforcement where appropriate.
- Managing natural resources (including deer) on a more holistic, ecosystem scale, needs to be based on research recommendations, recognising the full range of ecosystem values and functions.

## Lessons learnt for best practice

- The scenario workshops highlight the potential to learn from other species and habitat management frameworks, for example district fishery boards. Lessons may also be learned internationally from developments in the integrated management of natural resources, such as in Sweden.
- There is a need for land management stakeholder involvement in the co-construction of research agendas with researchers and policy makers, to develop understanding of the practicalities of the ‘ecosystem approach’.
- Cross-partner comparison of the scenario workshop approach illustrates the need for methodological flexibility and adaptation to ensure stakeholder relevance and maximise ownership of research process and output. Future processes that engage stakeholder groups in the ‘active’ research process will seek to ensure that the focus, method and output are best designed to meet the needs of stakeholders, as well as producing innovative scientific and policy-relevant findings.

For further information, please see:

HUNT project and National Stakeholder Group (2011) Developing a New Vision for Deer Management: ‘From species management to ecosystem approach’ – Policy implications of current thinking. The James Hutton Institute, June 2011.

Available online at: <http://fp7hunt.net/Portals/HUNT/Publikasjoner/developing%20a%20new%20vision%20for%20deer%20management.pdf>



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# Governance and game bird shooting styles

**Scott Newey, Karen Mustin, Steve Redpath and Justin Irvine**

## **Background**

All forms of hunting are deeply cultural activities and there are many regional and national hunting styles. While environment, habitat, species biology and economics dictate many aspects of hunting styles, these critically interact with the well known but often unexplored facets of land tenure and hunting rights. Here we look at how land tenure and the provision of hunting rights and regulations influences hunting styles and focus on game bird shooting in Europe and North America as an example.

## **Research questions**

The aim of the present study is to review hunting styles in Europe and North America, and to compare these styles to those adopted in the UK and explore how these interact with governance and land tenure.

## Method

As the previous research summary outlines, we carried out a comprehensive review of the scientific literature and published reports on game bird shooting in Europe and North America. Here we explore how governance, in particular; land ownership, allocation of hunting rights and regulation of harvest influence game bird shooting styles.

## Key findings

Our review of the literature suggested two broad game bird shooting styles around the world; i) 'driven shooting, and ii) walked-up (or rough) shooting, though we acknowledge there is some overlap in these styles and there are national differences in the interpretation of these terms. Furthermore, some hybrid and different shooting styles do exist, for example some forms of game bird shooting in Finland may be considered more akin to stalking than walked up shooting. Nevertheless, these two broad categories encompass most forms of game bird shooting found in Europe and North America.

These gamebird shooting styles appear strongly associated with land ownership and hunting rights. We identified three main types of governance:

- i) 'landowner regulated' – found in the UK – where hunting rights belong to the land owner, which allows considerable autonomy, investment in intensive management leading to higher bird densities and high or potential revenue;
- ii) 'state regulated' – found in Scandinavia and some other areas of the continent – where landowners have hunting rights but the State sets harvest limits (quotas). This type of governance is not associated with intensive management; and
- iii) 'state owned' where, for example in North America, game species are held in trust by the State – the right to hunt resides with the State and quotas are set by central or federal government or agencies.



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## Lessons learnt for best practice

The styles of game bird shooting found in different regions and countries are the product of many complex interacting biological, geographic, cultural, social, economic and legal factors which give rise to particular opportunities and challenges. Critiques of and policies aimed at influencing game bird or indeed all hunting need to understand the role of governance, and in particular land ownership, in influencing local hunting styles. In addition, while there may be some interest in transferring elements of one local style to another, any attempts to do so must understand the role of local, regional and national governance in driving shooting styles.



# A review of the effects of game bird management on non-game species'

Scott Newey, Karen Mustin, Steve Redpath and Justin Irvine

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## Background

Across Europe, game bird hunting occurs over millions of hectares of land, and provides economic and social benefits. Game birds and their habitat are often intensely managed to increase population density. Here we set out to assess the consequences for non-target species.

## Research questions

All management activities can have positive and negative effects on certain species. We reviewed the literature to assess the evidence for the effects of different types of management on other species also present in the habitats managed for game birds.

## Method

We considered five broad management activities: predator control, habitat management, provision of supplementary food and water, rear and release, and parasite/disease control and reviewed published literature to collate and synthesise our current understanding of the impacts of these management activities on the abundance, diversity, breeding success and survival of non-game species. We reviewed 41 studies.

## Key findings

The published evidence suggests that game bird management can have positive effects on some non-game species and

negative effects on others. Predator control is one of the most well studied aspects of game bird management results mainly show positive or no significant effect on non-game species. However, illegal control of protected predators has clear negative effects on some predator populations. Habitat management in agricultural areas generally has positive effects on a range of species, while the effects of management in non-agricultural areas are more variable. Whilst there are a number of negative effects of rear and release, there is little research concerning how this form of management affects the abundance, diversity, breeding success and survival of non-game species. While some aspects of the effects of game bird management on non-game species are well studied other areas are less well researched, in particular there is little known on the effects of the provision of supplemental food and water, and studies to assess the impacts of parasite and disease control on non-game wildlife are generally lacking.

## Lessons learnt for best practice

Despite many shared goals, hunting and conservation are often in real or perceived conflict over management objectives and practices. Although more data are clearly needed to fully understand the broader biodiversity effects and trade-offs associated with different management activities, the available evidence suggests that, with the exception of illegal predator control and release of exotic species, game bird management practices are positive or benign for non-game species.



# The same but different: Upland management and bird diversity in the Scottish Highlands

**Scott Newey, Karen Mustin, Ros Bryce, Debbie Fielding,  
Steve Redpath and Justin Irvine**

## **Background**

The protection of biodiversity is a key national and international policy objective. While protected areas provide one approach, the majority of land lies outside of protected areas and is subject to different, and often multiple, land uses. Understanding how biodiversity can be maximised amongst the varied pressures of other forms of land use is important for evaluating the effects of different policy objectives.

## **Research questions**

How do different forms of upland management objectives and practices influence bird diversity and community composition?

## **Method**

Heather moorland on twenty six upland estates with a variety of different management objectives was surveyed for breeding birds in spring-summer 2010. On each estate two to four 1km<sup>2</sup> areas were surveyed using a modified version of the Breeding Bird Survey methodology, where each 1km<sup>2</sup> area was traversed by 2 parallel 1km long transects spaced 500m apart. Each 1km<sup>2</sup> area was surveyed twice, once in April–May and again in May–June. All birds directly associated with the survey area were identified and recorded. Survey data were used to estimate bird species diversity using the Shannon Index. We also used (Non-metric Multi-dimensional Scaling) ordination to explore patterns in bird community composition and structure. For each estate we asked for information on the dominant management objectives and predator control. We used satellite imagery to estimate the percentage of land in each survey area which was subject to muirburn. Finally, we used the Land Classification 2007 data to estimate habitat diversity for each estate.

## Key findings

After controlling for the effect of latitude and longitude, none of the management objectives nor activities analysed in this study had a significant effect on bird diversity (Red grouse production;  $F_{1,23}=1.56$ ,  $p=0.23$ , Red deer stalking;  $F_{1,23}=0.35$ ,  $p=0.56$ , Sheep production;  $F_{1,23}=0.57$ ,  $p=0.45$ , Biodiversity conservation;  $F_{1,23}=0.95$ ,  $p=0.34$ , Predator control;  $F_{1,23}=0.35$ ,  $p=0.56$ , Percentage muirburn;  $F_{1,23}=0.52$ ,  $p=0.48$ , Estate habitat diversity;  $F_{1,23}=2.12$ ,  $p=0.16$ ).

However, the composition of upland bird communities was significantly affected by the main management activity (Figure 1). For example, wader species were associated with red grouse production and muirburn. Management for sheep production, predator control and estate habitat diversity had no significant effect on the diversity or composition of upland bird communities in this study (Table 1).

## Lessons learnt for best practice

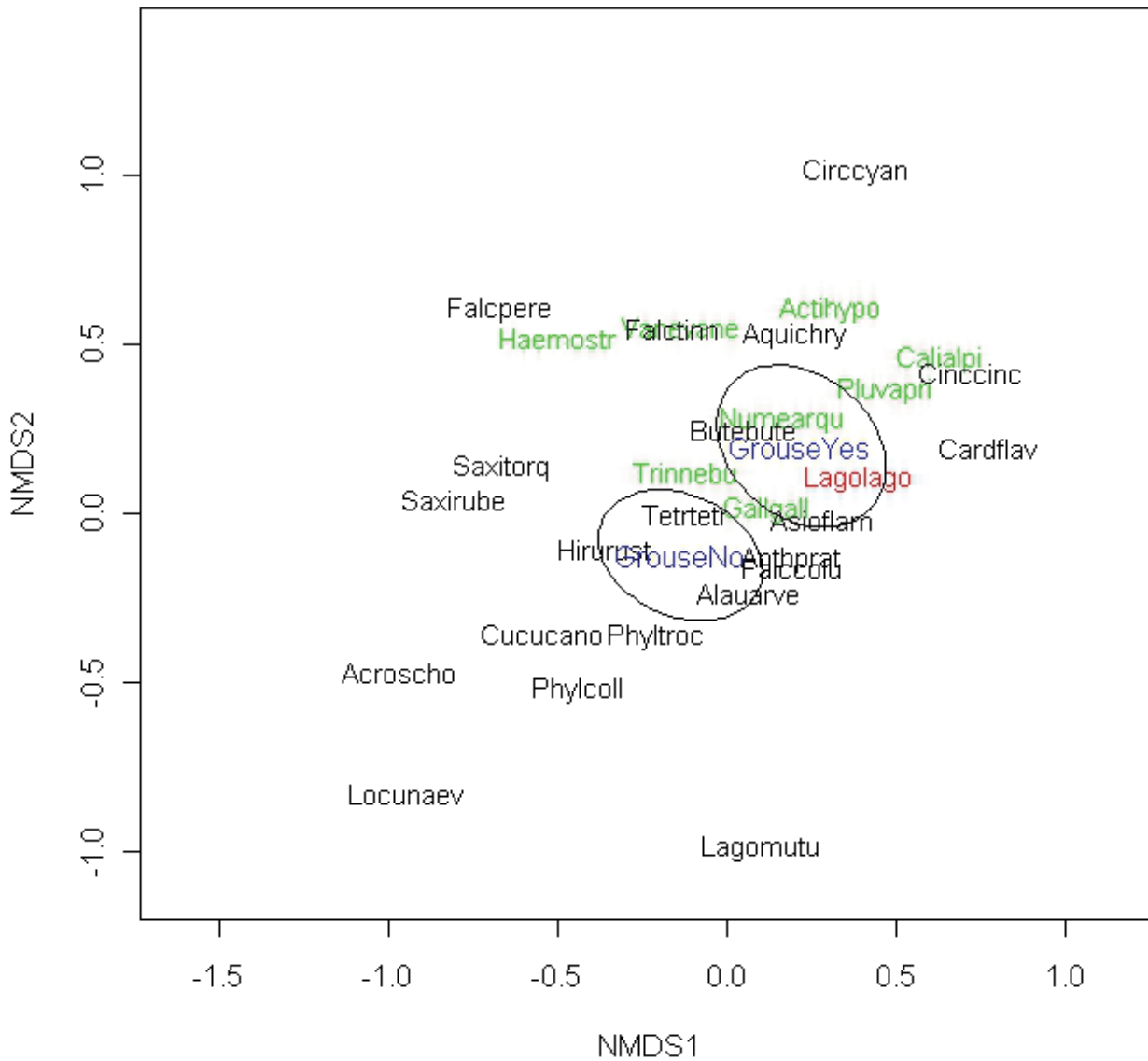
The management objectives and activities examined in this study do not appear to effect upland bird diversity per se, but do appear to effect community composition. Therefore, bird diversity may be maximised by a landscape with diverse land management strategies.



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**Figure 1**  
 NMDS ordination plot showing 95% centroids for estates managed for grouse production (Grouse Yes) and those estates not managed for grouse production (Grouse No). Those species that are within or close to the centroids tend to be more strongly associated with that particular management objective.

Names in green are wader species. Names in red is red grouse.

In all 58 bird species were recorded during surveys, however for clarity only 21 species are shown in this figure.

Key to species: species names are shortened to the first 4 letters of the genus and the first 4 letters of the species name;

Lagolago – Red grouse, Tetrinet – Black grouse, Anthprat – Meadow pipit, Alauarve – Skylark, Saxirube - Winchat, Saxitorq – Stonechat, Phyltroc – Willow warbler, Acroscho – Sedge warbler, Cardflav – Twite, Locunaev – Grasshopper warbler, Phylcoll – Chiffchaff, Hirurust – Swallow, Numearqu – Curlew, Pluvapri – Golden plover, Alialpi – Dunlin, Vanevane – Lapwing, Trinnebu – Greenshank, Gallgall – Common snipe, Haemostr – Oystercatcher, Actihypo – Common sandpiper, Cucucano – Cuckoo, Falcperere – Peregrine, Falctinn – Kestrel, Falccolu – Merlin, Butebute – Buzzard, Circcyan – Hen harrier, Asioflam – Short-eared owl, Aquichry – Golden eagle, Ciccinc – Dipper, Lagomutu – Ptarmigan.

Variables that had a significant effect on community structure	Variables that did not have a significant effect on community structure
Easting ( $r^2 = 0.34$ , $p < 0.01$ )	Northing ( $r^2=0.08$ , $p = 0.53$ )
Percentage Muirburn ( $r^2 = 0.12$ , $p < 0.05$ )	Estate habitat Diversity ( $r^2 = 0.12$ , $p = 0.34$ )
Management for grouse ( $r^2 = 0.19$ , $p < 0.05$ )	Management for sheep production ( $r^2 = 0.02$ , $p = 0.63$ )
Management for deer stalking ( $r^2 = 0.16$ , $p < 0.05$ )	Predator control ( $r^2 = 0.03$ , $p = 0.47$ )
Biodiversity conservation ( $r^2 = 0.15$ , $p < 0.05$ )	

**Table 1:** The effects of dominant management objective and management activities on upland bird community structure.



# Public preferences for moorland management on sporting estates

Nick Hanley, Justin Irvine, Mirko Moro and Steve Redpath

## 16 Background

Managing Scotland's heather moorlands for grouse shooting produces a range of impacts on a number of different groups in society. One of the negative impacts that has generated considerable interest is the effect on raptors, notably hen harriers and golden eagles.

### Research questions

In this project, we investigated what preferences the general public hold for how moorland is managed in terms of its effects on hen harriers and golden eagles. We wanted to know the willingness of the public to pay for changes in populations of these raptors, and also public views on what the most appropriate management methods, including feeding stations, re-distributing harriers away from moorlands with high densities to areas with low densities, and also tougher law enforcement.

### Method

We used the Choice Experiment method, based on a random sample of the Scottish general public. In the surveys, people were asked to make choices between different policy options, specified in terms of their consequences for hen harriers and for golden eagles, the management methods used, and any cost to the taxpayer. Two different information sets were used to test for the effects of providing different information on the hen harrier "problem".

### Key findings

Our results show that for our sample the mean willingness to pay for maintaining current populations of the hen harriers and golden eagles are around £36 and £52 per household per year respectively. A 20% increase in the population of each species would be worth £44 and £61 respectively. Changing the information provided to respondents made little difference to these estimates. The public did not have strong preferences between the three management options studied (feeding, moving, tougher law enforcement), but did have a strong preference for some increase in population size.

### Lessons learnt for best practice

Members of the public are indirectly affected by how grouse moors are managed, through a range of positive and negative impacts on biodiversity, access and landscape. The results from this survey suggest that people prefer management options which result in higher populations of raptors, but are unconcerned about how those improvements are achieved. Moreover, the public would be willing to pay for such changes. This implies that a "Payments for Ecosystem Services" scheme that rewarded moorland owners for improvements in biodiversity could well be justifiable on economic grounds. We also found that taxpayers want an improvement in the current situation of illegal persecution of raptors on some shooting estates.

For further information, please see: Hanley N, Czajkowski M., Hanley-Nickolls R. and Redpath S. (2010) "Economic values of species management options in human-wildlife conflicts: Hen Harriers in Scotland" *Ecological Economics*, Volume 70, Issue 1, pages 107-113.





# What do hunters and other recreational users of moorlands want?

Nick Hanley, Justin Irvine, Mirko Moro and Steve Redpath

## Background

Different groups will have differing views on what kind of management is best for Scotland's heather moorlands – be they grouse shooters or hill-walkers. Changing how grouse moors are managed could produce impacts on rural economies and environment. Understanding what each group wants from the land can help clarify and alleviate conflicts.

## Research questions

We were interested in how two different groups of moorland “users” – hunters and hill-walkers – viewed possible changes to how land is managed and the effects of land management on landscape, rural employment, biodiversity and the hunting experience.

## Method

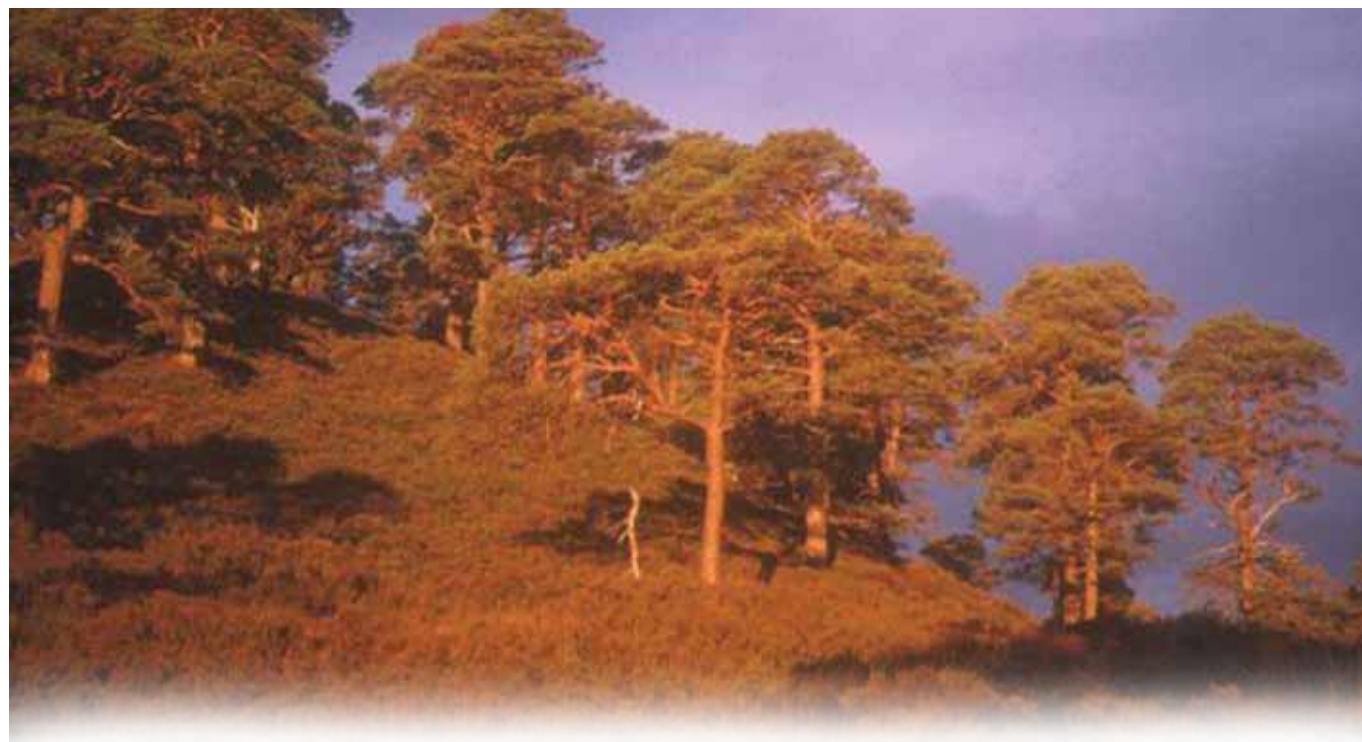
We used the Choice Experiment method, based on two separate surveys. In the first, we questioned visitors to the Cairngorms National Park about their preferences for moorland management in terms of three attributes: landscape appearance (e.g. extent of burning), moorland bird populations, and jobs relating to grouse shooting. In the second survey, we questioned hunters and those interested in hunting, using the type of shooting (driven versus walked-up), wader populations, raptor populations, and cost per brace as the basis for understanding their preferences for the effects of land management.

## Key findings

For the recreational users surveyed, we found that impacts of moorland management for red grouse shooting on landscape, birds and local employment all had significant effects on respondents' choices. In the survey of hunters, style of shooting, number of raptors, number of waders and cost are significant determinants of choice: driven shooting is preferred to walked up shooting, no change in raptor numbers is preferred to a 20% increase over the next 5 years. Overall, hunters showed a preference for 15% more waders than no change and preferred no change to a 15% decrease. Respondents prefer a lower cost per brace, but the landscape attributes are not a significant determinant of choice, implying that changes in the aesthetic appearance of the moorland do not significantly affect the utility of a hunting trip. We also found considerable variation in these preferences, and were able to identify different “types” of hunter in terms of what kind of experience they were most willing to pay for.

## Lessons learnt for best practice

We conclude that changes in management to less intensive modes, which employ fewer people but result in higher numbers of moorland birds and improved landscape quality, could be preferred by informal recreational users. For hunters, preferences varied, but mainly expressed a preference for other aspects of the shooting experience as well as the number of birds shot. Almost no hunters in the sample were in favour of higher raptor numbers.



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# Managing the uplands for multiple benefits

**Ros Bryce, Althea Davies and Steve Redpath**

## **Background**

Management for sporting activities in the Scottish uplands takes place alongside a range of other land management priorities. Current strategies for land use developed by the Scottish government, in parallel with EU and international approaches, emphasise an ecosystem approach in order to deliver environmental, economic, social and cultural benefits. However, there is little guidance on how to translate these national priorities into regional land management decisions. This is a key challenge facing Scotland's policy-makers and land managers.

## **Research questions**

To develop a functional ecosystem approach, policy-makers and land managers need to understand: (1) What benefits do different land management types (e.g. sporting, farming, forestry, conservation) currently deliver? (2) Which land management types provide compatible ways of delivering national and regional land management priorities, and what are the trade-offs if wider benefits are sought?

## **Method**

We tested how a participatory decision analysis method could be used to understand and represent how management practices in two upland regions in Scotland deliver both national and regional priorities. Multi-criteria analysis is a systematic and transparent method of assessing a range of views by integrating different values and forms of knowledge, both qualitative and quantitative. It is generally used to aid decision making in situations with high levels of complexity or conflict and we used it here to produce a synthesis of managers' views to inform the development of land

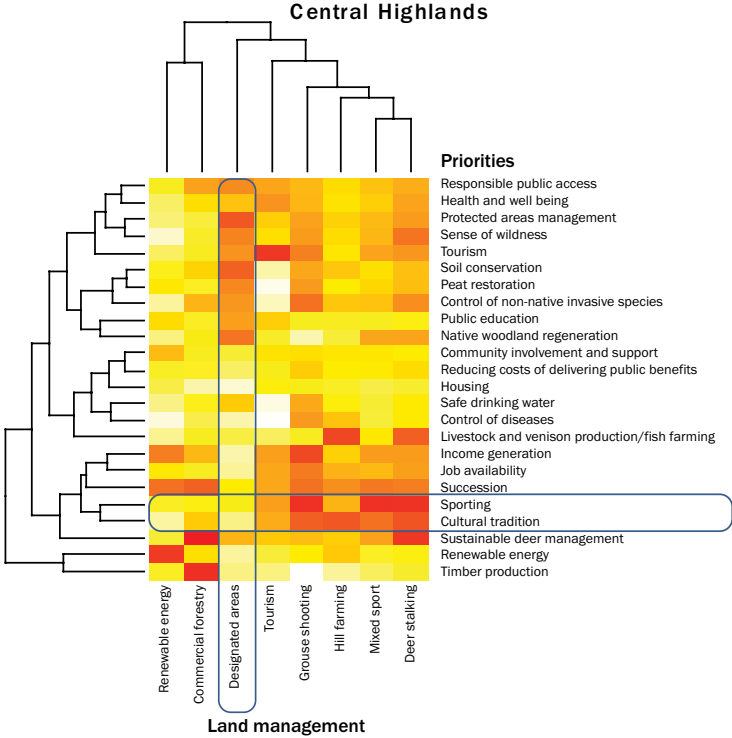
management policy. Representative groups of regional managers worked with researchers in a workshop setting to identify and rank policy and regional priorities, before evaluating how regional management practices currently deliver each of these priorities. A third meeting with national representatives from state agencies and NGOs will consider the key complementarities and trade-offs that need to be communicated to manage the uplands for multiple benefits.

**Key findings**

Regional differences in managers’ views about the benefits delivered by different types of land management reflect environmental opportunities and constraints as well as incentives and trade-offs. We used cluster analysis (Figure 1) to show similarities in the extent to which land managers’ feel that different land-uses deliver a range of national and regional level priorities. In the Central Highlands, local management consistently delivered priorities linked to: 1) conservation and 2) rural communities and estate resilience or sustainability. Overall, management for deer stalking was considered to best deliver the broadest range of priorities. Based on managers’ views, priorities related to the delivery of other benefits, e.g. food production, recreation, renewable energy and tourism, were less consistently delivered. The results were similar in the North West Highlands (NW), although priorities related to rural communities and resilience were less well delivered and here management for native woodland best delivered priorities. Overall, a broader range of priorities were delivered in the NW, including recreation and renewable energy. This can be partly explained by the lower productivity and higher costs associated with livestock and game, for instance, thus making the available incentives for native woodland and renewables an attractive alternative in the NW. By contrast, delivering more priorities in the Central Highlands would require greater trade-offs as the economic value of sporting activities is higher, making trade-offs towards policy interests less attractive.

**Lessons learnt for best practice**

Sporting activities play an important role in delivering regional and national benefits. The results highlight a range of regional trade-offs and complementarities with other practices that need to be considered to translate national ecosystem policy into regional practice in a way that reflects the varied geographical conditions and capacities faced by upland managers. Finding ways of analysing and representing the complex interrelations between different forms of land management and the ecosystem values and services that they support will become increasingly necessary to develop practical ecosystem-based management strategies. Although multi-criteria analysis requires some simplification, it is one of few methods that can incorporate the complex diversity of values and objectives held by land managers. It can therefore represent regional variations in the economic, social and environmental benefits that are provided by current land management strategies in a transparent and systematic way.



**Figure 1:** A cluster analysis summarising managers’ views of how priorities are delivered by land management types in the Central Highlands. The clusters separate management types (top cluster) according to how similarly they deliver the set of priorities and priorities (left cluster) according to how similarly they are delivered across the management types. For example the box highlighting ‘designated areas’ show how this type of management better delivers priorities related to conservation and education than those related to communities and income. The box highlighting ‘sporting’ and cultural tradition’ shows that these priorities are delivered similarly across the management types suggesting they are closely linked.



Please note that many of the research findings presented in this summary booklet are still undergoing analysis, but will be peer-reviewed through submission to academic journals.

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