Changing livestock numbers in the UK Less Favoured Areas – an analysis of likely biodiversity implications

Final Report for the Royal Society for the Protection of Birds
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Final Report prepared for the

Royal Society for the Protection of Birds

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Front cover picture credits: Mixed cattle (Andy Hay, rspb-images.com); Curlew (Chris Gomersall, rspb-images.com); Sheep (Andy Hay, rspb-images.com); Welsh Black (Cumulus Consultants).
Executive Summary

Since the decoupling of subsidies in 2005, under the last Common Agricultural Policy (CAP) reform, there has been a reduction in the total number of cattle and sheep in the UK. A number of reports have highlighted concerns that the rate of livestock losses has been greatest in the most disadvantaged areas and there has been a debate on the effects of reduced grazing activity on upland habitats and wildlife. However, data has been lacking on the detailed pattern of livestock losses across different regions of the four countries of the UK and the potential implications of these changes for habitats and species.

This research explores the changes in cattle and sheep grazing in the Less Favoured Areas (LFA) within England, Wales, Scotland and Northern Ireland and assesses the potential implications for biodiversity. The focus of the work is an analysis of June Survey data for the LFA at the finest level possible, together with a review of literature and site condition data, and a survey of expert opinion. A series of case studies illustrate the different circumstances from around the UK and explore the linkage between changes in livestock numbers, grazing regimes, habitats and species.

There has been a general reduction in grazing livestock numbers in the LFA across the UK over the past 10 years or so, with the decoupling of payments in 2005 reinforcing this trend. This follows a period during which dairy cattle have fallen in number and beef cattle and sheep numbers have increased, largely in response to the availability of headage payments.

The reduction in sheep numbers over the past 10 years has been much greater than that for cattle across the UK. Cattle numbers have reduced more sharply in the Severely Disadvantaged Areas (SDA) compared to the Disadvantages Areas (DA), however there is a less clear-cut pattern for sheep numbers.

The greatest reductions in LFA cattle and sheep numbers have occurred in Scotland and Northern Ireland, followed by Wales then England. Northern Ireland has experienced the greatest decrease in LFA beef cows (-19%) and breeding ewes (-34%), although Scotland has also seen a significant reduction in breeding ewes in particular. The number of LFA dairy cows decreased most in Wales (-25%). Overall grazing pressure in the LFA has reduced most in Scotland (-16.3%), followed by Wales (-14.6%), Northern Ireland and England; the greatest contribution to this has come from a reduction in sheep LU (livestock units), although cattle LU has also fallen in all countries. The greatest decreases in grazing pressure have occurred in the North of England, South Wales, the Western Isles of Scotland (Eileanan an Iar) and the Western part of Northern Ireland (Fermanagh). A minority of regions have experienced an increase in grazing pressure including the Peak District, Welsh Borders and South West of England, principally due to more cattle grazing. Changes in livestock numbers and grazing pressure vary considerably at local area level (with adjoining areas sometimes experiencing significant increases and decreases).

There are notable differences between countries in the proportion of LU arising from cattle and sheep and overall stocking density. Key observations include the dominance of cattle in Northern Ireland, and by contrast, the relative importance of sheep in the LFA in Wales. Stocking density varies significantly by country, from an average of 0.25 LU/ha in Scotland to 1.06 LU/ha in Northern Ireland (although this figure relates to LFA and non-LFA land). There are also significant variations within each country – for example, from 0.05 LU/ha in Eileanan an Iar (Scotland) through to 1.27 LU/ha in South West DA (England). These variations are likely to reflect in part the proportion of semi-natural vegetation in a region and potentially provide an indicator of how High Nature Value (HNV) an area is. The differences in grazing pressure and stocking density could have important implications for biodiversity which require further analysis. For example, the data indicates that, in Wales, there is less opportunity for mixed grazing due to the relative dominance of sheep which could lead to difficulties accessing cattle grazing to
manage unimproved ‘coarser’ vegetation types such as rhos pasture. Overall, grazing pressure is notably higher in Northern Ireland and Wales and further analysis is needed to understand the biodiversity implications of this – for example, by overlaying stocking rate and biodiversity data.

Alongside changes in livestock numbers, there have been a number of other changes in grazing regimes in the LFA in recent years. Common changes across all four countries include: less cattle and mixed grazing; greater use of continental/improved breeds of cattle and sheep; summer grazing on the hill starting later; less out-wintering and feeding on the hill; less hefting and shepherding, less common grazing, less burning, more housing of cattle and indoor lambing, more intensive use of in-bye land, a shift from hay to silage and more finishing of stock. There are fewer holdings and farmers with stock, fewer active commoners and more part-time farmers in the LFA. Other changes, specific to certain areas, include a decrease in pony grazing and a reduction in grazing on crofts.

The drivers behind these changes in livestock numbers and grazing regimes include the poor profitability of livestock farming, changing market demands, a switch from headage to decoupled payments, the introduction and widespread uptake of agri-environment schemes, outbreaks of livestock diseases including Bovine Spongiform Encephalopathy (BSE), Foot and Mouth Disease (FMD) and Bovine Tuberculosis (bovine TB), and socio-economic factors such as an aging farmer population and growth in off-farm income leading to a demand for simpler systems requiring less labour and management including less and/or a different type of stock. Regional differences are likely to have been influenced by differences in land productivity and suitability, remoteness, options for alternative management, policies, schemes available and socio-economic context. Single Farm Payments (SFP) and LFA payments are currently important in maintaining financial viability for farms in the LFA, but lack conditionality to reward those farms which deliver most environmental services.

In terms of the biodiversity implications of these changes in livestock numbers and grazing regimes, there has been a polarisation between semi-natural areas, which have experienced a reduction in grazing pressure and a recovery of habitats, which has been broadly positive for biodiversity, and improved areas which have been more intensively used and managed with a negative impact on biodiversity. In particular, a move from traditional breeds to continental or improved breeds of cattle and sheep has changed the grazing pressure on different parts of farms. The higher nutritional requirements of continental/improved breeds has led to an intensification of use and management of in-bye and marginal land, leading to a loss of semi-natural grassland habitats due to agricultural improvement. However, this change has also contributed to under-grazing on the hill.

Upland habitats such as dry heath, wet heath and blanket bog have recovered (and continue to recover) as a result of reduced grazing by sheep in particular, contributing to the improving condition of many sites. However undergrazing and loss of vegetation structure is now occurring in some areas, with adverse impacts for some species such as golden plover and other waders. Less cattle and mixed grazing is contributing to the spread of ranker grasses, rush, scrub and bracken and hampering restoration efforts. A decline in hefting and shepherding is leading to overgrazing and undergrazing on different parts of the same site. Less burning is leading to older stands of heather and loss of vegetation structure. Less grazing is contributing to both native woodland regeneration but also conifer regeneration. On the other hand, less livestock has allowed an increase in grazing by deer and other herbivores. This project has found there is a proven need for the use of cattle with hardy traits. However, not all traditional herds have these traits as they have been bred out of them in favour of intensive production values, illustrating the importance of careful stock selection. More intensive use and agricultural improvement of the in-bye land has resulted in a loss of floral diversity and structure for nesting birds such as lapwing and skylark, as well as nutrient enrichment.

The biodiversity impacts vary greatly at local level. The nature of the impact depends on the mix of habitats and species, the history of grazing in a particular area, and the nature
of the change in grazing regime. It also takes time for the impacts on species in particular to be fully realised. Some species may benefit from a change in grazing, while others may suffer. It is also important to recognise that habitats and species will have been affected by other influences, such as climate change, alongside grazing and land management. This work found that it is important not to overlook the habitats and species on land near to designated sites, as there is often a linkage between the two in terms of farming systems and grazing livestock.

In the same way, there will have been both positive and negative impacts on the delivery of ecosystem services arising from changes in grazing regimes. Reduction in grazing pressure on unenclosed land has delivered positive impacts such as reduced run-off and erosion, improved water quality, reduced flooding and carbon storage. However the wider changes in grazing practices will have also had impacts on ecosystem service delivery which warrant examination. For example, the trend towards intensification of the in-bye could have had negative impacts on biodiversity, carbon and water quality which should be considered. The case studies carried out for this work demonstrate that grazing regimes can have an important impact on ecosystem services delivery but these can be complex.

Looking ahead, it seems likely that there will be continuing reductions in livestock numbers and associated management given the poor profitability of livestock enterprises, the amalgamation of farm units and a decrease in the amount of labour available. There will also be new challenges including changing market prices and market requirements, and the future shape of the CAP, particularly the change from (full or part) historic-based payments in Wales, Scotland and Northern Ireland and a reduction in public sector based budgets; this is important given the dependency on LFA farms on scheme payments. Continuing trends and future changes relating to livestock grazing will influence biodiversity and other ecosystems in the LFA. Ecological and socio-economic monitoring is crucial to demonstrating the benefits of extensive grazing and understanding the support needed to make these systems commercially viable.

A number of suggestions have been made to address existing and potential issues and support the delivery of positive grazing regimes in the LFA. These are encompassed in the following broad recommendations:

1. Encourage policy makers, industry representatives, conservation organisations and farmers to work together to develop a positive, holistic and long term vision for the LFA with joined-up policies and clear objectives.

2. Engage in the CAP reform process to ensure that Pillar 1 and Pillar 2 payments support the delivery of public goods and sustainable farming systems; this includes LFA grazing livestock systems which deliver positively for biodiversity and other ecosystem services. This equates to a strong package of support for HNV farming systems.

3. Improve agri-environment schemes to enhance the biodiversity benefits delivered by making them better targeted, locally responsive, adequately funded and accessible. Specific areas for improvement include: site specific prescriptions and flexibility to deliver optimum grazing for biodiversity priorities; and payments which take account of whole farm system costs, rather than being restricted to ‘income forgone’ calculations for specific changes in management practice.

4. Continue woodland schemes which support the creation and restoration of native woodland for biodiversity and other benefits, recognising the importance of follow-up management including grazing.

5. Ensure regulations do not disproportionately impact on livestock enterprises which are more extensive or those in more marginal areas by carrying out thorough impact assessments.

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6. Continue to support grazing and land management projects run by NGOs and others which help to deliver positive results in terms of habitat restoration and/or species recovery. Ensure that future projects learn from existing experience, encourage co-operation and partnership working, and support valuable funding programmes such as INTERREG and LIFE+.

7. Undertake further research and dissemination to support positive cattle and sheep grazing systems that benefit wildlife and deliver wider public services. Specific areas include: a better understanding of how to restore and maintain habitats; the grazing attributes and biodiversity impacts of different cattle and sheep breeds; and developing more profitable and sustainable upland farming systems and enterprises.

8. Retain and promote the skills required for positive grazing and land management, including cattle management, close shepherding and burning. Encourage young farmers to obtain these skills and consider how suitable successors can be encouraged to take on the management of environmentally valuable sites.

9. Provide better support for initiatives which promote the products from positive cattle and sheep grazing in order to: help develop consumer awareness of the multifunctional nature of extensive grazing; enable strong branding and marketing; and foster supply chain development with the aim of building long term sustainability.

10. Explore ways in which livestock and biodiversity data can be collected in a more co-ordinated and coherent way in different parts of the UK, and establish key indicators, to enable better monitoring of grazing regime and biodiversity changes. In the meantime, the livestock and biodiversity data collected through this study represents an additional resource for future LFA research, nationally and locally.
Acknowledgements

Cumulus Consultants would like to thank a number of individuals and organisations for their invaluable input in helping us to analyse the likely biodiversity implications of changing livestock numbers in the Less Favoured Areas.

The data obtained from the four agricultural departments in the UK was critical to obtain a handle on recent changes in livestock numbers. The data on site condition from the four statutory conservation agencies was helpful to understand trends in habitat and species feature condition and linkages to grazing and related management. Thank you to all those who collated and provided this data.

The feedback from the 20 experts who participated in our survey of expert opinion was invaluable in obtaining a range of perspectives from different countries, organisations and disciplines. Thank you to all those who kindly participated in the survey.

The information and assistance provided by participants in the 8 case studies was much appreciated in order to enable us to understand and illustrate examples of grazing changes and likely biodiversity impacts from around the UK. Thank you to everyone who took time to provide us with information and show us the situation on the ground.

We would also like to thank Paul Britten and Michael Szebor, in the RSPB’s data unit and image library respectively, who produced the maps included in this report and provided some of the photographs.

Lastly, we would like to thank the members of the RSPB steering group including Abi Burns (Project Manager), Gethin Davies, Pat Thompson, Kevin Ryland, Arfon Williams, Amy Corrigan and John Martin who have been a great help in guiding the project and ensuring its objectives were met.
### Glossary

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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AE</td>
<td>Agri-environment</td>
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<tr>
<td>AES</td>
<td>Agri-environment scheme</td>
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<tr>
<td>ANC</td>
<td>Area of Natural Constraint</td>
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<td>AONB</td>
<td>Area of Outstanding Natural Beauty</td>
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<td>ASSI</td>
<td>Area of Special Scientific Interest</td>
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<td>BSE</td>
<td>Bovine Spongiform Encephalopathy</td>
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<td>bTB</td>
<td>Bovine Tuberculosis</td>
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<td>CAP</td>
<td>Common Agricultural Policy</td>
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<td>CCW</td>
<td>Countryside Council for Wales</td>
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<tr>
<td>CTS</td>
<td>Cattle Tracing System</td>
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<td>DA</td>
<td>Disadvantaged Area</td>
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<td>Defra</td>
<td>Department for Environment, Food and Rural Affairs</td>
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<td>DOENI</td>
<td>Department for Environment Northern Ireland</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EID</td>
<td>Electronic Identification</td>
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<td>ELS</td>
<td>Entry Level Stewardship</td>
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<td>FBI</td>
<td>Farm Business Income</td>
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<td>FMD</td>
<td>Foot and Mouth Disease</td>
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<td>GAP</td>
<td>Grazing Animals Project</td>
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<td>HCC</td>
<td>Hybu Cig Cymru</td>
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<td>HLS</td>
<td>Higher Level Stewardship</td>
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<td>HNV</td>
<td>High Nature Value</td>
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<td>LFA</td>
<td>Less Favoured Area</td>
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<td>LFASS</td>
<td>Less Favoured Area Support Scheme</td>
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<td>LFACA</td>
<td>Less Favoured Area Compensatory Allowance</td>
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<td>LNR</td>
<td>Local Nature Reserve</td>
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<td>LU</td>
<td>Livestock Unit</td>
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<td>LWS</td>
<td>Local Wildlife Site</td>
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<td>NCA</td>
<td>National Character Area</td>
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<td>NE</td>
<td>Natural England</td>
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<td>NIEA</td>
<td>Northern Ireland Environment Agency</td>
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<tr>
<td>NNR</td>
<td>National Nature Reserve</td>
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<td>NVZ</td>
<td>Nitrate Vulnerable Zone</td>
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<td>RBST</td>
<td>Rare Breeds Survival Trust</td>
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<td>RDP</td>
<td>Rural Development Programme</td>
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<tr>
<td>SAC</td>
<td>Special Area of Conservation</td>
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<td>SCaMP</td>
<td>Sustainable Catchment Management Programme</td>
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<td>SDA</td>
<td>Severely Disadvantaged Area</td>
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<td>SFP</td>
<td>Single Farm Payment</td>
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<td>SNH</td>
<td>Scottish Natural Heritage</td>
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<td>SPA</td>
<td>Special Protection Area</td>
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<td>SPS</td>
<td>Single Payment Scheme</td>
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<tr>
<td>SSSI</td>
<td>Site of Special Scientific Interest</td>
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<td>TSE</td>
<td>Transmissible Spongiform Encephalopathy</td>
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<td>UAA</td>
<td>Utilised agricultural area</td>
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<td>UELS</td>
<td>Upland Entry Level Stewardship</td>
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<td>WT</td>
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1 Introduction

1.1 Background

Since CAP reform in 2005, the number of beef cows and sheep in the UK has declined. Beef cow numbers have dropped over this period from 1.8 million to 1.6 million, while ewe and sheep numbers have fallen from 17.0 million to 15.0 million. Considered from a historical perspective, livestock numbers have always changed and are still at relatively high levels. However, a number of reports have highlighted concerns that the rate of losses has accelerated in certain regions, with declines being severest in the most disadvantaged areas. The debate has focused on the effects of reduced grazing activity in the uplands and potential negative impacts on habitats and wildlife associated with unenclosed hill and other unimproved land. There is particular concern about declines in suckler herds, given that extensive cattle grazing can benefit a number of species, for example, by creating a more heterogeneous sward.

Most studies examining the effects of the decline in grazing livestock have highlighted that there is a great deal of variation at regional and local levels. For example, in England between 2004 and 2009, beef cow numbers have risen (+1%) on lowland holdings, while numbers have fallen sharply within the Less Favoured Area (-13%), with certain areas particularly impacted (for example, South Pennines -18%). In Scotland, a similar pattern has occurred over the same period with beef cows falling by 11% in the LFA, but only by 2% in non-LFA areas, but the response has been complex. In some cases, an area may have experienced an increase in cattle numbers, while an immediately adjacent area experienced a major decline.

Different species respond in different ways to changes in grazing pressure - there will be winners and losers - so the appropriate grazing pressure will depend on the environmental objectives and which the priority species are. However, grazing is important for maintaining many semi-natural habitats and a number of species benefit from low intensity grazing.

The RSPB shares concerns about the potential impacts of declines in extensive grazing but believes data is lacking on the detailed pattern of livestock losses across different regions of the four countries. In 2008, the RSPB conducted a project mapping livestock losses in Scotland to the parish level and compared this with bird density data for nine bird species whose populations are known to be responsive to livestock grazing levels. This method indicated that livestock losses were most likely to be of concern in the Western Isles and Northwest Scotland. The RSPB plans to update this project as data becomes available from the 2007-2011 Bird Atlas. However, in the meantime, the RSPB believes it would be valuable to extend detailed mapping of livestock declines across the four countries and assimilate available data about likely biodiversity implications of these changes into one document.

1.2 Project aim

The aim of this project is to assess the likely biodiversity implications of changes in cattle and sheep grazing in the Less Favoured Areas (LFA) within England, Wales, Scotland and Northern Ireland.

The primary focus is an analysis of changes in grazing livestock numbers within the LFA using data at the finest level available from the agricultural departments of the four UK countries.

Supplementary evidence has been obtained from a review of site condition monitoring data, a survey of expert opinion to scope the extent to which the lack of suitable grazing or changing grazing practices are preventing conservation objectives from being attained.
and a series of eight case studies from around the UK to explore the issues in more detail on the ground.

It is acknowledged that a comprehensive determination of the impact of declines in grazing animals on biodiversity across the UK is not possible within the scope of this project. However, the output from this project consolidates existing information and, through a survey of expert opinion, indicates the extent to which issues with livestock grazing are preventing favourable habitat condition being maintained or achieved, or other conservation outcomes being delivered.

1.3 Project approach

The project approach involved the following tasks:

- An inception meeting to discuss and confirm the objectives, scope and approach to the study, collate relevant documents and data and identify contacts;
- A review of literature relevant to farming and biodiversity in the LFA to set the context for the study and subsequent tasks, see Appendix 1 for references;
- The collation and analysis of grazing livestock data sourced from the June Survey undertaken in England, Wales, Scotland and Northern Ireland;
- A review of site condition data relating to grazed habitats in the LFA, as far as this was available;
- A survey of opinion involving telephone interviews with 20 land management and biodiversity experts from different organisations and countries to find out the extent to which grazing issues are a significant issue preventing conservation objectives being achieved for different habitats and species;
- The production of eight case studies from around the UK to explore in detail the correlation between livestock numbers and management systems with site condition and biodiversity;
- The production of draft and final reports.
2 Literature review

2.1 Nature and extent of LFAs in the UK

Definition of LFA in the UK

EU Directive 75/2767 defined three distinct types of LFA:

1) Mountain regions;
2) Less Favoured Areas in danger of depopulation and where conservation of the countryside is necessary;
3) Areas affected by specific handicaps.

Council Regulation (EC) 1257/1999 broadly endorsed these three broad categories (though with some modifications and changes in emphasis) and added an additional category to give the following four designations:

1) Mountain areas, (Article 18), characterised by limitations or additional costs arising from the effects of altitude and slope. A latitude criterion was added (north of the 62nd parallel) as it was contended that the effects of northern latitudes on growing season were broadly equivalent to the effects of increasing altitudes;
2) Other LFA, (Article 19), characterised as areas of poor productivity in danger of abandonment and where accelerated decline in agricultural activity would put at risk the viability of the area and its ability to support habitation;
3) Areas affected by specific handicaps, (Article 20), where farming needs to be maintained for the conservation or improvement of the environment, the management of the landscape and/or its tourism value or to protect coastlines;
4) Areas subjected to environmental restrictions, (Article 16), where farming is restricted by the implementation of EU environmental protection rules.

In the UK, LFAs are classified almost exclusively (except for a minor area in the Isles of Scilly) as ‘Other LFA’ (in line with Article 19). The following criteria were used on designation under the 1975 Directive:

- Land of limited agricultural potential, i.e. rough grazing comprising greater than 49% of combined permanent and rough grazing, stocking densities less than 0.78LU/forage ha, and farm rents less than 48% of the national average;
- Low economic results of farming, i.e. earned income/man work unit less than 75% of the national average;
- Low population density, i.e. less than 36 inhabitants/km²; and
- Dependence on farming, i.e. more than 19% of total working population engaged in agriculture.

Extent of LFA in the UK

LFAs in the UK comprise 53% of utilised agricultural area (UAA) or 9.12 million ha. A series of maps showing the LFA in the UK is shown in Figure 2-1.

In England, 2.2m ha of land is classified as LFA, of which 1.8 m ha (17% of UAA in England) is in agricultural production. The LFA is predominantly in the northern, western and south western areas of England. Approximately 14% (306,000 ha) of the LFA is registered as common land and almost all of this is above the moorland line.

In Wales, there is 1.53m ha of agricultural land classified as LFA (80% of UAA in Wales). The LFA covers the main, central part of the country. The Severely Disadvantaged Area (SDA) accounts for 55% of UAA (839,000 ha) and the Disadvantaged Area (DA) covers 26% (393,000 ha).
Figure 2-1: Less Favoured Areas in the UK
In Scotland, there is 5.38m ha of agricultural land classified as LFA (86% of UAA in Scotland). The LFA stretches from the very south of the country to the Shetland Isles in the far north and the Western Isles in the extreme west. Virtually all of the LFA in Scotland is classified as SDA. The LFA includes 583,728ha of common land.

In Northern Ireland, there is 697,220ha of agricultural land classified as LFA (70% of the total agricultural area). The LFA is focused in the west, north east and south of the country. SDA accounts for 45% of UAA (451,445ha) with DA accounting for 25% (245,775ha). The LFA includes 39,849ha of common land, mainly in the SDA.

2.2 Biodiversity and ecosystem services value of LFAs

LFAs in England, Wales, Scotland and Northern Ireland hold significant contiguous tracts of the UK’s remaining areas of semi-natural (that is, comprised of native plants but with composition influenced by human management) upland habitats such as heather moorland, blanket bog and upland grassland. In Northern Ireland, in particular, the LFA also includes less productive, lowland habitats such as lowland bog, fen, floodplain grazing marsh and hay meadow.

Many sites within the LFA are afforded national or European protected status as Areas/Sites of Special Scientific Interest (A/SSSIs), Special Areas of Conservation (SAC) or Special Protection Areas (SPAs). For example 53% (by area) of England’s SSSIs is situated within the uplands.

There are seven upland UK BAP Priority Habitats:

- Blanket bog
- Inland Rock Outcrop and Scree Habitats
- Mountain Heaths and Willow Scrub
- Upland calcareous grassland
- Upland Flushes, Fens and Swamps
- Upland heathland
- Limestone pavements

Many upland areas are also designated as National Parks or Areas of Outstanding Natural Beauty (AONB) highlighting their importance not only for biodiversity but also for recreation, tourism and the preservation of undeveloped and scenic landscapes. Each park is operated by its own national park authority, with two “statutory purposes”:

1. To conserve and enhance the natural beauty, wildlife and cultural heritage of the area; and
2. To promote opportunities for the understanding and enjoyment of the park's special qualities by the public.

The biodiversity value of LFA within National Parks is illustrated below with a couple of examples:

- The Dartmoor National Park Management Plan 2007-2012 highlights the importance of Dartmoor, in the South West of England, for biodiversity: “Overall, over 40% of Dartmoor is afforded international recognition as a Special Area of Conservation (SAC) under the European Habitats and Species Directive, representing some of the finest examples in the UK of habitats and species that are rare or threatened in Europe. The upland blanket bogs and upland heathlands of the open moor and the upland oak-woods of the river valleys are three habitats of international importance on Dartmoor. Areas of blanket bog are the most southerly in England and support some of the best areas of this habitat in the UK covering no less than a third of the open moorland (some 8,500 hectares). They also support the world’s most southerly populations of breeding dunlin. Surrounding the blanket bogs are areas of upland heathland and valley mires. The upland heathland, covering 7,300 hectares, is dominated by heather and western gorse with plant communities that are extremely...
rare outside of Britain. The valley mires – areas of water-logged peat with characteristic acid wetland plant communities – are found wherever drainage is impeded within the river valleys. Dartmoor SAC has also been designated for southern damselfly, Atlantic salmon and otter.

- The Cairngorms National Park in Scotland has a large mountain range at its heart with diverse communities around it. It is home to 25% of Britain’s threatened species and includes unique mountainous areas of wild land, moorlands, forests, rivers, lochs and glens. Sites designated as of importance to natural heritage take up 39% of the land area - two thirds of these are of Europe-wide importance. These valuable habitats often support rare or range-restricted species, unique to the uplands. Birds such as the black grouse, dotterel, ptarmigan and breeding twite, rely on moorland habitats, whilst invertebrates comprise a significant component of moorland biodiversity and respond relatively quickly to habitat changes. They are also important in the diet of upland birds. Several UK BAP plant species such as Juniper, numerous alpine sedges and rushes are unique to the UK LFA, with upland habitats such as flushes and fens being exceptionally important for bryophytes. The uplands also support distinctive mammals such as red deer, mountain hare, pine marten and red squirrel.

In addition to their biodiversity value, LFAs can provide a range of other ecosystem services. A report by Natural England in 2009 sought to undertake an economic valuation of uplands ecosystem services, these included the following:

- Food and fibre;
- Renewable energy provision;
- Water supply (quantity and quality of drinking water) for downstream catchments;
- Costs associated with downstream flood risks;
- The use and enjoyment of uplands for outdoor recreation;
- The use and enjoyment of uplands for field sports;
- The non-use values of historic and cultural landscapes;
- The regulation of greenhouse gas emissions; and
- Biodiversity and wildlife.

The report investigated a number of management change options and illustrated how these changes could impact on ecosystem services. As the dominant land use in the uplands, grazing regime changes can be considered to impact ecosystem services on a large to landscape scale. Table 2-1, taken from the report, identifies the impacts of grazing regime changes on ecosystem services.

A major scheme devised by United Utilities illustrates the delivery of ecosystem services benefits via changes in grazing and other management. The company owns around 57,000 hectares of land in the North West and the Peak District, on which it collects and stores water for around seven million people. More than a quarter of this area is designated as SSSI, including areas such as the Dark Peak, the Goyt Valley and the Bowland Fells. The Sustainable Catchment Management Programme (SCaMP) was started in 2005 and covers an area of 27,000 hectares. Under the plan a range of environmental improvements have been made including: re-vegetating bare peat; grip blocking; introducing dwarf shrub species; establishing new woodland; and adopting more sustainable grazing regimes. As a result of these measures, SSSI land in the project area has gone from 17% in favourable or recovering condition to 98%.

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5 See [http://corporate.unitedutilities.com/The%20SCaMP%20solution.aspx](http://corporate.unitedutilities.com/The%20SCaMP%20solution.aspx)
<table>
<thead>
<tr>
<th>Service</th>
<th>Impacts</th>
<th>Quantification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and fibre</td>
<td>Changes in output and in type of output</td>
<td>Well understood and quantifiable</td>
</tr>
<tr>
<td></td>
<td>Potential indirect impacts on lowland production (fewer store lambs)</td>
<td></td>
</tr>
<tr>
<td>Renewable energy provision</td>
<td>No direct impact.</td>
<td></td>
</tr>
<tr>
<td>Water quality to downstream</td>
<td>Impact through condition of soil (erosion/sediment load)</td>
<td>Understood in principle but not quantitatively in practice.</td>
</tr>
<tr>
<td>catchments</td>
<td>Possible contamination impacts: pesticides (sheep dip); cryptosporidum, E. coli, E. coli.(pathogens), herbicides, and nutrients NPK.</td>
<td></td>
</tr>
<tr>
<td>Cost associated with downstream</td>
<td>Changes in run off may lead to changes in flash flood risks</td>
<td>Partly understood but difficult to quantify.</td>
</tr>
<tr>
<td>flood events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use and enjoyment for outdoor</td>
<td>Impacts on bird species can impact on bird watching. Eroded landscapes</td>
<td>Will be site specific. Variable knowledge on impacts.</td>
</tr>
<tr>
<td>recreation</td>
<td>tend to be muddy and hoof marked and are likely to be less valued for recreational pursuits. Values from observing livestock, especially unusual breeds / wild. Reduced access / risks associated with animals.</td>
<td></td>
</tr>
<tr>
<td>Use and enjoyment for field</td>
<td>Moderate grazing intensity can help keep suitable conditions for game birds and other hunting, and may reduce the frequency of burning. Overgrazing can reduce bird numbers. Water quality issues may impact on fishing downstream.</td>
<td>Partly quantifiable.</td>
</tr>
<tr>
<td>sports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-use values of historic and</td>
<td>“Iconic” moorland landscape dependent upon some level of grazing. Over grazing leads to degraded landscape. Possible non-use values for wild cattle. Grazing can prevent scrub and tree encroachment (major threat to archaeology) but can also pose direct problems to archaeology.</td>
<td>Poorly understood. Probably site specific. Likely part-whole bias.</td>
</tr>
<tr>
<td>cultural landscapes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation of greenhouse gas</td>
<td>Hoof trampling of peat lands leads to erosion and release of greenhouse gases. Trampling dependent not only upon intensity but timing (winter grazing, often with supplemental feeding, leads to trampling in wetter conditions and deep hoof impressions). Cattle can contribute to emissions, including methane from digestion. May influence frequency of burning (see “burning regimes”) and condition of soils/bogs (see “blanket bog restoration”)</td>
<td>Broad principles understood, but quantitative knowledge limited. Research ongoing..</td>
</tr>
<tr>
<td>emissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity and wildlife</td>
<td>Sward height dependent upon grazing regime and many species (in particular ground nesting bird species) in turn dependent upon sward height. Some grassland and heath are semi-natural systems reliant on burning or grazing. Bracken becoming a problem in some areas, cattle grazing one solution to this problem.</td>
<td>Broad knowledge of species favoured by different regimes.</td>
</tr>
</tbody>
</table>

Source: Economic evaluation of upland ecosystem services (NECR029).

Table 2-1: Impacts of grazing regime changes on ecosystem services

2.3 Link between grazing management and biodiversity in LFAs

Domestic livestock

Whilst the uplands are predominantly open, unenclosed, extensive landscapes, they have been subject to human interference over thousands of years, with management such as grazing, cutting and burning influencing their semi-natural state. Livestock grazing is the major agricultural land use in upland areas because of the limitations from difficult terrain and poor soils for other types of production.
The complex mosaic of habitats within the uplands has been highly influenced, and in some cases created, by livestock grazing. These habitats, and mosaics of habitats, require differing grazing regimes in order to be maintained. Some habitats require moderate to high levels of grazing to be in favourable condition for nature conservation (e.g. calcareous grassland) whereas others require very low levels of grazing (e.g. montane willow scrub). For each vegetation type, there is a range of grazing pressures that will maintain its species composition and structure. Grazing pressure outside that range can potentially lead to a decline in nature conservation value or conversion to another vegetation type.

Many upland designated sites have a mix of habitats with varying grazing requirements. This can lead to potential conflicts between habitats in relation to their grazing requirements and management problems in terms of how to manage sites to maintain or achieve favourable condition and deliver specific conservation outcomes.

Changes in livestock grazing pressure have regularly been cited as a key driver for change in the extent and quality of upland habitats (alongside afforestation, agricultural development and to a certain extent, climate change). For example, see Figure 2-2.

Overgrazing, particularly by sheep, has led to the replacement of much upland heathland by grassland. Overgrazing leads to the suppression of dwarf shrubs and ultimately to conversion to acid grassland. This can be exacerbated by a lack of shepherding which prevents stock utilizing the whole of the grazing land available to them. In addition, inappropriate supplementary feeding practices can lead to localised overgrazing and nutrient enrichment. Overstocking by sheep in particular is considered to have been the key reason for the degradation of upland heathland in Northern Ireland, according to the Northern Ireland Countryside Survey, although grazing pressure has subsequently reduced on some bog and heath habitats.

Many SSSI are in ‘unfavourable’ condition because of overgrazing and the Countryside Council for Wales (CCW) highlights overgrazing as the main factor limiting species distribution in upland habitats.

The mix of vegetation types in any upland area can determine the pattern of grazing by livestock and other species and hence the impact of such grazing. Areas dominated by palatable grasses will attract most grazing pressure, with surrounding vegetation types, such as dwarf-shrub heaths, being next in line. Small flushes and springs creating localised lush vegetation can also be favoured by grazing animals.

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Figure 2-2: Montane vegetation overgrazing

Montane vegetation supports many of the most threatened plants in Great Britain, and communities of mosses and liverworts found in habitats are some of the most threatened plant communities in the UK. Overgrazing by deer, sheep and goats continues to be a major issue for many alpine plants, whose populations have become so fragmented that genetic isolation is setting in, meaning that they struggle to produce and set viable seed. These communities are slow growing and very susceptible to damage as recovery takes a long time in these extreme environments.
Variation in the grazing characteristics of different livestock species will also impact vegetation composition. In contrast to cattle, sheep are highly selective grazers and search for and select out the most palatable species. By way of example:

- Within research experiments at Pwllpeiran, Wales, Critchley et al (2007) recorded that feeding studies showed that cattle selected *Nardus* and also consumed more *Nardus* than sheep.
- Another study by Critchley et al (2008) examined the impacts of grazing upland wet heath with sheep only or sheep and cattle together; *Molinia caerulea* was found to increase under grazing by sheep alone and to decrease substantially under grazing by cattle and sheep together.
- Research at the Bronydd Mawr Research Station (IBER, 2004), conducted to determine the effects of grazing on *Molinia caerulea* dominant rough grazing found that utilisation of the dominant tussock grass, *Molinia*, was greatest on the cattle-grazed plots, and thus cattle grazing had the greatest potential to significantly affect the species balance within this type of sward.

The timing of grazing is also a key factor in the effect of grazing. Summer grazing by cattle is potentially beneficial for moorland regeneration by reducing competitive grasses. For example, Backshall et al (2001) stated that cattle can be effective in controlling the spread of purple moor-grass, but grazing needs to occur early in the season when this grass is at its most palatable and susceptible to grazing effects.

![Welsh Blacks grazing the *Molinia* dominated reservoir banks in the Elan Valley, Wales](image)

Work carried out by Scottish Agricultural College on the grazing behaviour of hill sheep has shown that they do not graze randomly over hill vegetation. Vegetation type, time of year, topography and altitude all affect the foraging of the animals. The hill sheep breeds tend to forage in a dispersed manner with individual animals retaining a home-range within the larger home-range of the management flock, a behaviour known as hefting (Hunter and Milner, 1963). In contrast, deer and cattle tend to graze as herds or small groups.

Responses to particular grazing regimes will vary among sites and among plant communities within individual sites. Habitat requirements, and therefore the response to a grazing regime, also vary among bird and invertebrate species. For example, Evans et al (2006) researched the breeding abundance of Meadow Pipit on an upland estate in Scotland and concluded that low intensity, mixed livestock grazing improved the breeding abundance due to a greater variety in vegetation structure and therefore a greater range of invertebrate prey.
An important, broad-ranging study looking at biodiversity and livestock grazing with a focus on heather moorland was undertaken by ADAS and completed in 2007, ‘Determining Environmentally Sustainable and Economically Viable Grazing Systems for the Restoration and Maintenance of Heather Moorland in England and Wales’. Upland heath and mire habitats (generically referred to as heather moorland) in the UK are recognised as being of international conservation significance (Thompson et al., 1995) supporting unique bird and invertebrate assemblages. Many areas have declined in extent and condition as a result of heavy grazing and poor management by burning or other practices (Bardgett et al, 1995). The challenge of the study was to identify approaches for regenerating and restoring moorland habitats that were reliable, cost-effective and compatible with economically viable hill farming systems. Vegetation, bird-habitat, invertebrate and economic modelling were all undertaken alongside grazing studies; the conclusions were as follows:

i. Cattle can have a role in moorland grazing management;
ii. Cattle can reduce competitive grasses but are likely to damage sensitive habitats such as blanket bog;
iii. Sheep at low stocking densities are better for vegetation management and individual animal performance than at high stocking densities;
iv. Heterogeneity in moorland vegetation is required to maintain species diversity of birds and invertebrates;
v. Outcomes depend on the grazing regime and vegetation characteristics so site-specific regimes are necessary to meet particular objectives;
vi. Vegetation can take several years to show a substantial response to grazing;

A case study on the management of upland habitats (including montane heath and blanket bog) in the North Pennines by sheep grazing demonstrates the management of priority habitats at different sheep stocking levels (Ecosite, 2011). The study area comprises five contiguous upland commons in eastern Cumbria, covering 4,124 ha of land, in the North Pennines. Agri-environment agreements are the primary mechanism used to achieve environmental outcomes in the area. Under the terms of these agreements, stocking levels are managed and shepherding introduced to further reduce grazing pressure on sensitive habitats. The progress of these agreements has been closely monitored and analysis of change suggests:

• There has been a positive response of the montane heath vegetation to a reduction in grazing pressure under the agreements. This has included an increase in grass height, an increase in cover of mosses and lichens, an increase in height and dominance of stiff sedge, and an increase in frequency of bilberry;
• Yellow Marsh Saxifrage and other restricted and rare species such as sheathed sedge, alpine foxtail and alpine forget-me-not have benefitted in bog and upland flush habitats;
• The commons remain an important area for golden plover, with migrant dotterel present on Cross Fell summit. Short-eared owl breed here and the formerly threatened population of black grouse is expanding.

Semi-feral and non-domestic grazing animals

Semi-feral and non-domestic grazing animals, such as ponies on Dartmoor or deer in the Scottish Highlands have had a significant impact on habitat composition.

Milne (1998) found that red deer browsing and trampling has had a major impact on the vegetation of the Scottish hills, alongside domestic herbivores. Armstrong (1996) notes that red deer show similar foraging preferences to sheep however they have a higher propensity to browse dwarf shrub, shrub and tree species. This is partly because of competition between sheep and red deer when they share the same range and partly because their larger guts allow them to digest rough vegetation better.
Red deer range over much larger areas than sheep and are often segregated into hind and stag groups. Stags tend to wander over a wider area than hinds. Red deer will often congregate at high density in sheltered wintering areas. This is exacerbated by the common practice of supplementary feeding stags in winter. Red deer are woodland animals by preference and will make use of any available woodland for shelter and forage.

Holland, et al., (2010) suggests that in areas where sheep numbers have declined or been removed red deer numbers are likely to increase as a result of the increase in available herbage, reduced competition from grazing livestock and lower levels of disturbance. These increases in red deer may in part compensate for the loss of livestock however there are differences in the foraging behaviour of sheep and deer. The effects of deer grazing in other studies have largely been linked to upland woodland and forest situations, where they are likely to selectively browse on herbs, shrubs and young trees.

In Scotland, mountain hares also graze upland vegetation. Mountain hares feed largely at night, mostly in heather-dominated vegetation, preferring stands of younger, pioneer heather. They prefer grasses growing amongst the heather, resulting in a diet of less than half heather in summer and almost totally heather in winter when grasses are largely dead or have been removed by grazing.

There has been less research on the grazing characteristics of ponies, however anecdotal evidence suggests native breeds can be useful in terms of conservation grazing, thriving on poor quality upland forage and favoring grasses as opposed to wildflowers.

### 2.4 Livestock farming in the LFA

When assessing changes in livestock grazing and its implications, it is important to consider the context in terms of livestock farming businesses, systems and enterprises.

The predominant farm type engaged with grazing land in the LFA – particularly land with biodiversity value – is ‘grazing livestock (LFA)’. However, other farm types will also be engaged with grazing in the LFA, including dairy, mixed, ‘other’ and, in Scotland in particular, specialist grass and forage farms.

There were 41,000 grazing livestock (LFA) farms in the UK in 2010 – including approximately 12,700 in England, 12,200 in Wales, 13,753 in Scotland and 14,100 in Northern Ireland.

LFA livestock farms are often economically vulnerable, with relatively low profitability and a high dependency on public support payments.

The recent profitability of grazing livestock (LFA) farms – represented by Farm Business Income (FBI) – is shown in Figure 2-4. Average FBI in the UK increased from £14,700 per farm in 2005/6 to £29,600 per farm in 2009/10 before reducing in 2010/11. This dip relates to increased input costs including feed and fuel; there was an increase in output from sheep enterprises but a decrease from beef enterprises. Profitability appears to vary by country, with Scottish and Welsh farms being more profitable on average than those in England and Northern Ireland.

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9 Farm type is classified by the predominant farming activity taking place on the holding, based on economic measure and profitability (Standard Gross Margin, SGM). The farm type is defined as the activity which contributes more than two thirds of the total SGM for the holding.

10 Agriculture in the UK 2010

11 Farm Business Income (FBI) is the preferred measure for comparisons of farm type and represents the return to all unpaid labour (farmers, spouses and others with an entrepreneurial interest in the farm business) and to all their capital invested in the farm business including land and farm buildings. FBI equals: total output from agriculture (includes crop and livestock valuation change) plus total output from agri-environment schemes plus total output from diversification plus Single Payment Scheme less Expenditure (costs, overheads, fuel, repairs, rent, depreciation, paid labour) plus profit/(loss) on sale of fixed assets.
A breakdown of average FBI for grazing livestock (LFA) farms in England is shown in Figure 2-5, by way of example. This shows the negative contribution coming from agriculture and the significant positive contribution coming from the Single Payment Scheme (SPS) and agri-environment and other payments (including LFA payments). These scheme payments equate to well over 100% of FBI in the years after decoupling in 2005; they comprised 133% of FBI in 2010/11. This situation is likely to be similar in other parts of the UK.

Figure 2-4: Average Farm Business Income per farm – Grazing livestock (LFA)

Figure 2-5: Breakdown of average Farm Business Income per farm – Grazing livestock (LFA) - England

Across the UK, the livestock industry has experienced severe challenges to sustainable and profitable business over the past 20 years including outbreaks of Bovine Spongiform Encephalopathy (BSE), Foot and Mouth Disease (FMD) and Bovine Tuberculosis (bovine TB). These have had a direct impact on LFA livestock enterprises resulting in significant changes in land management and livestock numbers across the UK.

In a 2011 study for CCW, Cumulus Consultants examined the role of cattle grazing in delivering improved biodiversity outcomes in the uplands in Wales, specifically focusing...
on the barriers farmers faced in grazing cattle on upland habitats. In addition to the barriers described above, there were generally three areas causing concern: profitability; regulation; and labour. Some of the reasons stated for a decline in cattle numbers and reduced grazing are outlined below:

- The poor profitability of beef enterprises generally and in particular hill and upland suckler cow and store enterprises. The variable and fixed costs of production usually exceed returns (if one excludes subsidy);
- The move towards continental breeds of cattle and their crosses, due to market requirements and improved returns. These breeds are less hardy and less suitable for hill grazing than native breeds;
- The relative profitability of sheep enterprises compared to cattle enterprises;
- The higher labour requirements of cattle relative to sheep, combined with a reduction in the availability of labour on farm.

The SAC 2009 report on ‘Farming’s retreat from the hills’ in Scotland highlights that sheep numbers have fallen dramatically since 1999, most notably in the North West, with some areas seeing reductions of between 35 and 60 percent. Through an analysis of the census data it appears that this reduction is part of a process of down-sizing coupled with a number of farmers leaving the industry. Cattle numbers are also shown to have declined, although not so dramatically as sheep and not in the same areas. The decline in cattle numbers in some areas is a combination of down-sizing and farmers withdrawing from production. However, in many areas the changes are due to an increase in intensity as some farmers have expanded as others leave the industry. Analysis of the changes over different time periods suggests that declines in livestock numbers have accelerated since the introduction of the Single Farm Payment (SFP) and the decoupling of livestock numbers from payments.

A more recent SAC report for Scottish Natural Heritage (SNH) in 2011 analysed the impact on the natural heritage of the decline in hill farming in Scotland. Stock numbers have continued to decline, with the greatest declines occurring in the North and West. Some species and habitats are likely to benefit from a reduction or removal of livestock, while others depend on the presence of grazing herbivores. Within a case study area in South Skye it is likely that a reduction in livestock will result in under-management of grassland coastal crofts and the development of rough grass and scrub encroachment which will negatively affect some bird species which rely on short grass for foraging. In contrast a reduction in grazing pressure is likely to allow the dwarf-shrub heath vegetation to recover, however in the longer term there is potential for bracken to spread further if unmanaged. This emphasises the variation in optimal grazing levels required by different upland habitats to maintain their biodiversity and conservation value. The report also concludes that it is difficult to predict the long-term effects of livestock declines due to other factors such as increasing deer numbers, expanding sporting management and afforestation, and climate change which may all influence habitat change.

A 2008 RSPB livestock mapping project in Scotland also highlighted that the rate of livestock declines varies widely across regions, showing intensification in some areas and abandonment in others. The greatest losses occurred in the Western Isles, North and West Scotland and the Northern Isles, with little change or even some increases in the East. This information was compared with data for nine species of birds (corn bunting, corncrake, twite, curlew, lapwing, golden eagle, dunlin, golden plover and ring ouzel) to determine areas where changes in livestock numbers may impact bird populations. The conclusion was that there was little reason for concern over recent declines in cattle numbers and their impact of birds associated with grazing. However there was more concern over trends in sheep numbers. In the years since these comparisons were made it is clear that further changes in livestock number will have occurred.

Overall it is clear that the relationship between livestock numbers and habitat condition is a complex and evolving process. In all regions of the UK LFA the impact of changing grazing pressures has been evident over the past few decades, and changes are still occurring. The complex interactions between sensitive habitats and grazing animals present challenges in managing the uplands, further complicated by the economic and social issues associated with farming in the LFA.
3 Analysis of changes in grazing livestock numbers

3.1 Introduction

This section sets and analyses data relating to grazing livestock numbers in the LFA, derived principally from the June agricultural survey and complementary sources.

Data on grazing livestock numbers in the LFA from the June survey was requested from the agricultural departments in England, Wales, Scotland and Northern Ireland at the most local level possible (i.e. parish, ward) for the years 1995, 2000, 2005, 2010 and 2011. The availability of data varied from country to country as follows:

- England: data was only available for National Character Areas (NCA) for the years 2000, 2005 and 2010. All data shown in this section is from the Department for Environment Food and Rural Affairs (Defra) unless otherwise indicated.
- Wales: data was only available for small areas – each containing approximately 100-200 farms - for the years 2002, 2005 and 2010. All data is from the Welsh Government (WG) unless otherwise indicated.
- Scotland: data was available for parishes for the years 1995, 2000, 2005, 2010 and 2011. All data shown is from the Scottish Government (SG) unless otherwise indicated.
- Northern Ireland: data was only available at rural district level (LFA and non-LFA) for the years 1995, 2000, 2005, 2010 and 2011. All data shown is from the Department of Agriculture and Rural Development (DARD) unless otherwise indicated.

It is worth noting that the methodology used by the agricultural departments for collecting livestock number data changed over the time period being investigated. For example, in Wales, data on cattle in 2002 and 2005 was derived from the June survey but in 2010 it was derived from the Cattle Tracing System (CTS). Care is therefore required in using the findings of the analysis.

Grazing pressure data, measured in Livestock Units (LU), has been calculated from livestock number data using standard co-efficients for (upland) livestock, as advised by Defra for the Farm Business Survey.

Additional data was obtained from reports, studies and other sources to complement survey data.

At the end of each country section is a series of six maps showing changes in livestock numbers over 2000-2010 and grazing pressure in 2010 at the local area level. The same time period and year has been selected to enable comparison between countries.

An overall summary of changes in grazing livestock numbers by country and region is provided at the end of this section.

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12 Small Area Groups are based on aggregations of Communities within Local Authorities and Old Counties. The 866 Communities within Wales are grouped into 235 Small Areas.
3.2 **England**

19.4% of cattle and 44.5% of sheep in England were located in the LFA in June 2010.

Trends in total cattle and sheep numbers in the England LFA, and for comparative purposes lowland areas, are shown in Figure 3-1 and 3-2. Over the period 2000-2010, there was a:

- 21.1% decrease in cattle numbers in the SDA, 36.5% increase in the DA and 12% decrease in lowland areas.
- 21.2% decrease in sheep numbers in the SDA, 36.9% increase in the DA and 34% decrease in lowland areas.

There were around 17,700 holdings in the LFA in England in June 2009, including 13,000 grazing livestock (cattle and sheep) holdings and 4,700 holdings classified as specialist permanent grass/rough grazing. Grazing livestock farms account for around 70% of agricultural land in the LFA (Defra, 2010).
Dairy cows

Dairy cow numbers in the LFA have reduced by 12.9% since 2000, from 198,898 to 173,260. The SDA has experienced the greatest reduction, 41.5%, compared to a 9.7% increase in the DA, see Figure 3-3.

Historic trends in dairy cow numbers in the LFA are shown in Figure 3-4. Dairy cow numbers have fallen since the introduction of milk quota in 1984. Other drivers include increasing specialisation, improved milk yields, diseases such as Foot and Mouth Disease and bovine TB and more recently NVZ (Nitrate Vulnerable Zone) requirements.

![Figure 3-3: Dairy cow numbers in the LFA in England](image)

![Figure 3-4: Dairy cow numbers in England – historic trends](image)

Dairy farming occurs in all the main LFA regions in England, with the greatest number of LFA dairy cows being in the Peaks (26.3% of the total in 2011), followed by Dales & Bowland (21%) and South West DA (17.2%). In relative terms, the greatest reduction in dairy cow numbers over 2000-2010 occurred in the North York Moors (-30.9%) and South Pennines (-30%). See Table 3-1 and Figure 3-5.

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13 Defra (2010)
Average dairy herd size in the LFA in England has increased from around 55 cows in 1990 to over 90 in 2009 (compared to around 120 cows in lowland areas). Around 40% of dairy herds have less than 10 cows (Defra, 2010).

**Beef cows**

Beef cow numbers in the LFA increased from 229,644 in 2000 to 255,421 in 2005 before dropping back down to 228,587 in 2010. This represents a 0.5% reduction for the LFA as a whole, although this masks a reduction in 17.1% in the SDA and increase of 61.5% in the DA. See Figure 3-6.

Historic trends in beef cow numbers in the LFA are shown in Figure 3-7. Beef cow numbers increased rapidly during the 1980s and 1990s with the introduction of headage based subsidy schemes and the introduction of milk quotas leading some to switch from dairy to beef. Following the decoupling of subsidies in 2005, there has been an overall reduction in beef cow numbers although the extent of this has varied from one LFA region to another. Other influences on beef cow numbers in the LFA include diseases such as FMD and bovine TB, as well as the relative performance of upland sheep enterprises.
Beef farming occurs across all LFA regions in England; the greatest number of LFA beef cows is located in the Borders & North Pennines (23.8% of the total in 2010), followed by Exmoor, Dartmoor & Bodmin Moor (14.2%) and Peaks (13.4%). In most regions, beef cow numbers have increased over the period 2000-2010 (contrary to the national figure), with the greatest increases in the South West DA (26.9%) and the Peaks (22.4%). A notable exception is the significant reduction in the Borders & North Pennines (-19.6%). See Table 3-2 and Figure 3-8.

Table 3-2: Beef cow numbers by LFA region in England

<table>
<thead>
<tr>
<th></th>
<th>Borders &amp; North Pennines</th>
<th>Lakes &amp; Cumbrian Coast</th>
<th>Dales &amp; Bowland</th>
<th>North York Moors</th>
<th>South Pennines</th>
<th>Peaks</th>
<th>Welsh Borders</th>
<th>Exmoor, Dartmoor &amp; Bodmin Moor</th>
<th>South West DA</th>
<th>England</th>
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<tr>
<td>2000</td>
<td>67,649</td>
<td>27,161</td>
<td>26,682</td>
<td>9,050</td>
<td>12,181</td>
<td>24,965</td>
<td>13,334</td>
<td>31,490</td>
<td>14,795</td>
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<tr>
<td>2005</td>
<td>61,791</td>
<td>29,472</td>
<td>28,532</td>
<td>10,532</td>
<td>15,735</td>
<td>31,899</td>
<td>16,847</td>
<td>39,068</td>
<td>20,364</td>
<td>255,421</td>
</tr>
<tr>
<td>2010</td>
<td>54,362</td>
<td>26,745</td>
<td>26,921</td>
<td>9,634</td>
<td>13,204</td>
<td>30,569</td>
<td>15,251</td>
<td>32,463</td>
<td>18,772</td>
<td>228,587</td>
</tr>
</tbody>
</table>

Change 2000-2010  | -19.6%                   | -1.5%                 | 0.9%            | 6.5%            | 8.4%           | 22.4%| 14.4%         | 3.1%                           | 26.9%         | -0.5%  |

% of total in 2010| 23.8%                    | 11.7%                 | 11.8%           | 4.2%            | 5.8%           | 13.4%| 6.7%          | 14.2%                          | 8.2%          | 100.0% |
Average beef herd sizes in the LFA in England increased from around 27 cows in 1990 to 33 cows in 2003 before dropping back to around 29 in 2008 (lowland areas tend to have smaller average herd sizes, under 25 cows). The LFA regions with the largest beef herds include Borders & North Pennines and Exmoor, Dartmoor and Bodmin Moor; the smallest herds are in the South Pennines and the Peaks (Defra, 2010).

**Breeding ewes**

Breeding ewe numbers in the LFA decreased from 3,318,231 in 2000 to 2,909,441 in 2010; an overall reduction of 12%. In the SDA, there was a 23% reduction, however in the DA there was a 37% increase. See Figure 3-9

Historic trends in breeding ewe numbers in the LFA are shown in Figure 3-10. Sheep numbers in the LFA rose throughout the 1980s encouraged by headage based subsidy payments. Ewe quota limits limited the increase before changes in eligibility rules in 2000 and FMD in 2001 resulted in a decline in ewe numbers. Agri-environment scheme agreements have also contributed to a reduction in the number of moorland and fell ewes. Since the early 2000s, there has been a steady decline in overall ewe numbers in the LFA, with declines in all regions since the decoupling of subsidies in 2005.
The greatest number of breeding ewes in the LFA occurs in the Borders & North Pennines (24.1\% of the total in 2010), followed by the Dales & Bowland (19.6\%). In relative terms, the greatest reduction in breeding ewe numbers over the period 2000-2010 occurred in the North York Moors (-21.9\%) and the Borders & North Pennines (-18.7\%). Interestingly, the Welsh Borders experienced a 16.9\% increase in breeding ewe numbers over the same period. See Table 3-3 and Figure 3-11.

The following table shows the breeding ewe numbers by LFA region in England:

<table>
<thead>
<tr>
<th></th>
<th>Borders &amp; North Pennines</th>
<th>Lakes &amp; Cumbrian Coast</th>
<th>Dales &amp; Bowland</th>
<th>North York Moors</th>
<th>South Pennines</th>
<th>Peaks</th>
<th>Welsh Borders</th>
<th>Exmoor, Dartmoor &amp; Bodmin Moor</th>
<th>South West DA</th>
<th>England</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>862,242</td>
<td>617,516</td>
<td>636,860</td>
<td>120,057</td>
<td>172,912</td>
<td>249,496</td>
<td>199,498</td>
<td>318,549</td>
<td>111,941</td>
<td>3,318,231</td>
</tr>
<tr>
<td>2005</td>
<td>742,454</td>
<td>564,062</td>
<td>611,458</td>
<td>111,323</td>
<td>195,494</td>
<td>267,511</td>
<td>251,722</td>
<td>341,011</td>
<td>115,424</td>
<td>3,205,562</td>
</tr>
<tr>
<td>2010</td>
<td>700,575</td>
<td>515,665</td>
<td>569,580</td>
<td>93,823</td>
<td>166,732</td>
<td>241,453</td>
<td>233,293</td>
<td>280,814</td>
<td>101,673</td>
<td>2,909,441</td>
</tr>
<tr>
<td>Change 2000-2010</td>
<td>-18.7%</td>
<td>-16.5%</td>
<td>-10.6%</td>
<td>-21.9%</td>
<td>-3.6%</td>
<td>-3.2%</td>
<td>16.9%</td>
<td>-11.8%</td>
<td>-9.2%</td>
<td>-12.3%</td>
</tr>
<tr>
<td>% of total in 2010</td>
<td>24.1%</td>
<td>17.7%</td>
<td>19.6%</td>
<td>3.2%</td>
<td>5.7%</td>
<td>8.3%</td>
<td>8.0%</td>
<td>9.7%</td>
<td>3.5%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Grazing pressure

Overall grazing pressure in the LFA increased from 1,123,392 LUs in 2000 to 1,172,402 in 2005 before reducing to 1,068,531 LU in 2010, an overall reduction of 4.9%, see Figure 3-12. The main contributor has been a 10.2% reduction in sheep LU; there has also been a 1.7% reduction in cattle LU. In 2010, cattle comprised 64.6% of total LU, with sheep making up the remaining 35.4% of total LU.
Table 3-4: Grazing pressure (total LU) by LFA region in England

The relative changes in cattle and sheep LU by LFA region is shown in Figure 3-13. This shows the growth in grazing pressure from cattle in particular in the Welsh Borders and Peaks. In the South West, the increase in cattle LU has been offset to an extent by a decrease in sheep LU. In Northern regions, the main reduction in grazing pressure has come from sheep, except in the South Pennines, where it has come from a reduction in cattle.

![Graph showing changes in cattle and sheep LU over 2000-2010 by LFA region in England](image)

Table 3-5: Stocking density (LU/ha) by LFA region in England

A series of maps showing changes in livestock numbers and grazing pressure by NCA is shown in Figures 3-14 and 3-15.
Figure 3-14: England LFA – Livestock Change, 2000-2010
Key points of interest from a comparison of these maps include the following:

- There is considerable variation in livestock number change across England. Individual NCAs show changes ranging from +50% to -50% change. The regional figures are informative but hide differences at local level;
- The relative reduction in dairy cow numbers compared to beef cow numbers is evident;
- Changes in breeding ewe numbers show a mixed picture across the country;
- Changes in LU highlight some significant changes by NCA: for example – a significant decrease in the Shropshire, Cheshire and Staffordshire Plain, but a significant increase in the Shropshire Hills adjoining. Eden Valley/Orton Fells in the NW region also shows a significant increase;
- Cattle form a greater part of the total grazing pressure in the South West and Peak District/South Pennines, and less in the North Pennines and the Lake District;
- Variations in stocking density broadly correlate with variations in the cattle LU: sheep LU ratio;
- There does not appear to be a correlation between livestock number change and stocking density.

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14 Ratio of cattle LU / sheep LU: a ratio of <1 indicates that the majority of LU comes from sheep; and a ratio of >1 indicates that most LU comes from cattle.
3.3 Wales

Data on livestock numbers is not collated in the same form in Wales as in other parts of the UK. Livestock number data is only available for small areas, with each small area categorised by the largest type of land in the area (i.e. SDA, DA or lowland) and the share of the total that this type has. Livestock number data is not available for holdings. As a result it is only possible to provide LFA livestock data based on small areas which are wholly or predominantly (>50%) in the LFA. By definition this excludes livestock in the LFA in small areas which are not predominantly in the LFA, and vice versa. While it is still possible to extract trends and do regional comparisons, the total numbers of different types of livestock in the LFA should be treated with caution.

68.8% of cattle and 91.0% of sheep in Wales were located in the LFA in June 2010.

Trends in total cattle and sheep numbers in the Wales LFA – based on small areas which are wholly or predominantly in the LFA – and for comparative purposes lowland areas are shown in Figure 3-16 and 3-17. Over the period 2002-2010, there was a:

- 8.4% decrease in cattle numbers in the SDA, 2.4% decrease in the DA and 2.8% decrease in lowland areas. Note, however the increase to 2005.
- 17.4% decrease in sheep numbers in the SDA, 20.2% decrease in the DA and 18.9% decrease in lowland areas

Figure 3-16: Total cattle numbers in Wales

Figure 3-17: Total sheep numbers in Wales
There are 31,000 holdings in the LFA in Wales, including 10,897 grazing livestock (cattle and sheep) holdings; the majority of the remainder are in the ‘other’ category. Together these LFA holdings represent 77.1% of all farms in Wales as a whole.\(^{15}\)

**Dairy cows**

Dairy cow numbers in the LFA have reduced by 25.0% since 2002, from 209,080 to 156,743. The reduction has been greatest in the SDA, 30.0%, compared to the DA, 22.8%. See Figure 3-18.

It is important to note that the source of cattle data changed in 2006 from the June Survey to the Cattle Tracing System. Up to 2006, the data includes both cows and followers (females intended as herd replacements), whereas after 2006 it includes cows only. This will contribute to the sharp reduction shown in the graphs for both dairy and beef cows.

Reasons for the general decline in dairy cow numbers in recent years are likely to be similar to those experienced in England, see Section 3.2.

![Figure 3-18: Dairy cow numbers in the LFA in Wales](image)

Historic trends for all cattle and calves in Wales – including dairy and beef cattle in the LFA, as well as the non-LFA – are shown in Figure 3-19. There has been a steady reduction in cattle and calf numbers since 1984, with the exception of a noticeable drop and recovery around the time of the Foot and Mouth Disease outbreak in 2001/2. Overall, cattle and calf numbers in Wales have decreased by 22.3% over the period 1984 to 2011.
Dairy farming in the LFA occurs in all regions of Wales. The greatest numbers of dairy cows in the LFA are in Carmarthenshire (36.1%) and Ceredigion (17.8%). In relative terms, the reduction in dairy cow numbers has been greatest in South Wales (-43.3%), followed by Powys (-33.1%) and North West Wales (-30.9%). See Table 3-6 and Figure 3-20.

<table>
<thead>
<tr>
<th>Year</th>
<th>North West Wales</th>
<th>North East Wales</th>
<th>Ceredigion</th>
<th>Powys</th>
<th>Pembrokeshire</th>
<th>Carmarthenshire</th>
<th>South Wales</th>
<th>Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>14,795</td>
<td>20,409</td>
<td>34,153</td>
<td>21,877</td>
<td>24,621</td>
<td>72,789</td>
<td>19,440</td>
<td>209,080</td>
</tr>
<tr>
<td>2005</td>
<td>15,501</td>
<td>20,940</td>
<td>34,643</td>
<td>21,381</td>
<td>25,239</td>
<td>77,020</td>
<td>19,322</td>
<td>215,277</td>
</tr>
<tr>
<td>2010</td>
<td>11,221</td>
<td>16,620</td>
<td>27,926</td>
<td>17,782</td>
<td>17,782</td>
<td>56,544</td>
<td>11,017</td>
<td>156,742</td>
</tr>
<tr>
<td>Change 2002-2010</td>
<td>-30.9%</td>
<td>-18.6%</td>
<td>-18.2%</td>
<td>-33.1%</td>
<td>-27.8%</td>
<td>-43.3%</td>
<td>-25.0%</td>
<td></td>
</tr>
<tr>
<td>% of total in 2010</td>
<td>6.5%</td>
<td>10.6%</td>
<td>17.8%</td>
<td>9.3%</td>
<td>11.3%</td>
<td>36.1%</td>
<td>7.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The number of dairy farms has reduced from 4,564 in 2004 to 3,712 in 2009, a reduction of 19%. Average dairy herd size has increased from 66 to 74 cows.
**Beef cows**

Beef cow numbers in the LFA increased from 222,895 in 2002 to 236,619 in 2005 before reducing to 198,054 in 2010. This represents a 11.1% reduction for the LFA as a whole; the SDA experienced a 13.2% reduction and the DA a 6.7% reduction. See Figure 3-21.

The drivers behind the changes in beef cow numbers in Wales are likely to be similar to those experienced in England, see Section 3.2.

![Figure 3-21: Beef cow numbers in the LFA in Wales](image)

Beef farming in the LFA takes place across Wales, with the greatest numbers of beef cows in the LFA in Powys (33.3%) and North West Wales (16.9%). In relative terms, the reduction in beef cow numbers has been greatest in Carmarthenshire (-17.0%) and Powys (-15.4%). See Table 3-7 and Figure 3-22.

<table>
<thead>
<tr>
<th>Region</th>
<th>2002</th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>North West Wales</td>
<td>35,305</td>
<td>37,654</td>
<td>33,374</td>
</tr>
<tr>
<td>North East Wales</td>
<td>22,536</td>
<td>24,000</td>
<td>19,857</td>
</tr>
<tr>
<td>Ceredigion</td>
<td>22,229</td>
<td>22,964</td>
<td>19,015</td>
</tr>
<tr>
<td>Powys</td>
<td>77,918</td>
<td>83,612</td>
<td>65,926</td>
</tr>
<tr>
<td>Pembrokeshire</td>
<td>8,243</td>
<td>8,186</td>
<td>7,569</td>
</tr>
<tr>
<td>Carmarthenshire</td>
<td>33,392</td>
<td>35,366</td>
<td>27,700</td>
</tr>
<tr>
<td>South Wales</td>
<td>22,203</td>
<td>23,462</td>
<td>21,050</td>
</tr>
<tr>
<td>Wales</td>
<td>222,895</td>
<td>236,619</td>
<td>198,054</td>
</tr>
</tbody>
</table>

![Table 3-7: Beef cow numbers in the LFA by region in Wales](table)
The number of beef farms has reduced from 10,816 in 2004 to 9,888 in 2009, a reduction of 9%. Average beef herd size has remained at 24 cows.

**Breeding ewes**

Breeding ewe numbers in the LFA decreased from 4,689,874 in 2002 to 3,741,782 in 2010; an overall reduction of 20.2%. The SDA experienced a 19.9% reduction and the DA a 22.0% reduction. See Figure 3-23.

The reasons for the reduction in breeding ewe and sheep numbers in Wales are likely to be similar to those experienced in England, see Section 3.2.

Historic trends for sheep and lambs in Wales – including those in both the LFA and non-LFA – are shown in Figure 3-24. Sheep and lamb numbers rose to a peak of 11.8 million in 1999. They then fell, sharply at first and subsequently steadily, to around 8.2 million in 2010 before recovering slightly to 8.6 million in 2011, on the back of improved market prices.
The region with the greatest numbers of breeding ewes in the LFA is Powys (41.7% of the total in 2010) followed by North West Wales and North East Wales. In relative terms, the reduction in breeding ewe numbers has been greatest in South Wales (-29.4%), followed by Carmarthenshire, Ceredigion and North West Wales, see Table 3-8 and Figure 3-25.

Table 3-8: Breeding ewe numbers in the LFA by region in Wales

<table>
<thead>
<tr>
<th>Region</th>
<th>2002</th>
<th>2005</th>
<th>2010</th>
<th>Change 2002-2010</th>
<th>% of total in 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>North West Wales</td>
<td>772,031</td>
<td>713,009</td>
<td>607,470</td>
<td>-21.3%</td>
<td>16.2%</td>
</tr>
<tr>
<td>North East Wales</td>
<td>659,904</td>
<td>607,576</td>
<td>539,948</td>
<td>-18.2%</td>
<td>14.4%</td>
</tr>
<tr>
<td>Ceredigion</td>
<td>470,346</td>
<td>421,080</td>
<td>363,989</td>
<td>-22.6%</td>
<td>9.7%</td>
</tr>
<tr>
<td>Powys</td>
<td>1,865,249</td>
<td>1,740,297</td>
<td>1,558,930</td>
<td>-16.4%</td>
<td>41.7%</td>
</tr>
<tr>
<td>Pembrokeshire</td>
<td>86,950</td>
<td>78,838</td>
<td>70,468</td>
<td>-19.0%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Carmarthenshire</td>
<td>424,552</td>
<td>391,725</td>
<td>320,783</td>
<td>-24.4%</td>
<td>8.6%</td>
</tr>
<tr>
<td>South Wales</td>
<td>396,626</td>
<td>344,420</td>
<td>280,197</td>
<td>-29.4%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Wales</td>
<td>4,689,874</td>
<td>4,312,346</td>
<td>3,741,785</td>
<td>-20.2%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
The number of holdings with sheep has reduced from 16,589 in 2004 to 14,827 in 2009, a reduction of 10%. Average flock size has decreased from 669 to 556 sheep.

Grazing pressure

Overall grazing pressure in the LFA in Wales reduced from 1,127,520 LUs in 2002 to 963,261 LUs in 2010, a reduction of 14.6%, see Figure 3-26. The main contributor was a 18.3% reduction in sheep LU; there has also been a 10.9% reduction in cattle LU. In 2010, cattle accounted for 52.6% of total LU, compared to sheep which accounted for 47.4% of total LU.

Figure 3-26: Grazing pressure (total LU) in the LFA in Wales

Across the country, the greatest reduction in grazing pressure in the LFA has been in South Wales (-21.3%), followed by North West Wales (-15.8%) and Powys (-14.2%). See Table 3-9.

Table 3-9: Grazing pressure (total LU) in the LFA by region in Wales

<table>
<thead>
<tr>
<th>Region</th>
<th>North West Wales</th>
<th>North East Wales</th>
<th>Ceredigion</th>
<th>Powys</th>
<th>Pembrokeshire</th>
<th>Carmarthenshire</th>
<th>South Wales</th>
<th>Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>165,964</td>
<td>142,922</td>
<td>129,701</td>
<td>357,944</td>
<td>51,844</td>
<td>177,527</td>
<td>101,619</td>
<td>1,127,520</td>
</tr>
<tr>
<td>2005</td>
<td>165,331</td>
<td>139,858</td>
<td>126,871</td>
<td>353,307</td>
<td>52,314</td>
<td>182,113</td>
<td>97,990</td>
<td>1,117,786</td>
</tr>
<tr>
<td>2010</td>
<td>139,672</td>
<td>123,263</td>
<td>111,965</td>
<td>306,984</td>
<td>45,712</td>
<td>155,675</td>
<td>79,991</td>
<td>963,261</td>
</tr>
<tr>
<td>% change 2002-2010</td>
<td>-15.8%</td>
<td>-13.8%</td>
<td>-13.7%</td>
<td>-14.2%</td>
<td>-11.8%</td>
<td>-12.3%</td>
<td>-21.3%</td>
<td>-14.6%</td>
</tr>
<tr>
<td>% of total in 2010</td>
<td>14.5%</td>
<td>12.8%</td>
<td>11.6%</td>
<td>31.9%</td>
<td>4.7%</td>
<td>16.2%</td>
<td>8.3%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The relative changes in cattle and sheep LU by region in Wales are shown in Figure 3-27. This shows the general reduction in grazing pressure across the country with sheep being the main contributor in all regions. In Powys, however, the reduction in cattle LU almost matches that from sheep.
There has been a steady reduction in overall stocking density in the LFA in Wales from 1.10 LU/ha to 0.93 LU/ha (-15.7%) over the period 2002 to 2010. The greatest reduction in stocking density has occurred in South Wales and Pembrokeshire. The smallest reduction has occurred in North East Wales. See Table 3-10.

<table>
<thead>
<tr>
<th>Region</th>
<th>2002</th>
<th>2005</th>
<th>2010</th>
<th>% change 2002-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>North West Wales</td>
<td>0.80</td>
<td>0.81</td>
<td>0.66</td>
<td>-17.5%</td>
</tr>
<tr>
<td>North East Wales</td>
<td>1.06</td>
<td>1.17</td>
<td>0.98</td>
<td>-8.2%</td>
</tr>
<tr>
<td>Ceredigion</td>
<td>1.02</td>
<td>0.98</td>
<td>0.85</td>
<td>-16.6%</td>
</tr>
<tr>
<td>Powys</td>
<td>1.06</td>
<td>1.06</td>
<td>0.89</td>
<td>-15.7%</td>
</tr>
<tr>
<td>Pembrokeshire</td>
<td>1.45</td>
<td>1.41</td>
<td>1.19</td>
<td>-17.7%</td>
</tr>
<tr>
<td>Carmarthenshire</td>
<td>1.20</td>
<td>1.19</td>
<td>1.01</td>
<td>-16.4%</td>
</tr>
<tr>
<td>South Wales</td>
<td>0.96</td>
<td>0.96</td>
<td>0.77</td>
<td>-19.7%</td>
</tr>
<tr>
<td>Wales</td>
<td>1.10</td>
<td>1.10</td>
<td>0.93</td>
<td>-15.7%</td>
</tr>
</tbody>
</table>

A series of maps showing changes in livestock numbers and grazing pressure by small area is shown in Figures 3-28 and 3-29.
Figure 3-28: Wales LFA – Livestock Change, 2002-2010
Key points of interest from a comparison of these maps include the following:

- The general reduction in livestock numbers and grazing pressure is evident, albeit with exceptions for specific types of livestock in certain small areas;
- There has been a significant reduction in dairy cow numbers across the country, subject to a few exceptions including a cluster of small areas in mid Wales where numbers have risen;
- Beef cows have reduced less significantly than dairy cows. There are more small areas which have experienced an increase in beef cow numbers, including clusters in SE Wales and Anglesey;
- Breeding ewe numbers have reduced in number in virtually all small areas across the country.
- Changes in LU highlight the reduction in grazing pressure in most small areas; the exceptions include some small areas in the South West.
- Grazing pressure from cattle relative to sheep is greatest in the South West, South East, Llyn Peninsula, Anglesey and North East. Sheep grazing dominates in the central part of Wales, from North to South;
- Variations in stocking density broadly correlate with variations in the cattle LU: sheep LU ratio;
- There does not appear to be a strong correlation between livestock number change and stocking density.
### 3.4 Scotland

72.8% of cattle and 89.5% of sheep were located in the LFA in Scotland in June 2010.

Trends in total cattle and sheep numbers in the Scotland LFA, and for comparative purposes lowland areas, are shown in Figure 3-30 and 3-31. Over the period 1995-2011, there was a:

- 12.5% decrease in cattle numbers in the SDA, 12.1% decrease in the DA and 14.5% decrease in lowland areas;
- 28.6% decrease in sheep numbers in the SDA, 22.5% decrease in the DA and 29.1% decrease in lowland areas.

There were around 36,081 holdings in the LFA in Scotland in June 2010, including 13,753 grazing livestock (LFA) holdings with the majority of the remainder comprising specialist grass and forage farms.

![Figure 3-30: Total cattle numbers in Scotland](image1)

![Figure 3-31: Total sheep numbers in Scotland](image2)
Dairy cows

Dairy cow numbers in the LFA have reduced by 16.1% since 1995, from 146,811 to 123,124. The DA experienced the greatest reduction, 24.8%, compared to the SDA, 13.7%. See Figure 3-32.

Reasons for the general decline in dairy cow numbers in recent years are likely to be similar to those experienced in England, see Section 3.2.

![Figure 3-32: Dairy cow numbers in the LFA in Scotland](image)

Dairy farming in the LFA in Scotland is concentrated in Dumfries & Galloway (44.3%), Ayrshire (21.6%), Clyde Valley (18.5%) and Argyll & Bute (6.3%). In relative terms, the greatest reduction in dairy cow numbers over 1995-2011 has occurred in Eilean an Iar (Western Isles) and NE Scotland (both -65.9%). See Table 3-11 and Figure 3-33.

<table>
<thead>
<tr>
<th>Year</th>
<th>Shetland</th>
<th>Orkney</th>
<th>Eilean an Iar</th>
<th>Highland</th>
<th>NE Scotland</th>
<th>Tayside</th>
<th>Fife</th>
<th>Lothian</th>
<th>Scottish Borders</th>
<th>East Central</th>
<th>Argyll &amp; Bute</th>
<th>Clyde Valley</th>
<th>Ayshire</th>
<th>Dumfries &amp; Galloway</th>
<th>Scotland</th>
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<td>29,041</td>
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<tr>
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<td>754</td>
<td>801</td>
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<td>1,072</td>
<td>2,184</td>
<td>9,352</td>
<td>28,633</td>
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<td>337</td>
<td>1,038</td>
<td>1,144</td>
<td>981</td>
<td>2,331</td>
<td>7,993</td>
<td>23,151</td>
<td>27,285</td>
<td>54,207</td>
<td>124,012</td>
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<tr>
<td>2011</td>
<td>463</td>
<td>2,557</td>
<td>86</td>
<td>939</td>
<td>1,309</td>
<td>394</td>
<td>977</td>
<td>1,102</td>
<td>1,127</td>
<td>2,435</td>
<td>7,801</td>
<td>22,735</td>
<td>26,625</td>
<td>54,574</td>
<td>123,124</td>
</tr>
</tbody>
</table>

| Change 1995-2011 | -15.2% | -32.2% | -65.9% | -63.2% | -65.9% | -39.2% | 36.5% | -22.8% | -16.0% | -6.2% | -26.5% | -30.4% | -21.8% | 5.5% | -16.1% |
| % of total in 2011 | 0.4%   | 2.1%   | 0.1%   | 0.8%   | 1.1%   | 0.3%   | 0.6%  | 0.9%   | 0.9%   | 2.0%  | 6.3%  | 18.5%  | 21.5%  | 44.3% | 100.0% |
Average dairy herd size in the LFA in Scotland has increased from 70 cows in 1995 to over 114 cows in 2011. There is a large regional variation in average dairy herd size from 7 cows in Eilean an Iar to 164 cows in Dumfries & Galloway.

**Beef cows**

Beef cow numbers in the LFA decreased from 431,658 in 1995 to 375,226 in 2011. This represents a 13.1% reduction for the LFA as a whole, including a 14.5% reduction in the SDA and a 14.3% increase in the DA. See Figure 3-34.

More detailed, historic trends in beef cow numbers in Scotland are shown in Figure 3-35. The drivers behind the changes in beef cow numbers in Scotland are likely to be similar to those experienced in England, see Section 3.2. The Scottish Beef Calf Scheme is likely to have had a slowing effect on the reduction in the beef herd.
Beef production occurs across all regions in the LFA in Scotland; the greatest number of LFA beef cows is in Dumfries & Galloway (21.6%), NE Scotland (16.7%) and Highland (12.2%). There has been a reduction in beef cow numbers over 1995-2011, with the greatest decreases in East Central (-29.0%) and Tayside (-24.5%). See Table 3-12 and Figure 3-36.

**Figure 3-35: Beef cow numbers in Scotland – historic trends**

Average beef herd size in the LFA in Scotland has increased from 45 cows in 1995 to 51 cows in 2011. There is a large regional variation in average beef herd size from 7 cows in Eilean an Iar to 81 cows in Dumfries & Galloway.
Breeding ewes

Breeding ewe numbers in the LFA have decreased from 3,506,210 in 1995 to 2,393,489 in 2011; an overall reduction of 31.7%. There has been a 31.8% reduction in the SDA and a 27.4% reduction in the DA. See Figure 3-37.

More detailed, historic trends in breeding ewe numbers in Scotland are shown in Figure 3-38. The drivers behind the changes in sheep numbers in Scotland are likely to be similar to those experienced in England, see Section 3.2.

The greatest number of breeding ewes in the LFA in Scotland occurs in the Scottish Borders (16.0% of the total), followed by Dumfries & Galloway (15.5%) and Highland (14.2%). In relative terms, the greatest reduction in breeding ewe numbers has occurred in Eilean an Iar (-49%) and Highland (-42%). See Table 3-13 and Figure 3-39.
Changing livestock numbers in the UK LFA – Final Report
Cumulus Consultants Ltd - CC-P-545
Date: 4 December 2012

Table 3-13: Breeding ewe numbers in the LFA by region in Scotland

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shetland</td>
<td>181,701</td>
<td>180,889</td>
<td>147,879</td>
<td>123,475</td>
<td>122,023</td>
</tr>
<tr>
<td>Orkney</td>
<td>58,061</td>
<td>59,549</td>
<td>58,209</td>
<td>43,611</td>
<td>44,648</td>
</tr>
<tr>
<td>Eileanan an Iar</td>
<td>149,469</td>
<td>134,601</td>
<td>128,217</td>
<td>108,799</td>
<td>76,163</td>
</tr>
<tr>
<td>Highland</td>
<td>563,485</td>
<td>550,198</td>
<td>458,346</td>
<td>345,645</td>
<td>340,708</td>
</tr>
<tr>
<td>NE Scotland</td>
<td>191,436</td>
<td>182,027</td>
<td>166,292</td>
<td>146,818</td>
<td>143,755</td>
</tr>
<tr>
<td>Tayside</td>
<td>283,377</td>
<td>276,596</td>
<td>248,703</td>
<td>265,645</td>
<td>203,959</td>
</tr>
<tr>
<td>Fife</td>
<td>15,848</td>
<td>16,198</td>
<td>8,303</td>
<td>7,329</td>
<td>6,592</td>
</tr>
<tr>
<td>Lothian</td>
<td>154,362</td>
<td>141,433</td>
<td>120,634</td>
<td>95,577</td>
<td>98,169</td>
</tr>
<tr>
<td>Scottish Borders</td>
<td>479,690</td>
<td>481,500</td>
<td>428,955</td>
<td>383,205</td>
<td>383,804</td>
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<tr>
<td>East Central</td>
<td>567,737</td>
<td>540,679</td>
<td>420,001</td>
<td>369,264</td>
<td>371,526</td>
</tr>
<tr>
<td>Argyll &amp; Bute</td>
<td>229,914</td>
<td>221,171</td>
<td>189,812</td>
<td>158,124</td>
<td>154,141</td>
</tr>
<tr>
<td>Clyde Valley</td>
<td>235,390</td>
<td>230,107</td>
<td>201,677</td>
<td>177,611</td>
<td>170,112</td>
</tr>
<tr>
<td>Ayrshire</td>
<td>566,717</td>
<td>540,879</td>
<td>420,001</td>
<td>369,264</td>
<td>371,526</td>
</tr>
<tr>
<td>Dumfries &amp; Galloway</td>
<td>3,506,210</td>
<td>3,383,869</td>
<td>3,283,859</td>
<td>2,404,053</td>
<td>2,393,489</td>
</tr>
</tbody>
</table>

Change 1995-2011: -32.8% -23.1% -49.0% -41.6% -24.9% -28.0% -13.7% -28.0% -20.0% -36.4% -34.8% -29.1% -25.8% -34.6% -31.7%

% of total in 2011: 5.1% 1.9% 3.2% 14.2% 6.8% 14.2% 0.8% 2.4% 16.0% 4.1% 8.1% 6.6% 7.4% 15.5% 100.0%

Figure 3-39: Breeding ewe numbers in the LFA by region in Scotland, index

Average flock size in the LFA in Scotland increased from 219 ewes in 1995 to 239 ewes in 2000 then subsequently decreased to 217 ewes (490 total sheep) in 2011. There is a large regional variation in average flock size from 37 ewes in Eilean an Iar to 641 ewes in the Scottish Borders.

Grazing pressure

Overall grazing pressure in the LFA in Scotland decreased from 1,448,748 LUs in 1995 to 1,193,764 in 2011, an overall reduction of 17.6%, see Figure 3-40. The main contributor has been a 28.5% reduction in sheep LU; there has also been an 11.6% reduction in cattle LU. In 2011, cattle comprised 69.1% of total LU, with sheep making up the remaining 30.9% of total LU.
Across the country, the greatest reduction in grazing pressure has been in Eileanan an Iar (-34.6% over the period 1995-2011), East Central (-27.2%) and Shetland and Highland (both -26.8%). There was a small increase in grazing pressure in Fife (1.3%). See Table 3-14 and Figure 3-41.

Table 3-14: Grazing pressure (total LU) in the LFA by region in Scotland

<table>
<thead>
<tr>
<th>Region</th>
<th>Shetland</th>
<th>Orkney</th>
<th>Eileanan an Iar</th>
<th>Highland</th>
<th>NE Scotland</th>
<th>Tayside</th>
<th>Fife</th>
<th>Lothian</th>
<th>Scottish Borders</th>
<th>East Central</th>
<th>Argyll &amp; Bute</th>
<th>Clyde Valley</th>
<th>Ayrshire</th>
<th>Dumfries &amp; Galloway</th>
<th>Scotland</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>28,705</td>
<td>66,683</td>
<td>23,846</td>
<td>162,673</td>
<td>152,796</td>
<td>78,402</td>
<td>8,654</td>
<td>30,049</td>
<td>136,007</td>
<td>46,613</td>
<td>92,961</td>
<td>146,117</td>
<td>147,582</td>
<td>328,009</td>
<td>1,448,748</td>
</tr>
<tr>
<td>2000</td>
<td>28,746</td>
<td>66,005</td>
<td>23,690</td>
<td>152,461</td>
<td>150,461</td>
<td>78,736</td>
<td>9,086</td>
<td>30,234</td>
<td>139,455</td>
<td>42,768</td>
<td>92,109</td>
<td>143,319</td>
<td>143,319</td>
<td>326,506</td>
<td>1,433,838</td>
</tr>
<tr>
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<td>24,999</td>
<td>64,039</td>
<td>19,785</td>
<td>143,787</td>
<td>144,581</td>
<td>72,837</td>
<td>9,902</td>
<td>28,419</td>
<td>128,973</td>
<td>41,845</td>
<td>85,005</td>
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<td>130,851</td>
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<td>1,396,184</td>
</tr>
<tr>
<td>2010</td>
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<td>57,881</td>
<td>15,886</td>
<td>121,015</td>
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<td>63,576</td>
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<td>26,413</td>
<td>115,403</td>
<td>36,821</td>
<td>72,183</td>
<td>117,288</td>
<td>126,793</td>
<td>296,006</td>
<td>1,199,724</td>
</tr>
<tr>
<td>2011</td>
<td>21,003</td>
<td>58,899</td>
<td>15,594</td>
<td>119,092</td>
<td>131,826</td>
<td>62,911</td>
<td>8,785</td>
<td>25,656</td>
<td>116,189</td>
<td>33,205</td>
<td>71,929</td>
<td>117,307</td>
<td>120,042</td>
<td>287,581</td>
<td>1,193,784</td>
</tr>
</tbody>
</table>
% change 1995-2011        | -26.8%   | -11.7% | -34.6%         | -27.2%   | -26.8%      | -19.8%  | -14.0%| -14.6%  | -27.2%          | -22.6%      | -19.8%       | -18.7%      | -12.3%   | -17.6%              | -12.3%   |
% of total in 2011        | 1.8%     | 4.9%   | 1.3%           | 10.6%    | 11.0%       | 9.3%    | 0.7% | 2.2%    | 9.7%            | 3.8%        | 9.5%         | 10.1%       | 24.1%    | 100.0%              | 100.0%   |

Figure 3-41: Grazing pressure (total LU) in the LFA by region in Scotland, index

The relative changes in cattle and sheep LU in the LFA by region in Scotland are shown in Figure 3-42. This shows that sheep LU have reduced more than cattle LU in all regions. There has been a small percentage increase in cattle LU in Eileanan an Iar and Fife.
There has been a steady reduction in overall stocking density in the LFA in Scotland from 0.33 LU/ha to 0.29 LU/ha (-21.7%), excluding common land, over the period 1995 to 2011. When one takes common land into account, there has been a reduction from 0.29 LU/ha to 0.25 LU/ha (-13.7%).

There are wide variations in stocking density across Scotland from 0.05 LU/ha in Eileanan an Iar to 0.79 LU/ha in Dumfries & Galloway. The greatest reductions in stocking density have occurred in Eileanan an Iar, Shetland, Highland and East Central. There was an increase in stocking density in Fife. See Table 3-15.

<table>
<thead>
<tr>
<th>Region</th>
<th>Shetland</th>
<th>Orkney</th>
<th>Eileanan an Iar</th>
<th>Highland</th>
<th>NE Scotland</th>
<th>Tayside</th>
<th>Fife</th>
<th>Lothian</th>
<th>Scottish Borders</th>
<th>East Central</th>
<th>Argyll &amp; Bute</th>
<th>Clyde Valley</th>
<th>Ayrshire</th>
<th>Dumfries &amp; Galloway</th>
<th>Scotland</th>
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</thead>
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<tr>
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<tr>
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</tr>
<tr>
<td>2010</td>
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<td>0.71</td>
<td>0.05</td>
<td>0.06</td>
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<td>0.06</td>
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<tr>
<td>2011</td>
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<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
</tr>
</tbody>
</table>

% change 1995-2011 -28.9% -15.9% -38.0% -22.2% -12.7% -13.3% 5.3% -11.1% -11.9% -20.8% -13.9% -15.4% -15.4% -8.7% -13.7%

There are wide variations in stocking density across Scotland from 0.05 LU/ha in Eileanan an Iar to 0.79 LU/ha in Dumfries & Galloway. The greatest reductions in stocking density have occurred in Eileanan an Iar, Shetland, Highland and East Central. There was an increase in stocking density in Fife. See Table 3-15.

A series of maps showing changes in livestock numbers (2000-2010) and grazing pressure (2010) by parish is shown in Figures 3-43 and 3-44.
Figure 3-43: Scotland LFA – Livestock Change, 2000-2010
Key points of interest from a comparison of these maps include the following:

- There is considerable variation in changes in dairy cow numbers across Scotland. Individual parishes show changes ranging from +50% to -50% change. The regional figures hide the local variations;
- The general reduction in beef cow numbers across the country is evident, however there are exceptions where parishes have experienced an increase in numbers, in some cases this has been a significant increase (including Lewis and Harris, some parts of the Highland Region);
- There has been a significant reduction in breeding ewe numbers across the country, with exceptions in the east of the country and the central belt;
- The reduction in grazing pressure broadly mirrors that for breeding ewes albeit less severe.
- Grazing pressure from cattle relative to sheep is greatest in the Grampian, Strathclyde and Dumfries & Galloway Regions;
- Variations in stocking density broadly correlate with variations in the cattle LU: sheep LU ratio;
- There appears to be some correlation between a significant reduction in grazing pressure and low stocking density, especially in the Highlands and Islands and Southern Uplands.
3.5 **Northern Ireland**

60.8% of cattle and 80% of sheep in Northern Ireland were on LFA holdings in June 2011.

Trends in total cattle and sheep numbers in the Northern Ireland LFA, and for comparative purposes lowland areas, are shown in Figure 3-45 and 3-46. Over the period 1995-2011, there was a:

- 13.0% decrease in cattle numbers in the SDA, 4.8% decrease in the DA and a 1.4% increase in lowland areas.
- 27.3% decrease in sheep numbers in the SDA, 35.8% decrease in the DA and a 35.7% decrease in lowland areas.

There has been a gradual decrease in the numbers of both types of livestock in the LFA since 2000.

![Figure 3-45: Total cattle numbers in Northern Ireland](image1)

![Figure 3-46: Total sheep numbers in Northern Ireland](image2)
There were 17,082 farms in the LFA, including 14,259 LFA cattle and sheep farms, in June 2011. Of these LFA cattle and sheep farms, 8,702 are mainly in the SDA and 5,557 are mainly in the DA. They represent 83.5% of all farms in the LFA and 58.4% of all farms in Northern Ireland as a whole.

According to the Review of Support Arrangements in the Less Favoured Areas in Northern Ireland (DARD, 2009):
- There has been a significant restructuring of farm businesses with a 26% decline in the overall number of active farm holdings in the LFA over 1987-2007.
- In the SDA, small farms and beef cattle and sheep enterprises dominate. There has been specialisation over the period 1987-2007.

**Dairy cows**

Dairy cow numbers in the LFA have reduced by 4.5% since 1995, from 145,617 to 139,054. The reduction has been greatest in the SDA, 8.8%, compared to the DA, 2.2%. See Figure 3-47.

Historic trends in dairy cow numbers in Northern Ireland are shown in Figure 3-48. This shows the relative stabilisation of dairy cow numbers in recent years.
Dairy farming occurs in all counties of Northern Ireland, with the greatest numbers of dairy cows in Co. Tyrone (23.6% of the total in 2011), Co. Antrim (23.1%) and Co. Down (22.9%). In relative terms, the reduction in dairy cow numbers has been greatest in Fermanagh (-12.4%), followed by Co. Down and Co. Londonderry, see Table 3-16 and Figure 3-49.

Note, this data is for both LFA and non-LFA land – as there is no available data for the LFA only at county level in Northern Ireland. The proportion of LFA and non-LFA farms in each county is shown in Table 3-17. Note, Fermanagh farms are almost entirely LFA.

<table>
<thead>
<tr>
<th>County</th>
<th>Number of all farms (%)</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2011</th>
<th>Change 2000-2011</th>
<th>% of total in 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co. Antrim</td>
<td></td>
<td>66,022</td>
<td>67,936</td>
<td>65,214</td>
<td>65,296</td>
<td>-1.1%</td>
<td>23.1%</td>
</tr>
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<td>Co. Armagh</td>
<td></td>
<td>30,504</td>
<td>30,977</td>
<td>31,391</td>
<td>31,556</td>
<td>3.4%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Co. Down</td>
<td></td>
<td>67,195</td>
<td>66,599</td>
<td>64,438</td>
<td>64,764</td>
<td>-1.6%</td>
<td>22.9%</td>
</tr>
<tr>
<td>Co. Fermanagh</td>
<td></td>
<td>21,535</td>
<td>20,939</td>
<td>18,709</td>
<td>18,868</td>
<td>-12.4%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Co. Londonderry</td>
<td></td>
<td>33,805</td>
<td>35,491</td>
<td>34,793</td>
<td>35,429</td>
<td>4.8%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Co. Tyrone</td>
<td></td>
<td>65,324</td>
<td>68,588</td>
<td>66,498</td>
<td>66,574</td>
<td>1.9%</td>
<td>23.6%</td>
</tr>
<tr>
<td>N Ireland</td>
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<td>290,530</td>
<td>281,043</td>
<td>282,487</td>
<td>-0.7%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 3-16: Dairy cow numbers by county in Northern Ireland (LFA and non-LFA)

<table>
<thead>
<tr>
<th>County</th>
<th>Number of all farms (%)</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2011</th>
<th>Change 2000-2011</th>
<th>% of total in 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co. Antrim</td>
<td></td>
<td>66,022</td>
<td>67,936</td>
<td>65,214</td>
<td>65,296</td>
<td>-1.1%</td>
<td>23.1%</td>
</tr>
<tr>
<td>Co. Armagh</td>
<td></td>
<td>30,504</td>
<td>30,977</td>
<td>31,391</td>
<td>31,556</td>
<td>3.4%</td>
<td>11.2%</td>
</tr>
<tr>
<td>Co. Down</td>
<td></td>
<td>67,195</td>
<td>66,599</td>
<td>64,438</td>
<td>64,764</td>
<td>-1.6%</td>
<td>22.9%</td>
</tr>
<tr>
<td>Co. Fermanagh</td>
<td></td>
<td>21,535</td>
<td>20,939</td>
<td>18,709</td>
<td>18,868</td>
<td>-12.4%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Co. Londonderry</td>
<td></td>
<td>33,805</td>
<td>35,491</td>
<td>34,793</td>
<td>35,429</td>
<td>4.8%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Co. Tyrone</td>
<td></td>
<td>65,324</td>
<td>68,588</td>
<td>66,498</td>
<td>66,574</td>
<td>1.9%</td>
<td>23.6%</td>
</tr>
<tr>
<td>N Ireland</td>
<td></td>
<td>284,385</td>
<td>290,530</td>
<td>281,043</td>
<td>282,487</td>
<td>-0.7%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 3-17: Percentage of all farms in LFA by county in Northern Ireland

The number of dairy farms in the LFA has reduced from 2,918 in 2000 to 1,558 in 2011, a reduction of 47%. Average dairy herd size in the LFA has increased by over 80% from 48 cows to 89 cows. The average dairy herd size in 2011 nationally was 103 cows.
Beef cows

Beef cow numbers in the LFA increased from 1995 to a peak of 258,270 in 2000, reduced to 197,660 in 2010 and have since recovered slightly to 206,004 in 2011. This represents an overall reduction of 8.2%, comprising a reduction of 11% in the SDA and 2.2% in the DA. See Figure 3-50.

Historic trends in beef cow numbers in Northern Ireland are shown in Figure 3-51. This shows the increase in the sucker herd to the late 1990s, especially in the LFA, followed by a steady decline and more recent recovery in numbers. The main reasons are as described in Section 3.2; improved market conditions are likely to account for the recovery in 2010 and 2011.

Beef farming takes place across country, with the greatest numbers of beef cows in Co. Tyrone (24% of the total in 2011) and Co. Antrim (19%). In relative terms, the reduction in beef cow numbers has been greatest in Co. Fermanagh (-21.3%), followed by Co. Antrim and Co. Armagh, see Table 3-18 and Figure 3-52. As noted previously, this county data is for LFA and non-LFA land.
Average beef herd size in the LFA has increased over the period 1985-2007 from 12 cows to 16 cows in 2007 (15 cows in SDA and 17 cows in DA), however the number of beef cow herds is decreasing (DARD, 2009).

Breeding ewes

Breeding ewe numbers in the LFA increased from 1995 to a peak of 1,049,114 in 2000 and then reduced to 717,087 in 2011; there has been a slight increase since 2010. This represents an overall reduction of 31.6% since 2000, comprising a reduction of 29.3% in the SDA and 37.1% in the DA. See Figure 3-53

Historic trends in breeding ewe numbers in Northern Ireland are shown in Figure 3-54. This shows the steady increase in breeding ewe numbers to the late 1990s followed by a steady decline, with a slight recovery in 2011. The main drivers will be similar to those outlined in Section 3.2.
The county with the greatest numbers of breeding ewes is Co. Antrim (29% of the total in 2011) followed by Co. Londonderry and Co. Tyrone. In relative terms, the reduction in breeding ewe numbers has been greatest in Co. Armagh (-50%), see Table 3-19 and Figure 3-55. As noted previously, this county data is for LFA and non-LFA land.

<table>
<thead>
<tr>
<th>Year</th>
<th>Co. Antrim</th>
<th>Co. Armagh</th>
<th>Co. Down</th>
<th>Co. Fermanagh</th>
<th>Co. Londonderry</th>
<th>Co. Tyrone</th>
<th>N Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>350,014</td>
<td>84,235</td>
<td>265,279</td>
<td>57,866</td>
<td>286,450</td>
<td>288,771</td>
<td>1,332,615</td>
</tr>
<tr>
<td>2005</td>
<td>287,192</td>
<td>54,982</td>
<td>206,855</td>
<td>44,798</td>
<td>220,763</td>
<td>212,741</td>
<td>1,027,331</td>
</tr>
<tr>
<td>2010</td>
<td>254,778</td>
<td>40,631</td>
<td>173,358</td>
<td>41,756</td>
<td>184,966</td>
<td>180,412</td>
<td>875,901</td>
</tr>
</tbody>
</table>

Change 2000-2011: -25.9% -50.0% -34.3% -24.4% -34.4% -35.0% -32.8%

% of total in 2011: 29.0% 4.7% 19.5% 4.9% 21.0% 21.0% 100.0%

Table 3-19: Breeding ewe numbers by county in Northern Ireland (LFA and non-LFA)
Average flock size in the LFA has increased over the period 1985-2007 from 85 ewes to 113 ewes in 2007 (133 ewes in SDA and 93 ewes in DA), however the number of breeding ewe flocks is decreasing (DARD, 2009).

### Grazing pressure

Overall grazing pressure in the LFA increased to a peak of 809,125 LUs in 2000 then reduced to 714,426 LUs in 2011, a decrease of 11.7%. The main contributor has been a 30.2% reduction in sheep LU; there has also been a 8.2% reduction in cattle LU. It is worth noting that, in 2011, cattle comprised 87.4% of total LU, compared to sheep which comprised 12.6% of total LU. See Figure 3-56.

It is worth noting that there has been an increase in LU per holding (representing an increase in herd and flock size) over the period 1986-2007 of 30% on SDA farms and 48% on DA farms (DARD, 2009).
Across the country, the greatest reduction in grazing pressure has been in Co. Fermanagh, with a 15.4% reduction in total LU, followed by Co. Londonderry, see Figure 3-57.

The relative changes in cattle and sheep LU by county are shown in Figure 3-58. This shows the significant reduction in sheep grazing pressure across all counties, but particularly in Co. Armagh, and a greater than 15% reduction in both cattle and sheep LU in Co. Fermanagh.

There has been a steady reduction in overall stocking density in the LFA from 1.16 LU/ha to 1.06 LU/ha over the period 1995 to 2011. Stocking densities are lowest in the SDA (under 1.1 LU/ha) and higher in the DA (1.6-1.8 LU/ha) (DARD, 2009).

Stocking density data for LFA and non-LFA land by county is shown in Table 3-20. This shows the greatest reduction in Co. Fermanagh, a 10% reduction, followed by Co. Armagh.

A series of maps showing changes in LFA and non-LFA livestock numbers (2000-2010) and grazing pressure (2010) by rural district is shown in Figures 3-59 and 3-60.
Figure 3-59: Northern Ireland – Livestock Change, 2000-2010
Key points of interest from a comparison of these maps include the following:

- Dairy cow numbers have increased in the north and central part of the country, with reductions in the South West and South East;
- There has been a general reduction in beef cows across the country, with the exception of North Down;
- There has been a significant reduction in breeding ewe numbers across the country;
- Grazing pressure as a whole has decreased across the country, with the exception of three rural districts: Dungannon; Tandragee; and North Down;
- The dominance of cattle LU relative to sheep LU is evident across the country at this rural district level;
- Stocking density varies across the country, but is greatest in the central and south part of the country;
- There does not appear to be a strong correlation between livestock number change and stocking density.
3.6 Summary

There are significant variations in the changes in livestock numbers across the four countries of the UK and between the SDA and DA. 2000-2010 data is shown for all countries (aside from Wales where data is only available from 2002) for comparative purposes, see Table 3-21.

<table>
<thead>
<tr>
<th></th>
<th>England</th>
<th>Wales</th>
<th>Scotland</th>
<th>N. Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle LFA</td>
<td>0.6%</td>
<td>-5.6%</td>
<td>-11.2%</td>
<td>-8.2%</td>
</tr>
<tr>
<td>Cattle SDA</td>
<td>-21.1%</td>
<td>-8.4%</td>
<td>-11.4%</td>
<td>-11.9%</td>
</tr>
<tr>
<td>Cattle DA</td>
<td>+36.5%</td>
<td>-2.4%</td>
<td>-9.5%</td>
<td>-4.4%</td>
</tr>
<tr>
<td>Sheep LFA</td>
<td>-10.3%</td>
<td>-17.9%</td>
<td>-26.9%</td>
<td>-31.0%</td>
</tr>
<tr>
<td>Sheep SDA</td>
<td>-21.2%</td>
<td>-17.4%</td>
<td>-27.0%</td>
<td>-28.7%</td>
</tr>
<tr>
<td>Sheep DA</td>
<td>+36.9%</td>
<td>-20.2%</td>
<td>-24.8%</td>
<td>-36.2%</td>
</tr>
<tr>
<td>Dairy cows</td>
<td>-12.9%</td>
<td>-25.0%</td>
<td>-10.1%</td>
<td>-1.2%</td>
</tr>
<tr>
<td>Beef cows</td>
<td>-0.5%</td>
<td>-11.1%</td>
<td>-13.9%</td>
<td>-19.0%</td>
</tr>
<tr>
<td>Breeding ewes</td>
<td>-12.3%</td>
<td>-20.2%</td>
<td>-29.0%</td>
<td>-34.3%</td>
</tr>
<tr>
<td>Cattle LU</td>
<td>-1.7%</td>
<td>-10.9%</td>
<td>-10.6%</td>
<td>-7.6%</td>
</tr>
<tr>
<td>Sheep LU</td>
<td>-10.2%</td>
<td>-18.3%</td>
<td>-26.9%</td>
<td>-31.2%</td>
</tr>
<tr>
<td>Total LU</td>
<td>-4.9%</td>
<td>-14.6%</td>
<td>-16.3%</td>
<td>-11.3%</td>
</tr>
<tr>
<td>LU/ha</td>
<td>-21.7%</td>
<td>-15.7%</td>
<td>-16.1%</td>
<td>-5.8%</td>
</tr>
</tbody>
</table>

Table 3-21: Summary of changes in livestock numbers and livestock units 2000-2010 (2002-2010 for Wales)

Over the period 2000-2010, total cattle numbers in the LFA have decreased most in Scotland (-11.2%), followed by Northern Ireland and Wales; there has been a slight increase in England. Total sheep numbers have decreased most in Northern Ireland (-31.0%) and Scotland (-26.9%) followed by Wales and England.

There has been a general reduction in stock numbers since 2000, although cattle and sheep numbers in England, and cattle numbers in Wales, increased to 2005 before reducing following decoupling. Looking further back, dairy cow numbers in the LFA have generally been on a steady downward trend to the present day as the sector has restructured, whereas beef cow and breeding ewe numbers peaked in the mid-late 1990s before falling following the introduction of quotas and the outbreak of FMD in 2001, then decoupling in 2005. Data for 2011, where available, suggests a recovery in the number of livestock numbers in certain areas, this is likely to have been stimulated by improved market prices.

Reductions in cattle numbers have been greatest in the SDA, with lesser reductions in the DA (and, in the England DA, increasing numbers). The differences between SDA and DA for sheep is less clear, with greater reductions in the SDA compared to the DA in England and Scotland, and vice versa for Wales and Northern Ireland.

In terms of breeding livestock: dairy cows have decreased most in Wales (-25.0%), followed by England and Scotland; beef cows have decreased most in Northern Ireland (-19.0%), followed by Scotland, Wales and England (only -0.5%); breeding ewes have also decreased most in Northern Ireland (-34.3%), followed by Scotland, Wales and England.

Grazing pressure in the LFA has reduced most in Scotland (-16.3%) and Wales (-14.6%), followed by Northern Ireland and England. Reductions in sheep LU have had the greatest
influence on the change in grazing pressure a reduction in all four countries; although
cattle LU has also decreased in all four countries. The data indicates greatest stocking
density reduction in England\textsuperscript{16}, followed by Scotland, Wales and Northern Ireland.

It is also worth noting the differences between countries in the proportion of LU arising
from cattle and sheep and overall stocking density, see Table 3-22. Key observations
include the dominance of cattle in Northern Ireland, and by contrast, the relative
importance of sheep, alongside cattle, in the LFA in Wales. Stocking density varies
significantly by country, from an average of 0.25 LU/ha in Scotland to 1.06 LU/ha in
Northern Ireland (although this figure relates to LFA and non-LFA land). There are also
significant variations within each country – for example, from 0.05 LU/ha in Eileanan an
Iar (Scotland) through to 1.27 LU/ha in South West DA (England). These variations are
likely to reflect in part the amount/proportion of semi-natural vegetation in a region and
potentially provide an indicator of how High Nature Value (HNV) an area is. The
differences in grazing pressure and stocking density could have important implications for
biodiversity which require further analysis. For example, the data indicates that, in Wales,
there is less opportunity for mixed grazing due to the relative dominance of sheep which
could lead to difficulties accessing cattle grazing to manage unimproved ‘coarser’
vegetation types such as rhos pasture. Overall, grazing pressure is notably higher in
Northern Ireland and Wales and further analysis is needed to understand the biodiversity
implications of this – for example, by overlaying stocking rate and biodiversity data.

<table>
<thead>
<tr>
<th></th>
<th>England</th>
<th>Wales</th>
<th>Scotland</th>
<th>N. Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle LU as % of total LU</td>
<td>64.6%</td>
<td>52.6%</td>
<td>69.3%</td>
<td>87.6%</td>
</tr>
<tr>
<td>Sheep LU as % of total LU</td>
<td>35.4%</td>
<td>47.4%</td>
<td>30.7%</td>
<td>12.4%</td>
</tr>
<tr>
<td>LU/ha</td>
<td>0.78</td>
<td>0.93</td>
<td>0.25</td>
<td>1.06</td>
</tr>
</tbody>
</table>

Table 3-22: Summary of grazing pressure and stocking density, 2010

A brief summary of regional differences in terms of livestock number change over 2000-
2010 is set out below:

England:
- Dairy cows: from -30% (South Pennines, North Yorkshire Moors) to increases in the
  West and South West, especially in the DA.
- Beef cows: from -20% (Borders & North Pennines) to + 20% (South West DA, Peaks)
- Breeding ewes: from -22% (North York Moors) to more modest reductions in the
  Peaks and South Pennines and an increase in the Welsh borders.
- Grazing pressure: from -17% (Borders & N Pennines) to increases in the Peaks,
  Welsh Borders and South West; these increases have been fuelled by greater
  grazing pressure from cattle in particular.
- Stocking density: from -33% (North York Moors) to -12% (South West DA).

Wales:
- Dairy cows: from -43% (South Wales) to -18% (Ceredigion and North East Wales).
- Beef cows: from -17% (Carmarthenshire) to -5% (South Wales, North West Wales)
- Breeding ewes: from -29% (South Wales) to -16% (Powys)
- Grazing pressure: from -21% (South Wales) to -12% (Pembrokeshire,
  Carmarthenshire). The main contributor is a reduction in sheep grazing pressure in all
  regions.
- Stocking density: from -20% (South Wales) to -8% (North East Wales).

\textsuperscript{16} Note, however this result appears at odds with the LU data for England. The significant reduction in stocking
density is in part due to a 21.5% increase in forage area in England between 2000 and 2005; this could possibly
related to registration of forage area for purposes of SPS entitlement.
Scotland:
- Dairy cows: from -59% (NE Scotland) to +6% (Dumfries & Galloway).
- Beef cows: from -25% (East Central) to -2% (Eileanan an Iar).
- Breeding ewes: from -42% (Eileanan an Iar) to -12% (Fife)
- Grazing pressure: from -33% (Eileanan an Iar) to -1% (Fife). The main contributor is a reduction in sheep grazing pressure in all regions.
- Stocking density: from -34% (Eileanan an Iar) to -3% (Fife).

Northern Ireland (LFA and non-LFA land):
- Dairy cows: from -13% (Fermanagh) to +3% (Londonderry & Armagh).
- Beef cows: from -25% (Fermanagh) to -17% (Londonderry).
- Breeding ewes: from -52% (Armagh) to -12% (Antrim, Fermanagh)
- Grazing pressure: from -17% (Fermanagh) to -5% (Armagh). The main contributor is a reduction in sheep grazing pressure in all regions.
- Stocking density: from -12% (Fermanagh) to +9% (Armagh).

These figures show a complex picture, however there is considerably greater variation in livestock number and grazing pressure change at local area level (with some areas experiencing increases while the corresponding region experiences a decrease, and vice versa). At this level of analysis, there appears to be a strong correlation between stocking density and the cattle LU: sheep LU ratio.
4 Review of site condition data in relating to grazing

4.1 Introduction

This section reviews site condition data in the context of livestock grazing in the LFA. It summarises key findings from the data and considers the extent to which site condition data can assist with assessing/monitoring the impacts of livestock grazing on designated sites and priority features.

Data on the condition of designated sites in the LFA was requested from the statutory conservation agencies in England, Wales, Scotland and Northern Ireland - Natural England (NE), Countryside Council for Wales (CCW), Scottish Natural Heritage (SNH) and Department of Environment Northern Ireland (DOENI) respectively. For each country, the most up to date data was requested on: extent of protected areas by type; percentage of protected area in favourable and unfavourable condition; split by type of protected area; reason for adverse condition split by type of protected area; differences by LFA habitat type; and the name, location, features, condition and reasons for adverse condition for individual sites. The availability of data varied from country to country.

Data was also collected from the Joint Nature Conservation Committee (JNCC) in relation for the UK as a whole, and from conservation organisations in relation to non-designated sites.

4.2 UK overview

The UK Common Standards Monitoring Programme report produced by the JNCC in 2006 provides the latest UK-wide site condition data. It provides useful data for this study, albeit not LFA specific.

Condition of upland features

The report found that 44% of terrestrial habitats with upland features were in favourable condition (maintained or recovering), 19% were unfavourable recovering, 36% were unfavourable and 1% were partially/wholly destroyed.

Upland habitats appear to have a higher percentage of features in favourable condition but a lower percentage in unfavourable recovering condition compared to lowland habitats.

Variations occur between specific upland habitats. Upland assemblages (i.e. upland habitat mosaics) were assessed to be 87% favourable, with individual habitats ranging from 54% favourable (blanket bogs) down to 20% favourable (heathland - upland), see Table 4-1. In general, grassland and heathland habitats – those associated with upland livestock grazing - had a higher percentage of unfavourable condition assessments.

Since 2005, the percentage of sites in favourable or unfavourable recovering conditions has increased, although no specific data is available for terrestrial habitats with upland features and/or protected areas within the LFA. The change reflects improved management of sites (which for upland habitats will include a reduction in livestock grazing pressure) but is also affected by a greater number of sites/features having been assessed over time.
### Reporting category

<table>
<thead>
<tr>
<th>Reporting category</th>
<th>% favourable</th>
<th>% unfavourable - recovering</th>
<th>% unfavourable - no change or declining</th>
<th>% destroyed or part destroyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upland assemblages</td>
<td>87.3</td>
<td>1.8</td>
<td>10.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Blanket bogs</td>
<td>54.1</td>
<td>14.9</td>
<td>30.6</td>
<td>0.5</td>
</tr>
<tr>
<td>Fens and marshes – upland</td>
<td>45.6</td>
<td>18.4</td>
<td>35.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Montane grasslands and heaths</td>
<td>31.9</td>
<td>11.6</td>
<td>56.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Acid grassland – upland</td>
<td>23.2</td>
<td>28.6</td>
<td>46.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Calcareous grassland – upland</td>
<td>22.6</td>
<td>31.0</td>
<td>44.0</td>
<td>2.4</td>
</tr>
<tr>
<td>Heathland – upland</td>
<td>20.5</td>
<td>25.6</td>
<td>50.8</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Source: JNCC, 2006

### Table 4-1: Condition of upland features in the UK, 2005

#### Reasons for adverse condition

Reasons for adverse condition are recorded to help identify the types of activities which are having a negative impact. This enables resources and management to be prioritized and targeted to move the site and features back towards favourable condition.

The 2006 report states that “grazing (either under-grazing or over-grazing) is mentioned very commonly, for many feature types, as the activity causing unfavourable condition. It is perhaps the largest single cause for concern.” It goes onto state that “there is a general trend toward over-grazing in upland habitats and under-grazing in the lowlands”.

For the purposes of this study, adverse activities linked to livestock grazing in the LFA aside from over-grazing and under-grazing include inappropriate livestock feeding and other agricultural interactions such as burning. In practice the condition of a site can be influenced by a number of complex interactions. It should also be noted that instances of overgrazing may not be solely linked to livestock; wild herbivores such as red deer can heavily influence the characteristics of the sites.

#### 4.3 England

The condition of SSSIs, SACs and SPAs in the LFA in England\(^\text{17}\) is summarized in Table 4-2. This shows that, by area, only 18.1% of SSSIs, 14.7% of SACs and 11.1% of SPAs in the LFA are in favourable condition. However, approximately 98% is in favourable or unfavourable recovering condition. Note, in England, condition is assessed at the management unit level; the data covers all units in the LFA and all types of habitat (upland habitats and others).

The condition of upland habitats by LFA region in England is shown in Figure 4-1. Upland habitats include upland acid grassland, bogs, fens, calcareous grassland, heathland, montane heath and neutral grassland. The data shows a broadly similar picture across the LFA regions, although the South Pennines appears to have a very small percentage of upland habitats in favourable condition relative to other areas.

\(^{17}\) This is 2012 data, although the latest condition assessment date varies from site to site.
<table>
<thead>
<tr>
<th>Condition</th>
<th>SSSI</th>
<th>SAC</th>
<th>SPA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (ha)</td>
<td>Area (%)</td>
<td>Area (ha)</td>
</tr>
<tr>
<td>Favourable</td>
<td>82,533.05</td>
<td>18.1%</td>
<td>52,630.25</td>
</tr>
<tr>
<td>Unfavourable recovering</td>
<td>362,943.23</td>
<td>79.7%</td>
<td>299,931.36</td>
</tr>
<tr>
<td>Unfavourable no change</td>
<td>7,373.80</td>
<td>1.6%</td>
<td>5,277.47</td>
</tr>
<tr>
<td>Unfavourable declining</td>
<td>2,246.35</td>
<td>0.5%</td>
<td>1,383.17</td>
</tr>
<tr>
<td>Part destroyed</td>
<td>19.85</td>
<td>0.0%</td>
<td>0.00</td>
</tr>
<tr>
<td>Destroyed</td>
<td>1.86</td>
<td>0.0%</td>
<td>0.00</td>
</tr>
<tr>
<td>Total</td>
<td>455,118.15</td>
<td>100.0%</td>
<td>359,222.24</td>
</tr>
</tbody>
</table>

Data from NE, 2012

Table 4-2: SSSI, SAC and SPA condition in LFA in England

Data for sites in the LFA in England in unfavourable or unfavourable recovering condition with grazing and/or livestock farming related reasons for adverse condition is shown in Table 4-3. This is a subset of all sites in unfavourable condition. The data includes both sites in unfavourable no change or declining condition (live) and those in unfavourable recovering condition (which are indicated as “remedied” i.e. measures are now in place to address the reason for adverse condition). For this subset, overgrazing is the dominant reason for adverse condition accounting for 75% of remedied sites and 50% of live sites, with undergrazing accounting for 5% and 11% respectively.

<table>
<thead>
<tr>
<th>Reason for adverse condition</th>
<th>Live (ha)</th>
<th>Live (%)</th>
<th>Remedied (ha)</th>
<th>Remedied (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture - Other</td>
<td>235</td>
<td>3%</td>
<td>4,733</td>
<td>3%</td>
</tr>
<tr>
<td>Deer Grazing</td>
<td>351</td>
<td>5%</td>
<td>1,035</td>
<td>1%</td>
</tr>
<tr>
<td>Inappropriate Stock Feeding</td>
<td>30</td>
<td>0%</td>
<td>2,875</td>
<td>2%</td>
</tr>
<tr>
<td>Overgrazing</td>
<td>3,355</td>
<td>50%</td>
<td>109,784</td>
<td>75%</td>
</tr>
<tr>
<td>Undergrazing</td>
<td>760</td>
<td>11%</td>
<td>6,627</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>2,008</td>
<td>30%</td>
<td>20,500</td>
<td>14%</td>
</tr>
<tr>
<td>Total</td>
<td>6,738</td>
<td>100%</td>
<td>145,553</td>
<td>100%</td>
</tr>
</tbody>
</table>

Data from NE, 2012

Table 4-3: Reason for adverse condition of protected areas in the LFA in England
An analysis of ‘live’ sites by reason for adverse condition and by LFA region is shown in Figure 4-2. While overgrazing is the dominant reason for adverse condition for live sites in most LFA regions, in a few regions, there are other important reasons including undergrazing in the Dales & Bowland, and ‘other’ (non-agricultural) reasons in the South Pennines, Welsh Borders and the SW moors.

![Bar chart showing reason for adverse condition by LFA region in England](image)

**Figure 4-2: Reason for adverse condition for sites in unfavourable no change or declining condition by LFA region in England**

### 4.4 Wales

A summary of the condition of protected areas and upland habitats in the LFA in Wales was requested but was not available.

Data for sites in the LFA in Wales in unfavourable condition with grazing and/or livestock farming related reasons for adverse condition is shown in Table 4-4. This is a subset of all sites in unfavourable condition. For this sub-set, grazing type and/or timing (40%) and overgrazing (38%) are the dominant reasons for adverse condition followed by insufficient grazing (18%).

<table>
<thead>
<tr>
<th>Reason for adverse condition / issue</th>
<th>Area (ha)</th>
<th>Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing overgrazing</td>
<td>62,413</td>
<td>38%</td>
</tr>
<tr>
<td>Grazing insufficient grazing</td>
<td>29,400</td>
<td>18%</td>
</tr>
<tr>
<td>Grazing type and/or timing</td>
<td>65,550</td>
<td>40%</td>
</tr>
<tr>
<td>(Risk) Grazing - type and/or timing</td>
<td>5,598</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>162,961</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Data from CCW, 2012*

**Table 4-4: Reason for adverse condition of protected areas in the LFA in Wales**

An analysis by CCW region of sites in unfavourable condition with grazing and/or livestock farming related reasons for adverse condition is shown in Figure 4-3. While this is for a limited sample of sites, the data suggests that: grazing type and/or timing is more of an issue in North Wales; overgrazing is the dominant reason for adverse condition in South & East Wales; and there is a more even spread of reasons in West Wales.
4.5 Scotland

A summary of the condition of protected areas in the LFA in Scotland, broken down by type, was requested but was not available.

The condition of upland habitats by LFA region in Scotland is shown in Figure 4-4. Upland habitats include upland acid grassland, bog, fens marsh and swamp, calcareous grassland, dwarf shrub heath and montane heath. This suggests that just 49% of upland habitats in the LFA in Scotland are in favourable or unfavourable recovering condition. This figure is as high as 74% in Argyll and the Outer Hebrides and as low as 29% in Strathclyde & Ayrshire.
Data for sites in the LFA in Scotland in unfavourable condition with grazing and/or livestock farming related reasons for adverse condition is shown in Table 4-5. This is a subset of all sites in unfavourable condition. For this sub-set, overgrazing is the dominant reason for adverse condition accounting for 54% of sites, followed by burning 14%, undergrazing 13% and (other) agricultural operations 10%.

<table>
<thead>
<tr>
<th>Reason for adverse condition</th>
<th>Sites (no.)</th>
<th>Sites (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural operations</td>
<td>103</td>
<td>10%</td>
</tr>
<tr>
<td>Burning</td>
<td>139</td>
<td>14%</td>
</tr>
<tr>
<td>Grazing appropriate level</td>
<td>14</td>
<td>1%</td>
</tr>
<tr>
<td>Grazing over</td>
<td>551</td>
<td>54%</td>
</tr>
<tr>
<td>Grazing under</td>
<td>135</td>
<td>13%</td>
</tr>
<tr>
<td>Trampling</td>
<td>72</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1014</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Table 4-5: Reason for adverse condition of protected areas in the LFA in Scotland

An analysis by LFA region of sites in unfavourable condition with grazing and/or livestock farming related reasons for adverse condition is shown in Figure 4-5. Overgrazing is the dominant reason for adverse condition in all LFA regions, however there is a difference in other reasons for adverse condition by region: trampling is an issue in the Northern Isles & North Highland and South Highland; undergrazing is an issue in South Scotland and Forth; and burning is an issue in Tayside & Grampian and Strathclyde & Ayrshire.

4.6 **Northern Ireland**

Northern Ireland’s Areas of Special Scientific Interest: the Results of the First Condition Assessment Monitoring Cycle 2002-2008 (NIEA, 2008) provides information on site condition, albeit not specific to the LFA.

The condition of features on ASSIs, SACs and SPAs (in both the LFA and non-LFA) in Northern Ireland is summarised in Table 4-6. This shows that only 66.2% of features on ASSIs are in favourable condition and 69% is in favourable or unfavourable recovering condition. 39.5% of SAC features and 83% of SPA features are in favourable condition.
### Table 4-6: ASSI, SAC and SPA condition in Northern Ireland

The condition of features on different types of habitat on ASSI is shown in Figure 4-6. For key habitats relevant to this study, it is worth noting that: 37.5% of grassland features were in favourable or unfavourable recovering condition; 51.7% of heathlands and uplands; and 54.1% of peatlands.

![Figure 4-6: Condition of habitat features on ASSI in Northern Ireland (LFA and non-LFA)](image)

Analysis of reasons for adverse condition by habitat across LFA and non-LFA indicates that the main reasons are as follows:

- Blanket bog: overgrazing
- Wet heath: overgrazing
- Dry heath: overgrazing
- Fens: undergrazing, invasive species
- Purple moor grass: agricultural operations, undergrazing
- Lowland meadow: agricultural operations (ploughing, reseeding, fertilising)
- Lowland bog: water management
4.7 Non-designated sites and reserves

In addition to designated sites, many valuable habitats occur within wildlife sites or reserves; these include around 40,000 Local Wildlife Sites (LWS) (also known as County Wildlife Sites) and around 1500 Local Nature Reserves (LNRs) in England alone (LFA & non-LFA). It is apparent that monitoring of these sites has been at best sporadic, and at worst non-existent.

Defra guidelines advise that the condition of LWS is monitored every 5-10 years. The Wildlife Trusts (the umbrella organisation for all county WTs) carried out a survey into the ‘Status of English Local Wildlife Site Systems 2011’. While 43 partnerships provided details of the number of LWS that have been monitored - least 2,502 LWS in England in 2010 - unfortunately, the results of this monitoring are not available. However, 49 partnerships cited lack of management and 42 cited inappropriate management as among the main threats to LWS.

Information obtained from Devon Wildlife Trust and Derbyshire Wildlife Trust, by way of example, indicate that data is available on the area and percentage of LWS in positive management and this is reported to government via National Indicator 197. However, only limited information is collected in relation to site condition and the reason for unfavourable condition, including whether this relates to changes in livestock grazing. Examples of the reasons reported in relation to LWS in the LFA include: changes in the type of livestock grazed and management regime, and scrub growth (Derbyshire limestone dales); and a reduction in grazing pressure (Devon Culm grassland).

The National Trust (NT) is the UK’s largest landowner with over 250,000ha of land, with large areas situated in the LFAs ranging from peatlands in Powys and Yorkshire to mountains and lakes in Ennerdale, Cumbria. Much of its land is let to tenant farmers, however the NT strives to make space for nature on all its land. Monitoring the condition of habitats is an integrated part of targeted projects such as the ‘Protecting our Peatlands’ project, however there is a lack of standard monitoring programmes across its land.

The RSPB itself manages over 140,000ha on 211 reserves throughout the UK covering a vast array of sites and habitats. Almost 75% is designated SSSI/ASSI and therefore covered by statutory conservation organisation condition assessment.

Key changes in ‘Broad Habitats’ relevant to the LFA between 1998 and 2007, are provided below by way of context. This information is derived from the Countryside Survey 2007:

- The area of Bracken Broad Habitat decreased in the UK by 17.4%, particularly in Wales;
- The area of Dwarf Shrub Heath Broad Habitat in England increased by 15%, but there was no change at UK level;
- The area of Bog, Fen, Marsh Swamp and Calcareous Grassland Broad Habitats did not change in the UK;
- The area of Acid Grassland Broad Habitat in the UK increased by 5.5%, particularly in the uplands of Wales and England (partly in response to the decrease in bracken) In addition, there was a 29% increase in scrub in Northern Ireland over the period between 1998 and 2007, considered to be due to reduced levels of grazing.

The Countryside Survey results “generally show a shift along an ecological gradient succession in Great Britain, perhaps a consequence of vegetation responding to a reduced intensity of management.”
4.8 Summary

Site condition data obtained from statutory conservation agencies as part of this research shows that the percentage of designated sites in favourable condition varies according to type of upland habitat and there has been an improvement in the percentage of sites in favourable or recovering condition in all countries since 2005. Grazing (over-grazing or under-grazing) and related management are commonly mentioned as reasons for the continuing adverse condition of upland habitats on designated sites.

The dominant reasons for adverse condition by country are: overgrazing (England and Scotland); overgrazing and grazing type and timing (Wales); and overgrazing and agricultural operations (Northern Ireland). There are also regional differences, for example: undergrazing is assessed to be a particular issue in the Dales & Bowland, West Wales and South Scotland; trampling is an issue in the Highlands of Scotland; and burning is important in Tayside & Grampian and Strathclyde & Ayrshire.

When reason for adverse condition is analysed against changes in grazing pressure at regional level (based on June Survey data), there does not appear to be any clear correlation. For example a region such as Borders & North Pennines which shows the greatest reduction in grazing pressure in England (see Table 3-4) does not have a significantly lower percentage of sites with over-grazing cited as the reason for adverse condition (Figure 4-2). Another example is the Western Isles and Highlands, which experienced a 25-35% reduction in grazing pressure over 1995-2011 (Table 3-14), but where overgrazing remains the dominant reason for adverse condition (Figure 4-5). Possible reasons for this lack of correlation include: the complexity of the linkages between changes in grazing regimes and biodiversity outcomes; the partial coverage of site condition data in terms of biodiversity impacts; and the poor fit between the livestock number and site condition datasets available (varying dates, geographical scale etc.).

It is important to note that, even with good availability and accessibility, site condition data can only provide a partial picture of biodiversity in a particular area as it is focused on the condition of specific designated features only as opposed to non-designated features and sites. The fact that a site or unit is assessed to be in favourable condition does not necessarily mean that all habitats and species on the site are also in favourable condition.
5 Survey of expert opinion

5.1 Introduction

Using a semi-structured telephone questionnaire, we surveyed a wide range of relevant experts including researchers, policy makers, farming body representatives, advisers and land managers in order to gather informed views on the key grazing and biodiversity issues facing the LFA. We aimed to ensure representative coverage across the four countries, and within countries, to reflect LFA type and land management variation. A list of those surveyed is shown in Appendix 2.

A summary of the key findings from the survey, building on the previous sections of the report, is set out below.

5.2 Changes in livestock numbers

All those interviewed noted that there has been an overall downward trend in livestock numbers, in line with the survey data, but the majority commented on variations at local level. These local variations were often considered large enough to impact on site condition and biodiversity success.

In England, cattle numbers have risen in some parts of the South West and in valleys in the Peak District where there is better land and a more robust cattle economy, and also where HLS (Higher Level Stewardship) targeting and GAP (Grazing Animal Project) projects have facilitated new herds (e.g. the North Pennines AONB).

In Wales, while sheep numbers have declined in recent years, grazing pressure may not have reduced to the same extent due to heavier type lambs (e.g. Texel crosses). Now, sheep numbers are now starting to increase again due to improved market prices. In the Brecon Beacons, sheep numbers have returned to pre FMD outbreak numbers, limiting the recovery of the degraded moorland.

In Scotland, there have been marked variations across the country. There are likely to be variety of reasons for this. One expert commented on the difference between Skye and the Shetlands, and the possible linkage between a greater reduction in livestock numbers in the former due to factors such as the higher average age of crofters, difficulty of management and history of absenteeism. It was also noted that lower livestock numbers do not necessarily equate with more extensive systems; some farmers/crofters have gone out of stock altogether with the land now being used for forestry and stalking.

In Northern Ireland, there is very little difference in the reduction in stock numbers inside and outside designated upland areas / LFAs. While cattle numbers have declined, sheep have reduced even more so.

5.3 Changes in grazing regimes

Evidence from those interviewed, backed up the literature reviewed, indicates the following common changes in grazing regimes (including grazing species, breed, timing, management practices, farming system etc.) in the LFA, aside from the general trend of a reduction in the number of cattle and, in particular, sheep. The changes occur in different combinations depending on circumstances:
• Less cattle and/or mixed grazing (associated with increasing specialisation);
• Move away from traditional to continental or improved breeds of cattle and sheep on both enclosed and unenclosed land (e.g. the use of Blue Faced Leicester rams on native Scottish Blackface ewes in Scotland, producing a faster growing and more needy, but less hardy, lamb);
• More indoor lambing and more finishing;
• Higher lambing percentage and lamb liveweight due to improved breeds and better forage from in-bye\textsuperscript{21};
• Summer grazing starting later on the hill, following lambing;
• Less hefting and shepherding on the hill, linked to seasonal undergrazing and in some places semi-abandonment;
• Less burning on the hill (less common and less frequent);
• Less out-wintering on the hill and more away wintering (but less so in Scotland);
• Less feeding on the hill;
• More animal health issues related to ranker grasses and wet ground (e.g. redwater, louping ill, ticks etc.), and associated with this, some breeding up of own resistant stock;
• Intensification of in-bye land and improvement of marginal land;
• Move from hay to silage;
• Less fertiliser use, partly due to cost and partly due to agri-environment (AES) prescriptions;
• Fewer holdings and farmers with cattle and/or sheep (in some cases, amalgamations of units and crofts);
• Fewer active commoners and a decline in gathering and co-operation (associated with reduced stock numbers) leading to a breakdown in the common grazing system\textsuperscript{22};
• More part-time farmers;
• Some farmers changing to low input - low output systems;

\textbf{Figure 5-1: Cattle grazing on a croft in North Uist}

\textsuperscript{21} This dovetails with Defra figures showing a 10% increase in UK home killed dressed carcase weights for sheep and lambs (kg) over the period 1987-2011.
\textsuperscript{22} One example, cited, was the decline of “soumings” (the right of grazing on common pastures in crofting) in Scotland. This system is thought to have been adversely affected by the introduction of livestock headage payments and subsequent schemes which did not fully recognise or take into account traditional management of common grazings.
Specific changes in certain areas were also identified by the experts:

- A decrease in pony numbers (e.g. Dartmoor, Cambrian Mountains);
- A return to traditional breeds of cattle (e.g. Belted Galloway, Luing), particularly where supported (e.g. North Pennines, Yorkshire Dales). Welsh Black promoted by the breed society, Hybu Cig Cymru and schemes/agreements have had some success but some strains are not hardy enough now for the job on the hill. In Scotland, the reintroduction of cattle via the Moorland Grazing Initiative has also had mixed results;
- Continued overgrazing by sheep on some hills, particularly commons, with undergrazing occurring elsewhere (Wales);
- An increase in summer grazing on the hill as a response to less winter grazing (e.g. Northern Ireland);
- A return to some, limited winter grazing influenced/supported by AES. For example a shift to allow some overwintering of hardy cattle and ponies at appropriate stocking levels on Dartmoor;
- Lack of grazing and other land management on some crofts (e.g. Outer Hebrides);
- Separation of hill and other enterprises (e.g. Outer Hebrides);
- Increase in numbers of rabbit (e.g. Yorkshire Dales) and deer (e.g. Sutherland) and associated grazing pressure from these species.

The different elements of LFA grazing regimes were scored by the experts in terms of their environmental relevance/impact, see Figure 5-2. The elements which scored highest include: stocking density; timing of grazing; livestock species; livestock management and wider farming system. Livestock breed was also considered important, but livestock age profile less so.

![Figure 5-2: LFA grazing regime – environmental relevance/impact](image)

The key points made in relation to this scoring are summarised in Table 5-1 below:

<table>
<thead>
<tr>
<th>Element</th>
<th>Rationale/comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock species</td>
<td>Species is more important than breed. Sheep are better than no grazing at all, but cattle are preferred. Mixed grazing is ideal on most sites, although this has declined as farms have specialised. Cattle are needed on the hill, particularly when restorative work is needed, but they can cause too much damage to the most sensitive heather and red grouse habitats. Cattle and ponies have a greater impact on scrub encroachment than sheep due to the diversity of grazing.</td>
</tr>
<tr>
<td>Livestock breeds</td>
<td>There is a difference of opinion on relative importance of cattle and sheep breed/traits for biodiversity. Upland hardy sheep breeds such as the Welsh Mountain are crucial if the hefts and extensive hill grazing systems are to be saved and optimised. Improved sheep breeds are leading to overgrazing in certain peripheral locations. The breed is not as important as many people suggest; more importantly is the history of hardiness, grazing traits, learnt behaviour, nutritional needs etc. of the particular cow/herd. There is a big variation within breed and across breeds – natives are generally better though.</td>
</tr>
<tr>
<td>Livestock age profile</td>
<td>Stock age is not directly linked to actual biodiversity outcomes however age is important for hefting and site behaviour. Older cattle with experience are better for conservation grazing and awkward sites. The Over Thirty Month Scheme has impacted on age profile.</td>
</tr>
<tr>
<td>Stocking density</td>
<td>Stocking density is a key factor influencing (the condition of) blanket bog and upland heathland. Stock densities seem to be on the low side now on the hills and undergrazing is common. Overgrazing remains in some areas. Getting stock numbers right is not an exact science and varies from site to site and year to year.</td>
</tr>
<tr>
<td>Livestock management</td>
<td>Even though total stock numbers may be right for the hill or valley, the loss of regular close shepherding and hefted flocks is resulting in undergrazing in some areas and overgrazing in other areas. The ability to shepherd is reduced with improved breeds. Supplementary feeding is an issue on certain sites. Extended grazing (kale, fodder beet, deferred grazing/foggage) is becoming more popular again with higher feed prices and good prices for lambs after Christmas. This offers a different type of mosaic on some farms which can be good for overwintering birds etc.</td>
</tr>
<tr>
<td>Wider farming system</td>
<td>Farming systems are generally greener, with more AES uptake, and some simplification. This is generally positive environmentally but not necessarily economically. Changes in the wider farming system have led to agricultural improvement of the in-bye and some marginal areas, resulting in the loss of habitat mosaic, and abandonment in other areas, leading to increase in rush and scrubbing up. Interaction between pasture types (hill, in-bye etc.) is important and has changed. Improved stock demands higher nutritional requirements and this is less able to be met by the ‘unimproved’ parts of farms i.e. hill and semi-natural in-bye. The role and function of the common in the farming system is being eroded. There is a loss of mixed grazing and agricultural diversity.</td>
</tr>
</tbody>
</table>

Table 5-1: LFA grazing regime – environmental relevance/impact

### 5.4 Reasons for changes in livestock numbers and grazing regimes

The main reasons for the changes in livestock numbers and grazing regimes, based on the survey of expert opinion and literature reviewed, are outlined below.
Low returns from livestock enterprises, high costs and low profitability are key drivers influencing the reduction in stock numbers and change in management systems. Prices have been relatively poor for a long period since the 1980s due to BSE and other factors; more recently market prices have improved, although costs have also increased (especially feed, fertiliser and fuel). Market requirements have changed with a demand for better carcass quality and uniformity (although this is not always feasible with extensive and/or upland farming systems). Farmers have sought to adapt their systems to improve profitability and meet changing demands by switching to continental or improved breeds, which are more productive, and finishing animals where possible. The use of continental breeds and crosses has led to a demand for improved forage with the resulting intensification of in-bye land and the use of other productive land elsewhere. The ability of farmers to finish stock and add value has been affected by the loss of abattoirs and independent outlets.

At the same time, farmers’ use of their hill ground has been positively influenced by agri-environment schemes introduced in the late 1980s and 1990s; prescriptions required lower stocking densities, restricted the timing of grazing (particularly in the winter) and discouraged practices such as unsuitable supplementary feeding. These changes are linked to an increased use of housing and away wintering, and a shift to continental breeds and crosses which do better in sheds.

The introduction of quotas for suckler cow premium and sheep annual premium in the late 1990s put a brake on livestock numbers. The outbreak of FMD in 2001 then led to significant stock reductions in key areas and damaged traditional systems based on hefted flocks; individuals restocked in a variety of ways. More recently, the introduction of decoupled subsidies in 2005 broke the link between the amount of payment received and the number of livestock kept resulting in many farmers deciding to reduce numbers of cattle and sheep (in particular), where they were unprofitable, and in some cases going out of stock entirely. The minimum stocking density attached to LFA payments (and similar payments under successor agri-environment schemes in England and Wales) has helped to retain a minimum level of stock in the hills.

![Figure 5-3: Scottish Blackface ewes at Glenwherry Hill Farm, Co. Antrim](image)

More recently, the incidence of bovine TB has had a negative impact on the number of cattle kept in the LFA. Regulations relating to tagging, movements, Nitrate Vulnerable Zones and cross compliance, high infrastructure costs, and labour availability/cost have also been cited as barriers to keeping or re-introducing cattle.

Socio-economic drivers include the increasing age of farmers and a shift to more part-time farming (linked to the growing importance of off-farm income); these have contributed to a shift away from cattle and mixed farming to simpler systems requiring less management and less labour. Where there is high visitor pressure, farmers will often remove their stock, particularly cattle, to reduce risk to the public.
In addition to the above, dairy cow numbers and enterprises in the LFA have been strongly influenced by the introduction of milk quotas in 1984 and pressure to improve milk yields, improve margins and reduce overheads, generally resulting in restructuring to fewer, larger herds.

Whilst these factors have undoubtedly influenced the changes in grazing livestock numbers and grazing regimes, the differences between regions and local areas are less easy to explain. Contributing factors to regional/local differences are likely to include: the underlying suitability and productivity of the land (e.g. influencing recent increases in cattle numbers in SW England and parts of the Peak District); remoteness affecting market opportunities, costs of production and profitability; options for alternative management (e.g. sporting and conservation in Scotland); the policies and incentive schemes applicable in different countries and regions; designations influencing flexibility of management and the availability of agri-environment scheme income; the system of tenure (e.g. crofting in Scotland); and the socio-economic context of different areas.

5.5 Implications of changes in livestock numbers and grazing regimes on biodiversity

Drawing on the expert opinion survey and literature, this important section highlights the key impacts of changes in livestock numbers and grazing regimes on biodiversity and the wider environment in the LFA.

In broad terms, changes in livestock numbers and grazing regimes in recent years have led to a polarisation between: semi-natural areas, which have experienced a reduction in grazing pressure and a recovery of habitats, which has been positive for biodiversity; and improved ground, which has experienced more intensive use and management, with negative impacts.

However, this simplifies a range of complex interactions and local variations across countries and regions. It is also worthwhile noting that the biodiversity implications of grazing change are often missed and/or not fully understood, given the fact that vegetation structure changes first, with changes in vegetation type and animal species responding much more slowly. Habitat changes can be subtle and are not necessarily picked up when mapped or assessed (e.g. heather moorland remains heather moorland when mapped or assessed but individual species dominance, structure, age profile, plant health, linkage between discreet areas etc. alters over time). With these caveats in mind, an outline of the range of impacts of grazing change on biodiversity in the LFA, many of which arise in combination, is set out below.

Reduced grazing pressure on hill land has generally contributed to the restoration of upland habitats such as dry heath, wet heath and blanket bog across the UK. However the response to reduced grazing varies from site to site depending on the habitat and species present, the condition of the habitat and species, and the previous grazing history. For example:

- Where *Molinia* is present on deep peat, less sheep grazing can result in more *Molinia* and a decrease in species diversity (which then requires cattle grazing);
- Where there is limited dwarf shrub on degraded land, less grazing can simply result in an increase in the height of vegetation and rank grasses rather than an improvement in species composition. On the other hand, where semi-degraded dwarf shrub communities are present, stock removal can lead to a recovery in condition;
- Wet heaths tend to recover quickly in response to reduced sheep grazing. This is because cross leaved heath is less palatable than heather and is often hanging on in degraded wet heaths;
- A reduction in grazing can lead to improved site condition where overgrazing has been an issue, but otherwise may just halt a deterioration in condition.

Getting the right type and level of grazing can be difficult, see Figure 5-4.
Loss of cattle and increased sheep numbers in the 1970s/80s resulted in overgrazing of the species rich limestone pavement and the loss of flowering plants in the Yorkshire Dales. Reduced grazing has now allowed the Blue moor grass to dominate some areas and harder grazing with cattle is required to help open up the sward again. Too many cattle however can damage the shrub layers within the limestone pavement mosaic (a key measure of favourable condition). “Getting the balance right is very hard”.

Figure 5-4: Grazing and limestone pavement

A reduction in stocking can lead to greater structural diversity, particularly in grassy areas such as upland calcareous grassland. This can benefit some species (e.g. meadow pipit and skylark) but those species associated with shorter swards (e.g. wheatear, eyebright spp.) or mixed swards (e.g. ring ouzel) may become less widespread.

However, reduced grazing pressure can also lead to undergrazing and a loss of vegetation structure, leading to a sense that the hill is “overgrown”. Less burning can have a similar effect, leading to the presence of older stands of heather and Molinia, and a loss of vegetation structure. This can adversely affect certain species (e.g. golden plover on heather moorland).

Reduced cattle and mixed grazing, in particular, has contributed to the spread of ranker grasses (Molinia, Nardus), rush, bracken and scrub, and more homogeneous swards. Where this occurs, and scrub and rank grasses dominate, restoration can become harder, particularly with the farming systems and grazing animals available on the hill; it can also increase the need for burning. In Scotland, bracken and gorse has increased in extent, with less heather and scrub, due to changes not only in grazing pressure but also climatic conditions.

Lower levels of sheep and cattle grazing have supported the regeneration of native woodland and heathland in places, assisting species such as black grouse, see Figure 5-5. However less grazing has also contributed to coniferous scrub encroachment next to plantations.

Figure 5-5: Grazing and Black Grouse

In places, reduced livestock grazing has led to an increase in grazing by wild herbivores including deer, hare and rabbits. This can impact on a range of habitats, for example in the Scottish Highlands, large numbers of browsing deer can deplete the forest shrub layer and deprive black grouse of cover and food.

A change from traditional breeds to continental or improved breeds of cattle and sheep has changed the grazing pressure on different parts of farms. The higher nutritional requirements of continental/improved breeds has led to an intensification of use and...
management of in-bye and marginal land, leading to a loss of semi-natural grassland habitats due to agricultural improvement. However, this change has also contributed to under-grazing on the hill.

A reduction in hefting and shepherding in hill areas has led to over-grazing in some areas, but under-grazing and scrub encroachment in others, with adverse impacts on some upland habitats and associated species.

Marginal areas, such as the ffridd in the Welsh uplands, have experienced both under and over-grazing. This has led to a significant loss of habitat mosaic on many farms.

On species rich grassland habitats, overgrazing and improvement has led to nutrient enrichment and loss of floral diversity. For example, the improvement and overgrazing of purple moor grass and rush pasture can result in the sward being dominated by soft rush and ranker grasses. Higher stocking rates can also lead to increased disturbance of ground nesting birds such as the lapwing and skylark.

The switch from hay to silage has resulted in a large decline in the area of species rich meadow, with adverse impacts on the range of plants present and other species such as curlew, twite and yellow wagtail.

Where cattle are housed during winter, in association with more intensive use of grassland, this can lead potential pollution issues arising from manure storage and application.

Undergrazing on grassland habitats, on the other hand (which occurs in parts of the South West moors in England for example) can lead to the encroachment by scrub and rushes and loss of species diversity. Stocking density declines have tended to be more acute on awkward sites and these are often the best for biodiversity.

As indicated above, the impact of changes in livestock numbers and grazing regimes on species can be positive or negative depending on the species concerned. Other examples of potential species conflicts identified by the experts interviewed are set out in Table 5-2.
Example of potential species conflict arising from changes in grazing

Restricting grazing to benefit species such as red grouse can impact on golden plover, and other waders as the vegetation can get too tall/dense.

Cattle grazing has been used to reduce the dominance of *Molinia* in Wales. However some overgrazing has occurred before grazing spreads into target areas. This has, for example, impacted on acid grassland in terms of structural diversity and poaching.

Where ffridd is undergrazed scrub, successional woodland can dominate. This will decrease the immediate biodiversity value although some woodland bird species will benefit and valuable mature woodland will develop over time.

Undergrazing in South West moors in England has led to an increase in scrub which has affected key species such as heath fritillary butterfly; this now requires scrub management.

Marginal rush pasture is a mosaic of habitats and has varied grazing requirements which is difficult to get right. In Northern Ireland, curlew has suffered from a loss of habitat mosaic declining from 5,000 to a few hundred now; lapwing have suffered from a loss of bare ground.

Work on the red billed chough on in-bye and dune systems in Scotland has shown the need for short open pasture (hard winter/late spring grazing) with high insect numbers for nesting and chick survival in spring/early summer. This conflicts with the objectives for corncrake which needs meadows to be shut up for hay, creating a denser sward.

<table>
<thead>
<tr>
<th>Table 5-2: Potential species conflicts arising from changes in grazing</th>
</tr>
</thead>
</table>

It is important to highlight the impact of grazing changes on a range of other ecosystem services aside from biodiversity. Extensive grazing introduced to, or maintained on, habitats, as a result of AES participation or otherwise, has helped reduce soil erosion, improve water quality and reduce flood risk. Undergrazing on the other hand can increase the risk of wildfire. This can leave a surface which is vulnerable to rain damage, run-off and erosion, with adverse impacts on soils and water quality. It can also contribute to the loss of carbon from peatland and other soils.

Grazing change can result in both positive and negative impacts on ecosystem services on the same site; for example, a recovery of dwarf shrub heath may reduce overland flow and soil erosion, and improve water quality, but more heather can lower the water table with potential adverse impacts on the availability of water, and habitats and species in the area which are dependent on high water levels such as wet heath and blanket bog.

Reduced stock numbers have also had an adverse impact on animal and human health (with an increase in bracken leading to a greater tick problem) and recreational use (with taller vegetation making areas more difficult to access).

Further examples of the interactions between grazing change and biodiversity and other ecosystem services are provided by the case studies, see Section 6 and Appendix 3.

![Golden plover](image)

**Figure 5-7: Golden plover**
5.6 Achieving positive cattle and sheep grazing

This section explores “positive” cattle and sheep grazing, what it is and current barriers to achieving this.

In order to communicate positive change and desirable grazing regimes, a set of clear definitions and measures are needed. The experts suggested that positive grazing needs to be defined on a site by site basis as it depends on what's on the ground. It should be focused on those habitats and vegetation types which we want to be in good condition, with evidence based habitat and species outcomes (not just area under AES agreement or general site condition), supported by photographic guidance and targets (e.g. sward heights). In many locations, a mixed grazing regime over moorland, hillside and in-bye land is required in order to produce a range of different habitats for a variety of species. More generally, the experts said that we should aim for grazing systems which deliver balanced environmental, economic and social benefits, which can flex to meet climatic and other changes. Being clear on exactly what constitutes a positive grazing regime is obviously important in order to be able to achieve it.

Other barriers to positive cattle and sheep grazing mentioned by the experts included: a lack of shared objectives between organisations; limitations in terms of the support available and schemes’ ability to get the right stock in place at the right levels, blunt AES prescriptions (i.e. a ‘one size fits all approach), and limited staff resources; low farm business profitability for LFA livestock farms and over-dependence on scheme payments; lack of good models demonstrating how suitable grazing regimes can work practically and economically; socio-economic issues including an ageing farmer population, reluctance to change, lack of labour and loss of skills; and animal health and welfare issues including liverfluke, redwater and ticks. Specific barriers relating to positive cattle or mixed grazing include: the costs associated with keeping cattle; loss of infrastructure; the high value of cattle compared to the risks associated with rough grazing on the hills; loss of traditional cattle and hill grazing skills; and bovine TB and associated regulations relating to testing and movements. Specific barriers to positive sheep grazing include: loss of shepherding skills and time; the loss of hefts; and demands from retailers which favour improved breeds.

The experts cited a number of examples where current barriers have been overcome to achieve positive results:

- “Overcoming the real barriers is very hard but better farmer liaison and using GAP/PONT approach etc. can work.
- “There is a range of excellent conservation grazing projects across the UK. Not all have been sustainable after the initial start-up, however, so finding ways of making them more self sustaining e.g. through marketing of the end produce, is crucial.”
- “The re-introduction of Welsh Black cattle on Snowdonia has been a hard won success. The National Trust has used sound science, economic/business skills and AES money to develop the herd and project.”

The case studies in Section 6 and Appendix 3 provide further examples where positive grazing and other management is being delivered.

5.7 The Future

Many of the current barriers to positive grazing can be expected to continue given the underlying structure and profitability of the livestock industry. This may well result in the continuation of trends such as falling livestock numbers, the polarisation between more intensively managed areas and undergrazed or abandoned areas, the simplification of farming systems and enterprises, the loss and amalgamation of farm units, and the reduction in the number of farmers.

A number of potential future opportunities and threats were also identified by the experts, see Table 5-3.
### Opportunities

Current high prices may encourage an increase in stock numbers in some locations. This could help in areas where undergrazing is a problem but crucially may not lead to the right animal in the right place.

- Improvements in the productivity and quality of stock (and hence enterprise profitability), where this does not compromise the wildlife value of the system.
- Greater appreciation of the value of natural assets (i.e. the grazing resource) in helping to reduce costs and improve profitability.
- Increasing direct sales of local quality food and positive support from some retailers (e.g. Morrisons Traditional Beef Scheme, focusing on beef shorthorn).
- The future shape of the CAP and payments through both Pillar 1 and Pillar 2, particularly with the switch from (full or part) historic-based payments to area payments in Wales, Scotland and Northern Ireland, if this results in a financial uplift for land managers in the most disadvantaged areas.\(^\text{23}\)
- Reviews of agri-environment / rural development schemes could provide a better means of supporting positive grazing in the LFA. This could address the delivery of HNV farming.
- Income generation through payments for ecosystem services via both public and private schemes.

### Threats

- The impact on farm profitability of fluctuating world market commodity prices for beef and lamb, rising input prices and a strengthening exchange rate. The success of the Welsh lamb export trade and the risk from cheap beef imports will have a major impact on prices and stocking in Wales.
- Concentration of the market through a smaller number of key buyers.
- Limitations on the size of the market for local food with high environmental credentials.
- The future shape of the CAP and payments through both Pillar 1 and Pillar 2, particularly with the switch from (full or part) historic-based payments to area payments in Wales, Scotland and Northern Ireland, depending on how regionalisation influences distribution.\(^\text{23}\)
- Budget reductions for Pillar 1 and Pillar 2 funded schemes.
- EU proposals to replace LFAs with ANCs (Areas of Natural Constraint); this could adversely affect the level and type of funding available to some LFA farmers.
- Landlords’ responses to CAP and related changes which will influence rent, profitability and livestock systems.
- New priorities which could adversely affected grazed habitats (for example, woodland creation stimulated by climate change policies).

Table 5-3: Positive cattle and sheep grazing – opportunities and threats

The experts put forward a number of thoughts and ideas concerning what could be done to overcome barriers, mitigate threats and make the most of opportunities to help deliver positive grazing. These are incorporated into the discussion in Section 7.

![Belted Galloways in the Yorkshire Dales](image_url)

\(^\text{23}\) CAP reform presents both an opportunity and a threat. It could move money into the LFA but depending on how money is distributed between regions it might not. This will have impacts on farmers and consequently on future grazing regimes and biodiversity.
6 Case studies

6.1 Introduction

This section summarises the findings from a series of eight case studies produced as part of this project. The purpose of the case studies was to explore in further detail the correlation between livestock numbers and grazing systems with site condition and biodiversity. The case studies cover a range of different circumstances, issues and approaches across the UK. Each case study involved a desk-based review of data and documents and a series of face-to-face interviews and site visits. The eight case studies are set out as separate documents in Appendix 3.

6.2 Description

The eight case studies, together with region and country, and focus areas (including specific themes or initiatives investigated) are set out in Table 6-1 below.

<table>
<thead>
<tr>
<th>Study area</th>
<th>Area (sq km)</th>
<th>Region</th>
<th>Country</th>
<th>Focus areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dartmoor</td>
<td>954</td>
<td>Devon</td>
<td>England</td>
<td>Two Moors Butterfly Project, Ponies as Conservation Graziers, Agri-environment schemes on common land</td>
</tr>
<tr>
<td>Limestone Country</td>
<td>110</td>
<td>Yorkshire Dales</td>
<td>England</td>
<td>Limestone Country Project, Ingleborough NNR</td>
</tr>
<tr>
<td>Mid Wales Uplands</td>
<td>1,970</td>
<td>Powys/ Ceredigion</td>
<td>Wales</td>
<td>Abergwesyn Common, Elan Valley, Pumlumon Project</td>
</tr>
<tr>
<td>Snowdonia</td>
<td>2,140</td>
<td>Gwynedd</td>
<td>Wales</td>
<td>Hafod y Llan, SAC Management Plan/LBAP/PONT</td>
</tr>
<tr>
<td>Uists</td>
<td>705</td>
<td>Outer Hebrides</td>
<td>Scotland</td>
<td>Machair Life+ Project, Entrepreneurial approach</td>
</tr>
<tr>
<td>Croick Estate</td>
<td>5</td>
<td>Sutherland</td>
<td>Scotland</td>
<td>Croick Estate</td>
</tr>
<tr>
<td>Antrim Hills</td>
<td>725</td>
<td>County Antrim</td>
<td>Northern Ireland</td>
<td>Halting Environmental Loss Project, Glenwherry Hill Regeneration Project</td>
</tr>
<tr>
<td>Fermanagh</td>
<td>1,875</td>
<td>County Fermanagh</td>
<td>Northern Ireland</td>
<td>Cuilcagh Mountain, Upper Lough Eme</td>
</tr>
</tbody>
</table>

Table 6-1: Case studies - description

Figure 6-1: Dwarf shrub heath in Snowdonia
A summary of key habitats and species within the case study areas is set out in Table 6-2.

<table>
<thead>
<tr>
<th>Study area</th>
<th>Key habitats</th>
<th>Key species*24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dartmoor</td>
<td>Upland heathland</td>
<td>Dunlin&lt;br&gt;Marsh fritillary and other fritillary spp.&lt;br&gt;Southern Damselfly</td>
</tr>
<tr>
<td></td>
<td>Blanket bog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purple moor grass and rush pasture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bracken</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upland oak woodland</td>
<td></td>
</tr>
<tr>
<td>Limestone Country</td>
<td>Limestone pavement</td>
<td>Breeding waders&lt;br&gt;Yellow wagtail&lt;br&gt;Twite&lt;br&gt;Skylark&lt;br&gt;Northern brown argus butterfly&lt;br&gt;Dark green fritillary</td>
</tr>
<tr>
<td></td>
<td>Calcareous grassland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blanket bog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limestone springs and flushes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alkaline fen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acid grassland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dwarf shrub heath</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upland mixed ash woodland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limestone cliffs &amp; screes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purple moor grass pasture</td>
<td></td>
</tr>
<tr>
<td>Cambrian Mountains</td>
<td>Blanket bog</td>
<td>Breeding waders&lt;br&gt;Red kite&lt;br&gt;Red grouse</td>
</tr>
<tr>
<td></td>
<td>Acid grassland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dwarf shrub heath</td>
<td></td>
</tr>
<tr>
<td></td>
<td>West Atlantic oakwood</td>
<td></td>
</tr>
<tr>
<td>Snowdonia</td>
<td>Blanket bog</td>
<td>Snowdon lily&lt;br&gt;Western gorse&lt;br&gt;Marsh fritillary&lt;br&gt;Twite&lt;br&gt;Golden plover&lt;br&gt;Chough</td>
</tr>
<tr>
<td></td>
<td>Raised bog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acid grassland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dwarf shrub heath</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purple moor grass and rush pasture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upland oak and mixed ash woodland</td>
<td></td>
</tr>
<tr>
<td>Uists</td>
<td>Machair</td>
<td>Dunlin&lt;br&gt;Ringed plover&lt;br&gt;Corncrake&lt;br&gt;Corn bunting&lt;br&gt;Greenland barnacle goose&lt;br&gt;Great yellow bumblebee&lt;br&gt;Irish Lady’s tresses</td>
</tr>
<tr>
<td></td>
<td>Coastal sand dune</td>
<td></td>
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<tr>
<td></td>
<td>Coastal salt marsh</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saline lagoons</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lochs and lakes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blanket bog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upland heathland</td>
<td></td>
</tr>
<tr>
<td>Croick Estate</td>
<td>Upland heathland</td>
<td>Black grouse&lt;br&gt;Red grouse&lt;br&gt;Hen harrier&lt;br&gt;Golden plover, greenshank and other waders&lt;br&gt;Red, sika, roe and fallow deer</td>
</tr>
<tr>
<td></td>
<td>Blanket bog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Native Caledonian woodland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coniferous woodland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Floodplain grassland</td>
<td></td>
</tr>
<tr>
<td>Antrim Hills</td>
<td>Upland heathland</td>
<td>Curlew, snipe and lapwing&lt;br&gt;Irish red grouse&lt;br&gt;Whinchat&lt;br&gt;Marsh fritillary&lt;br&gt;Yellow marsh saxifrage</td>
</tr>
<tr>
<td></td>
<td>Blanket bog</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alkaline fen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rough grazing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unimproved grassland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upland oak woodland</td>
<td></td>
</tr>
<tr>
<td>Fermanagh</td>
<td>Upland heathd</td>
<td>Golden plover and other waders&lt;br&gt;Irish red grouse&lt;br&gt;Hen harrier&lt;br&gt;Small blue butterfly&lt;br&gt;Blue-eyed grass</td>
</tr>
<tr>
<td></td>
<td>Montane heath</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limestone pavement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calcareous grassland</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lowland meadow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purple moor grass and rush pasture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Floodplain grazing marsh</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fen, reedbed, lakes, Wet woodland, species-rich hedgerows</td>
<td></td>
</tr>
</tbody>
</table>

Table 6-2: Case studies - biodiversity

*24 These are examples; it is not an indicative list.
### 6.3 Changes in livestock numbers and grazing regimes

Changes in the number of cattle and sheep over the period 2000 to 2010\(^{25}\) in each case study area are set out in Figure 6-2. It is worth noting the significant reductions in the Scotland, Northern Ireland and Wales case study areas compared to the England ones. The greatest reductions occurred in the Kincardine (Croick) case study, with a 46% reduction in total cattle and 32% reduction in total sheep. In the Uists, total sheep numbers experienced a very significant 37% reduction, although the reduction for cattle has been less. In the Antrim Hills and Fermanagh, the reduction in total cattle numbers has been exceeded by that for total sheep numbers which have decreased by 25%. In Wales, there was a difference between the Cambrian Mountains, which experienced a 26% reduction in total sheep numbers and a lesser decrease in cattle numbers, compared to Snowdonia where the reductions by stock type were more even (although suckler cows reduced by 19%). In the England case studies, the reduction in sheep numbers has been similar, but whereas cattle numbers decreased by 6% in the Limestone Country, they increased by 14% in Dartmoor. In all case study areas, reductions in the number of breeding animals have exceeded reductions in total stock numbers.

![Figure 6-2: Case studies – change in livestock numbers 2000-2010 (Wales, 2002-2010)](image)

A summary of the main farming systems in the case study areas and recent changes in grazing regime is set out in Table 6-3. There are a number of common trends in line with those changes identified in Section 5.3.

<table>
<thead>
<tr>
<th>Study area</th>
<th>Farming systems</th>
<th>Changes in grazing regime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dartmoor</td>
<td>Extensive cattle and sheep rearing, and</td>
<td>Decrease in sheep numbers and significant decrease in pony numbers</td>
</tr>
<tr>
<td></td>
<td>pony grazing</td>
<td>Move away from traditional to continental cattle breeds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recent pressure to increase stock levels and outwinter more stock</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hill farms buying lowland ground to produce commercially viable stock</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less hefting and shepherding on the hill</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less burning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Farms being broken up with small awkward sites sold off</td>
</tr>
<tr>
<td>Limestone Country</td>
<td>Extensive cattle and sheep rearing, and</td>
<td>Decrease in cattle and sheep numbers, and less mixed stocking</td>
</tr>
<tr>
<td></td>
<td>pony grazing</td>
<td>Intensification of in bye land and improvement of marginal land</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Move away from traditional to continental cattle breeds</td>
</tr>
</tbody>
</table>

\(^{25}\) This period has been selected as the best basis for comparison between the countries. Note however, the percentage changes for the Welsh case studies are based on 2002-2010.
<table>
<thead>
<tr>
<th>Location</th>
<th>Farming Systems and Grazing Regime Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambrian Mountains</td>
<td><strong>Dairy Farming</strong>: Move away from traditional to lowland/continental sheep breeds&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>More indoor lambing, twin lambing and fattening&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less outwintering and more away wintering&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less hefting and shepherding on the hill&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less burning on the hill&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Move from hay to silage&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Increase in rabbit populations&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td><strong>Extensive Sheep and Cattle Rearing</strong>:&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less mixed stocking and loss of native Welsh pony herds&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less out-wintering of sheep and cattle and less feeding on the hill&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>A move to continental breeds and their crosses&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>More indoor lambing and finishing, higher lambing percentages&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less wether lambs run on for a second year&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Intensification of the in bye&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>More animal health issues due to ranker grasses and lack of drainage&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Fewer active commoners grazing sheep and cattle&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less hefting and virtually no shepherding on the hill&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less controlled burning on the hill&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>A move to earlier silage making from traditional late cut hay making.&lt;br&gt;</td>
</tr>
<tr>
<td>Snowdonia</td>
<td><strong>Crofting, Extensive Cattle and Sheep Rearing</strong>:&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Decrease in cattle and particularly sheep numbers&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Crofters tending to specialise in cattle or sheep&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>North Uist has larger units, more focused on cattle; South Uist has smaller crofts.&lt;br&gt;</td>
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<td></td>
<td>Livestock becoming concentrated in fewer hands.&lt;br&gt;</td>
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<td></td>
<td>Simplification of cropping practices and some intensification on machair with greater use of organic and inorganic fertilisers&lt;br&gt;</td>
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<td>More summer grazing on machair&lt;br&gt;</td>
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<td>Less common and hill grazing&lt;br&gt;</td>
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<td>Separation of enterprises between machair/low ground and hill ground&lt;br&gt;</td>
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<td>Uists</td>
<td><strong>Crofting, Extensive Cattle and Sheep Rearing</strong>:&lt;br&gt;</td>
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<tr>
<td></td>
<td>Decrease in cattle and particularly sheep numbers&lt;br&gt;</td>
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<tr>
<td></td>
<td>Crofters tending to specialise in cattle or sheep&lt;br&gt;</td>
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<tr>
<td></td>
<td>North Uist has larger units, more focused on cattle; South Uist has smaller crofts.&lt;br&gt;</td>
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<td></td>
<td>Separation of enterprises between machair/low ground and hill ground&lt;br&gt;</td>
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<tr>
<td>Croick Estate</td>
<td><strong>Extensive Cattle and Sheep Grazing</strong>:&lt;br&gt;</td>
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<tr>
<td></td>
<td>Decrease in cattle and sheep numbers, particularly on estates managed for sporting and wildlife interests.&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Simplification of cattle and sheep management, including the use of store cattle as opposed to suckler cows, on such estates.&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Fewer holdings with cattle and sheep&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Increase in deer numbers and deer grazing&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less labour involved with grazing; more labour involved with sporting, forestry and wildlife conservation&lt;br&gt;</td>
</tr>
<tr>
<td>Antrim Hills</td>
<td><strong>Extensive Cattle and Sheep Rearing</strong>:&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Decrease in cattle and sheep numbers&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Change to more low input low output systems&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Interest in keeping cattle on hill, but limited availability of suitable stock&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Move to improved breeds of sheep, with higher lambing percentage, and fewer sheep being kept on the hill&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Less outwintering of cattle and sheep on the hill&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>More rush cutting and weedwiping to improve usability of hill ground for cattle and sheep, as well as wildlife. Less burning&lt;br&gt;</td>
</tr>
<tr>
<td>Fermanagh</td>
<td><strong>Extensive Cattle and Sheep Rearing</strong>:&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Decrease in cattle and particularly sheep numbers&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Change to more low input low output systems&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Improvement in quality of stock&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>More breeding of own stock to help avoid diseases&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>More part time farmers, with less intensive systems&lt;br&gt;</td>
</tr>
<tr>
<td></td>
<td>Removal of scrub, fencing off of woodland and unauthorized burning related to retaining SFP eligibility.&lt;br&gt;</td>
</tr>
</tbody>
</table>

Table 6-3: Case studies - farming systems and grazing regime changes
6.4 Implications of changes in livestock numbers and grazing regimes for biodiversity

Changes in livestock numbers and grazing regimes have had a variety of impacts on biodiversity in the case study areas, these are summarised in Table 6-4. Common impacts are similar to those outlined in Section 5.5. It is important to note other influences, such as commercial forestry and sporting, also influence biodiversity in these areas.

<table>
<thead>
<tr>
<th>Study area</th>
<th>Grazing change impacts on biodiversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dartmoor</td>
<td>Decline in hefting and shepherding → overgrazing on some areas and undergrazing and scrub encroachment on others.</td>
</tr>
<tr>
<td></td>
<td>Reduced burning on the moorland → increase in <em>Molinia</em> and older stands of heather.</td>
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<tr>
<td></td>
<td>Little or no grazing on many Rhos pasture sites → scrub invasion requiring manual removal.</td>
</tr>
<tr>
<td></td>
<td>Undergrazing on Rhos pasture sites → dominance of purple moor grass or rush, which can shade out other floristic interest.</td>
</tr>
<tr>
<td></td>
<td>Overgrazing on some Rhos pasture sites → grassland sward which is less structurally diverse, with few patches of warm and sheltered habitat to support invertebrates such as marsh fritillary.</td>
</tr>
<tr>
<td></td>
<td>Intensification/ improvement of species rich pasture and meadows → loss of floral diversity.</td>
</tr>
<tr>
<td>Limestone Country</td>
<td>Increased grazing intensity particularly sheep in spring/summer → reduced frequency and flowering ability and/or removal of herbaceous plants.</td>
</tr>
<tr>
<td></td>
<td>Loss of mixed grazing and increased sheep numbers → more homogeneous swards.</td>
</tr>
<tr>
<td></td>
<td>Decline in cattle → spread of ranker grasses, scrub and bracken on some sites.</td>
</tr>
<tr>
<td></td>
<td>Re-introduction of cattle to limestone pavement/calcareous grassland mosaic → benefited sward but not woodland regeneration.</td>
</tr>
<tr>
<td></td>
<td>Intensification/improvement of species rich pasture and meadows → loss of floral diversity.</td>
</tr>
<tr>
<td></td>
<td>Loss of host plants e.g. common rockrose → associated species e.g. brown argus butterfly impacted.</td>
</tr>
<tr>
<td></td>
<td>Higher stocking rates → increased disturbance of ground nesting birds e.g. lapwing, skylark.</td>
</tr>
<tr>
<td></td>
<td>Loss of habitat mosaic, increased disturbance, predation → decline in wader birds.</td>
</tr>
<tr>
<td></td>
<td>Loss of seed rich areas, late flowering meadows → decline in yellow wagtail and twite.</td>
</tr>
<tr>
<td></td>
<td>Less hefting and shepherding → overgrazing in some areas, undergrazing and scrub encroachment on others.</td>
</tr>
<tr>
<td></td>
<td>Reduced burning on the moorland → increase in ranker grasses, older stands of heather.</td>
</tr>
<tr>
<td>Cambrian Mountains</td>
<td>Increased grazing intensity particularly sheep in spring/summer → reduced frequency and flowering ability and/or removal of herbaceous plants.</td>
</tr>
<tr>
<td></td>
<td>Declining levels of sheep grazing → more rank grasses, particularly <em>Molinia</em>.</td>
</tr>
<tr>
<td></td>
<td>Decline in cattle → spread of ranker grasses, scrub and bracken on some sites.</td>
</tr>
<tr>
<td></td>
<td>Reduced controlled burning on the moorland → increase in ranker grasses and older stands of heather.</td>
</tr>
<tr>
<td></td>
<td>Agricultural improvement of rushy pasture → dominance of soft rush and ranker grasses such as Yorkshire fog.</td>
</tr>
<tr>
<td></td>
<td>Loss of mixed grazing and focus on sheep → more homogeneous swards.</td>
</tr>
<tr>
<td></td>
<td>Intensification/ improvement of species-rich pasture and meadows → loss of floral diversity.</td>
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<td></td>
<td>Less hefting and shepherding → overgrazing in some areas, undergrazing and scrub encroachment on others.</td>
</tr>
<tr>
<td>Snowdonia</td>
<td>Heavy sheep grazing on upland calcareous grassland → close-cropped, closed sward and species poor.</td>
</tr>
<tr>
<td></td>
<td>Agricultural improvement/over grazing of purple moor grass and rush pastures → dominance of soft rush and ranker grasses such as Yorkshire fog.</td>
</tr>
<tr>
<td></td>
<td>Overgrazing by sheep → species-poor acid grassland now dominates at the expense of dwarf shrub heath in hill areas. Dwarf shrub heaths found mostly on steeper slopes where grazing levels are low.</td>
</tr>
<tr>
<td></td>
<td>Lack of suitable cattle grazing on blanket bog → rank growth.</td>
</tr>
<tr>
<td></td>
<td>Grazing pressure → alters understorey and shrub layer of upland oak/ash woods, marginal scrubby areas and fridd zones.</td>
</tr>
<tr>
<td></td>
<td>Agricultural improvement and early/over grazing → less species rich meadow</td>
</tr>
<tr>
<td></td>
<td>Grazing changes → impacts species such as the Snowdon lilly, western gorse, dormouse, Snowdon beetle, marsh fritillary butterfly, twite, golden plover and chough.</td>
</tr>
</tbody>
</table>
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Cumulus Consultants Ltd - CC-P-545  Issue 3.0
Date: 4 December 2012

Uists
Reduced stock numbers and stocking rates → undergrazing on common land/hill ground.
Lack of sheep grazing → reduced palatability of heather and other species in hill areas, encouraging deer to graze lower down the slope, including on machair.
Fewer crofters involved with grazing common land / hill ground, and lack of family support, has led to less labour being available for shepherding and other management such as burning → loss of vegetation structure potentially with adverse impacts on certain species.
Conservation based management practices supported by SRDP and Machair Life+ agreements → improvement in Machair habitats and benefits for associated species.

Croick Estate
Reduction in grazing pressure, from previously high sheep numbers → dry heath, wet heath, blanket bog and grassland in better condition.
Grazing by cattle in particular, but also sheep and deer, in the native Caledonian woodland → open areas and structure, beneficial for species such as black grouse, willow warbler, cuckoo, tree pipit, lesser redpoll and whinchat.
Extensive grazing of floodplain grassland by cattle, sheep and deer → benefits bird species such as mallard, teal, common sandpiper, sand martin, reed bunting and oystercatcher.
Extensive grazing of heath and blanket bog → benefits bird species such as red grouse, meadow pipit, skylark and wheatear.
Extensive grazing and woodland creation → less erosion and run-off, thereby improving water quality and reducing flooding

Antrim Hills
Reduced grazing by cattle → increase in the area of ‘Sprit’ (rush)
Lower grazing levels → good for breeding waders, but still some over-grazing and undergrazing
An increase in mixed grazing required, in particular cattle with better rush management → predation risk associated with edge effects of forestry and scrub.
Inappropriate burning → damage to habitats such as blanket bog.
Pilot SCaMP project between NIW and RSPB → investigating the impact of habitat management on water quality impacts.

Fermanagh
Reductions in grazing pressure following the introduction of the ESA, together with fencing and decoupling → improvements in upland habitats.
Reduction in grazing combined with less rotational burning and no cattle → loss of vegetation structure with adverse impact on species such as golden plover and Irish red grouse.
Inappropriate burning linked to SFP eligibility → damage to upland habitats, such as blanket bog and heath, and adversely impacted species such as golden plover.
Undergrazing in lowland areas → some grassland habitats, rushier and scrubbing up.
Agricultural operations including reseeding, fertilising and drainage → damage or destruction of grassland habitats.
Concern over SFP eligibility and cross compliance rules relating to scrub and hedgerows → clearance and over-zealous cutting leading to loss of habitat.

Table 6-4: Case studies – implications of grazing change for biodiversity
Where available, data has been obtained for site condition and the reason for adverse condition. In three case study areas – Limestone Country, Antrim and Fermanagh – a number of upland sites have been assessed to be unfavourable due to overgrazing. In two of these case study areas – Limestone Country and Fermanagh – a smaller number of lowland sites have been assessed to be unfavourable due to undergrazing.

6.5 Lessons learnt
The key lessons learnt from the case studies – in addition to those covered elsewhere in this report - include the following:

Practical management
- Better management of upland habitats has agricultural benefits in terms of forage availability and improved compliance (reduced risk of non-compliance).
- New systems have to be found on some sites where there is a lack of cattle on the hill and sheep numbers are too low.
- Mechanical intervention and innovation is needed where grazing is not adequate.
• Traditional breed cattle have a positive and proven effect on grazed habitats, although on an open site they do not always graze where needed or where expected.
• The introduction of cattle can have negative impacts such as shrub layer damage and increased diffuse pollution risk.
• There is a proven need for the use of cattle with hardy traits but not all traditional herds have these traits as they have been bred out of them in favour of intensive production values. Stock must be chosen carefully.
• Finding suitable land for off-wintering can be a challenge.
• Ensure restorative grazing is available before destocking.
• Don’t ignore the grazing role of ponies, pigs and goats in the grazing mix.
• Always consider the knock-on effects of grazing change i.e. exclusion of stock from one area may result in increased stocking on another part of the farm or expensive/unsustainable away wintering. Compromises and site specific solutions have to be found.
• Ensuring suitable grazing regimes is only part of the picture; other management including cutting, burning, ditching and scrape creation also contributes to improving habitats, species diversity and greater populations.
• Controlled burning has many benefits (biodiversity, grazing, local economics, risk management) and has a key role to play.
• Fencing helps control grazing on the hill but has disadvantages including landscape impact, increased predation and bird strikes.
• Grazing in native Caledonian woodland restoration, particularly by cattle, helps to open up and creates structure in woodland which is valuable for species such as black grouse

Biodiversity management and monitoring
• While designated sites may be a priority nationally, it is important not to overlook habitats and species on nearby undesignated land; there is often a linkage between the two in terms of farming systems and grazing livestock.
• Conservation success with specific priority species needs to be managed to mitigate or avoid adverse impacts on other species, habitats and farming.
• Ecological and socio-economic monitoring is crucial to help show and justify the benefits of extensive grazing.

Figure 6-3: Undesignated upland heathland in North Uist
Farming systems

- More sustainable farming systems can result from lowering stocking rates, a switch to native breeds and a focus on improving quality, in conjunction with scheme payments.
- Although financial support and sound advice is needed to facilitate system/breed change and extensive grazing practice, a sustainable business model can be developed.
- A more entrepreneurial approach can result in economic and environmental ‘win-wins’. There is clearly a need to encourage this as well as new entrants.
- The sustainability of pony grazing is threatened by no market value and loss of heritage breed bloodlines
- Improving farmer knowledge has potentially long-lasting benefits for the farmers and the upland environment.
- A lack of livestock and farming knowledge means education is important for non-farming landowners in avoiding inappropriate grazing or abandonment.
- Lack of suitable successors for farmers and graziers threatens long term sustainability.
- In hand farming and grazing may be needed on more sites.

Schemes

- SFP and LFA payments are currently important in maintaining financial viability for farms in the LFA, though lack conditionality to reward those farms which deliver most environmental services.
- The incentive to maintain some level of stocking contained in the LFA support schemes has played an important role in keeping livestock on the hills, with consequential benefits for biodiversity. AES payments, where available, provide additional valuable additional support and help deliver positive grazing regimes.
- Cross compliance conditions, agri-environment prescriptions and nature conservation requirements are not always fully aligned on some sites. This can result in conflict or compromise.
- Concern over SFP eligibility rules relating to heather height, and encroachment by woodland, scrub and hedges, have contributed to inappropriate burning, clearance and cutting leading to loss of habitat and unnecessary work and expense.
- Restrictions of future payments to ‘active’ farmers could undermine some landscape scale habitat restoration projects.
- Woodland restoration projects could be adversely affected by the strict differentiation between agricultural and forestry land in terms of support available.
Ecosystem services

- Ecosystem service and community approaches are useful tools. Changes in grazing regimes in the LFA which enhance habitats and species can also deliver other environmental benefits such as reduced soil erosion, improved water quality and less flooding.

Projects and initiatives

- Grazing and land management projects run by NGOs or others are helping to achieve positive results in terms of habitat restoration and/or species recovery.
- Forming partnerships with other organisations works, it also extends the reach of solo initiatives.
- Working with farmers, providing information, advice and guidance on a 1:1 basis and training through group events, has proved successful in delivering improved land management and environmental outcomes.
- Projects can complement the support available through agri-environment and other schemes; they lead to greater uptake and enhance the environmental outcomes.
- Continued management of many sites is dependent on AES which require a great deal of facilitation in order to come to fruition. Facilitation is also key on non-designated sites where advice and assistance for works such as scrub management is often undertaken by project officers or charitable organisations, which rely on short-term funding.
- Careful planning is needed to sustain the benefits beyond the end of projects.
- Landscape scale change managed by private individuals can benefit from specialist guidance, advice and monitoring.
- Improved farmer buy in for native cattle grazing on the hill is important and can be won by demonstration and support. Cultural change is often needed.
- There is a market for conservation grazing products. Good branding and marketing is crucial, as is linkage of the food supply chain.
7 Discussion on future policies and initiatives

There is no single solution for overcoming the barriers and managing the future challenges to achieve positive cattle and sheep grazing in the UK LFA and a range of different views have been expressed by the experts and practitioners consulted. It is possible however to identify a number of key areas where changes could be made to support sustainable upland farming systems and the delivery of priority habitats and species and a range of other ecosystem services.

Vision

There is a need to encourage policy makers, industry representatives, conservation organisations and farmers to work together to develop a positive, holistic and long term vision for the LFA with joined-up policies and clear objectives. Defining what comprises positive cattle and sheep grazing, and applying it on the ground, will be an essential part of this overall vision.

CAP reform

The CAP reform represents both an opportunity and a threat. There is an opportunity to ensure that Pillar 1 and Pillar 2 is re-oriented to support the delivery of public goods including biodiversity, and sustainable farming systems. The threat lies in a potential reduction in the overall budget as well as a weak reform with limited movement from the current structures and priorities. Specific elements which would benefit positive cattle and sheep grazing include the following:

- Ensure that the redistribution of payments in Wales, Scotland and Northern Ireland from a historic/hybrid basis to an area basis supports the delivery of positive grazing in LFAs/ANCs.
- Ensure that Pillar 1 greening policies compliment any new LFA/ANC and targeted agri-environment schemes.
- Reform LFA/ANC support schemes to address economic and environmental needs with payments being highest for land subject to greatest natural constraint and eligibility criteria that do not exclude areas with grazing management good for biodiversity. Consider the use of a minimum stocking rate in LFA/ANC schemes to keep stock on the hill but this must not discriminate against HNV systems with low intensity grazing. Assess the impact of redefining LFAs using new criteria for ANCs on upland farming and biodiversity.
- Develop agri-environment schemes to build on the achievements to date and enable them to deliver more for biodiversity and other ecosystem services (see below for more detail).
- Consider special support for appropriate farming activity in Natura 2000 areas.
- If coupled support is retained in Scotland through the Beef Calf Scheme, it must be refined to ensure some environmental delivery and support of HNV systems.
- Ensure, through the above, that there is a strong package of support for HNV farming systems in recognition of the exceptional public goods they deliver and their economic vulnerability.
- Strengthen links to other rural development measures including: skills development; farm-based infrastructure grants; farm business development; co-operation support and innovation support.
- Recognise, in policy and schemes, the valuable interface on the ground between agriculture and forestry (e.g. native woodland, scrub, grazing).
- Avoid inappropriate restrictions of payments to ‘active farmers’ in a way that prevents the environmental benefits of sustainable land management from being rewarded.
- Address SPS eligibility issues and associated guidance (including cross compliance) to ensure unintended damage to habitats and species and unnecessary management does not occur.
Agri-environment schemes

Agri-environment schemes have been central to environmental improvements in many parts of the LFA. There is a need however to improve agri-environment schemes to enhance the biodiversity benefits delivered by making schemes better targeted, locally responsive, adequately funded and accessible. Specific areas for improvement include the following:

- Ensure agri-environment scheme design can accommodate integrated management across designated and undesignated land in order to improve biodiversity outcomes and support important farming systems as a whole, rather than just individual management practices.
- Develop site specific mechanisms and flexible prescriptions in order to deliver optimum grazing for biodiversity priorities.
- Provide targeted support to help overcome barriers to maintaining and extending cattle and/or mixed grazing on the hill, and other priorities.
- Ensure agri-environment payments take into account the whole system cost of delivering suitable grazing and management, and reward biodiversity and ecosystem service outcomes. Stable and well funded agri-environments schemes are critical for securing appropriate grazing regimes and safeguarding vulnerable species and habitats.
- Broaden the funding sources used to support positive grazing to take account of the full range of ecosystem services delivered (e.g. using WFD measures to support grazing regimes which can help improve water quality, alongside benefiting biodiversity).
- Involve farmers in the design, implementation and monitoring of agri-environment schemes.
- Explain the link between specific grazing regimes and site objectives better, in order to improve farmer understanding and delivery.
- Overcome teething issues associated with current agri-environment schemes (e.g. Glastir) and improve transitional arrangements to provide certainty for farmers seeking to farm in an environmentally friendly way (e.g. Northern Ireland Countryside Management Scheme).

Woodland schemes

Woodland schemes have played an important role in restoring native woodland in the uplands, and could be developed further:

- Continue to support large-scale woodland creation and restoration, in appropriate locations, for biodiversity and wider environmental benefits but recognise the importance of follow-up management, in particular cattle grazing.

Regulations

Regulations represent a key barrier to the continuation and uptake of cattle and mixed grazing in the uplands:

- Where possible, simplify regulations affecting livestock farming in the LFA; these include regulations relating to animal identification, movements, TB testing and common land.
- Ensure regulation does not disproportionately impact on livestock enterprises which are more extensive or those in more marginal areas, for example, by conducting thorough impact assessments in relation to regulatory and other changes (e.g. abattoirs, animal health etc.).

Projects and partnerships

There are a number of successful grazing and land management projects run by NGOs and others which are helping to deliver positive results in terms of habitat restoration.
and/or species recovery. There is an opportunity to continue and develop these further as follows:

- Ensure future projects and partnerships learn from existing experience including: providing advice and support to farmers on an individual and group basis; working from a sound scientific and economic/business base; complementing agri-environment scheme support; encouraging young farmers and an entrepreneurial approach; ensuring good branding, marketing and supply chain management; and carefully planning the legacy of fixed term projects.
- Foster more co-operation and partnership working at local level using brokers such as PONT/GAP to overcome site specific barriers.
- Support INTERREG, LIFE+ and other funding programmes which underpin the delivery of bespoke projects that can provide innovative solutions to environmental and economic problems and can be critical to the survival of vulnerable farming communities and wildlife.

Research, information exchange and skills development

There is a need for further research, information exchange and skills development to support positive cattle and sheep grazing in the future. Specific areas include the following:

- Develop a better understanding of how to restore and maintain habitats (and the impacts of abandonment), bridging the gap between science and practice.
- Develop the evidence base and improve knowledge transfer relating to different cattle and sheep breeds, their grazing attributes and biodiversity impacts. Also develop a better understanding of the carbon footprint of LFA grazing livestock including the carbon benefits of semi-natural pasture.
- Continue to support research into more profitable and sustainable upland farming systems, including livestock breeding programmes and enterprises based on traditional breeds. Demonstrate how sustainable grazing can work and the benefits to farm viability through positive case studies.
- Develop models of how co-operative shepherding and burning projects can work to benefit biodiversity, farm viability, grazing quality and local employment. Trial such an approach.
- Retain and promote the skills required for positive grazing and land management, including cattle management, close shepherding and burning. Encourage young farmers to obtain these skills.
- Consider how suitable successors can be encouraged to take on the management of environmentally valuable sites.

Marketing initiatives

Initiatives that build farm business resilience and competitiveness in appropriate ways can help secure the future of extensive livestock systems, for example, by facilitating local partnerships to differentiate high quality products from extensively managed, native breeds or stock with a strong place-based identity:

- Provide better support for initiatives which promote the products from conservation grazing, to help develop consumer awareness of the multifunctional nature of extensive grazing, to enable strong branding and marketing and to foster supply chain development with the aim of building long term sustainability.

Other

Finally, two additional areas for consideration include the following:

- Consider in-hand grazing where the barriers are too high and all other farmer led grazing approaches have been tried.
- Explore ways in which livestock and biodiversity data can be collected in a more co-ordinated and coherent way in different parts of the UK, and establish key indicators, to enable better monitoring of grazing regime and biodiversity changes.
Note, in the meantime, the livestock and biodiversity data collected through this research represents a resource for future research, for example:

- Livestock change data could be overlain with biodiversity datasets such as the RSPB/BTO Bird Atlas;
- Grazing pressure/stocking density data could be analysed to consider its ‘fit’ as an indicator for HNV farming;
- Changes in different livestock types and grazing pressure could be further analysed;
- At a local level, livestock change data could be analysed in more detail and compared with other quantitative and qualitative farming and biodiversity data to inform future priorities.
8 Conclusions

There has been a general reduction in grazing livestock numbers in the LFA across the UK over the past 10 years or so, with the decoupling of payments in 2005 reinforcing and/or accelerating this trend. This follows a period during which dairy cattle have fallen in number, but beef cattle and sheep numbers have increased largely in response to the availability of headage payments. The reduction in sheep numbers has been much greater than that for cattle across the UK. Cattle numbers have reduced more sharply in the SDA compared to the DA; however changes in sheep numbers in the SDA and DA have varied from country to country.

The greatest reductions in LFA cattle and sheep numbers have occurred in Scotland and Northern Ireland, followed by Wales then England. Northern Ireland has experienced the greatest decrease in LFA beef cows (-19%) and breeding ewes (-34%), although Scotland has also suffered a significant reduction in breeding ewes in particular. The number of LFA dairy cows decreased most in Wales (-25%). Overall grazing pressure has reduced most in Scotland (-16.3%), followed by Wales (-14.6%), Northern Ireland and England; the greatest contribution to this has come from a reduction in sheep LU, although cattle LU has also fallen in all countries. The greatest decreases in grazing pressure have occurred in the North of England, South Wales, the Western Isles of Scotland (Eileanan an Iar) and the Western part of Northern Ireland (Fermanagh). A minority of regions have experienced an increase in grazing pressure including the Peak District, Welsh Borders and South West of England, principally due to more cattle grazing in the more productive parts of the LFA. Changes in livestock numbers and grazing pressure vary considerably at local area level (with adjoining areas sometimes experiencing significant increases and decreases).

There are notable differences between countries in the proportion of LU arising from cattle and sheep and overall stocking density. Key observations include the dominance of cattle in Northern Ireland, and by contrast, the relative importance of sheep in the LFA in Wales. Stocking density varies significantly by country, from an average of 0.25 LU/ha in Scotland to 1.06 LU/ha in Northern Ireland (although this figure relates to LFA and non-LFA land). There are also significant variations within each country – for example, from 0.05 LU/ha in Eileanan an Iar (Scotland) through to 1.27 LU/ha in South West DA (England). These variations are likely to reflect in part the proportion of semi-natural vegetation in a region and potentially provide an indicator of how High Nature Value (HNV) an area is. The differences in grazing pressure and stocking density could have important implications for biodiversity which require further analysis. For example, the data indicates that, in Wales, there is less opportunity for mixed grazing due to the relative dominance of sheep which could lead to difficulties accessing cattle grazing to manage unimproved ‘coarser’ vegetation types such as rhos pasture. Overall, grazing pressure is notably higher in Northern Ireland and Wales and further analysis is needed to understand the biodiversity implications of this – for example, by overlaying stocking rate and biodiversity data.

Alongside changes in livestock numbers and grazing pressure, there have been a number of other changes in grazing regimes in the LFA in recent years. Common changes across all four countries include: less cattle and mixed grazing; greater use of continental/improved breeds of cattle and sheep; summer grazing on the hill starting later; less out-wintering and feeding on the hill; less hefting and shepherding, less common grazing, less burning, more housing of cattle and indoor lambing, more intensive use of in-byre land, a shift from hay to silage and more finishing of stock. There are fewer holdings and farmers with stock, fewer active commoners and more part-time farmers in the LFA. Other changes, specific to certain areas, include a decrease in pony grazing and a reduction in grazing on crofts.

The drivers behind these changes in livestock numbers and grazing regimes include the poor profitability of livestock farming, changing market demands, a switch from headage to decoupled payments, the introduction and widespread uptake of agri-environment
schemes, outbreaks of livestock diseases including BSE, FMD and bovine TB, and socio-economic factors such as an aging farmer population and growth in off-farm income leading to a demand for simpler systems requiring less labour and management including less and/or a different type of stock. Regional differences are likely to have been influenced by differences in land productivity and suitability, remoteness, options for alternative management, policies, schemes available and socio-economic context. SFP and LFA payments are currently important in maintaining financial viability for farms in the LFA, but lack conditionality to reward those farms which deliver most environmental services.

In terms of the biodiversity implications of these changes in livestock numbers and grazing regimes, there has been a polarisation between semi-natural areas, which have experienced a reduction in grazing pressure and a recovery of habitats which has been broadly positive for biodiversity, and improved areas which have been more intensively used and managed with a negative impact on biodiversity. In particular, a move from traditional breeds to continental or improved breeds of cattle and sheep has changed the grazing pressure on different parts of farms. The higher nutritional requirements of continental/improved breeds has led to an intensification of use and management of in-bye and marginal land, leading to a loss of semi-natural grassland habitats due to agricultural improvement. However, this change has also contributed to undergrazing on the hill.

Upland habitats such as dry heath, wet heath and blanket bog have recovered (and continue to recover) as a result of reduced grazing by sheep in particular, contributing to the improving condition of many sites. However undergrazing and loss of vegetation structure is now occurring in some areas, with adverse impacts for some species such as golden plover and other waders. Less cattle and mixed grazing is contributing to the spread of ranker grasses, rush, scrub and bracken and hampering restoration efforts. A decline in hefting and shepherding is leading to overgrazing and undergrazing on different parts of the same site. Less burning is leading to older stands of heather and loss of vegetation structure. Less grazing is contributing to both native woodland regeneration but also conifer regeneration. On the other hand, less livestock has allowed an increase in grazing by deer and other herbivores. This project has found there is a proven need for the use of cattle with hardy traits. However, not all traditional herds have these traits as they have been bred out of them in favour of intensive production values, illustrating the importance of careful stock selection. More intensive use and agricultural improvement of the in-bye land has resulted in a loss of floral diversity and structure for nesting birds such as lapwing and skylark, as well as nutrient enrichment.

The biodiversity impacts vary greatly at local level. The nature of the impact depends on the mix of habitats and species, the history of grazing in a particular area, and the nature of the change in grazing regime. It also takes time for the impacts on species in particular to be fully realised. Some species may benefit from a change in grazing, while others may suffer. It is also important to recognise that habitats and species will have been affected by other influences, such as climate change, alongside grazing and land management. This work found that it is important not to overlook the habitats and species on land near to designated sites, as there is often a linkage between the two in terms of farming systems and grazing livestock.

In the same way, there will have been both positive and negative impacts on the delivery of ecosystem services arising from changes in grazing regime. Reduction in grazing pressure on unenclosed land has delivered positive impacts such as reduced run-off and erosion, improved water quality, reduced flooding and carbon storage. However the wider changes in grazing practices will have also had impacts on ecosystem service delivery which warrant examination. For example, the trend towards intensification of the in-bye could have had negative impacts on biodiversity, carbon and water quality which should be considered. The case studies carried out for this work demonstrate that grazing regimes can have an important impact on ecosystem services delivery but these can be complex.
Looking ahead, it seems likely that there will be continuing reductions in livestock numbers and associated management given the poor profitability of livestock enterprises, the amalgamation of farm units and a decrease in the amount of labour available. There will also be new challenges including changing market prices and market requirements, and the future shape of the CAP, particularly the change from (full or part) historic-based payments in Wales, Scotland and Northern Ireland and a reduction in public sector based budgets; this is important given the dependency on LFA farms on scheme payments. Continuing trends and future changes relating to livestock grazing will influence biodiversity and other ecosystems in the LFA. Ecological and socio-economic monitoring is crucial to demonstrating the benefits of extensive grazing and understanding the support needed to make these systems commercially viable.

A number of suggestions have been made to address existing and potential issues and support the delivery of positive grazing regimes in the LFA. These are encompassed in the following broad recommendations:

1. Encourage policy makers, industry representatives, conservation organisations and farmers to work together to develop a positive, holistic and long term vision for the LFA with joined-up policies and clear objectives.

2. Engage in the CAP reform process to ensure that Pillar 1 and Pillar 2 payments support the delivery of public goods and sustainable farming systems; this includes LFA grazing livestock systems which deliver positively for biodiversity and other ecosystem services. This equates to a strong package of support for HNV farming systems.

3. Improve agri-environment schemes to enhance the biodiversity benefits delivered by making them better targeted, locally responsive, adequately funded and accessible. Specific areas for improvement include: site specific prescriptions and flexibility to deliver optimum grazing for biodiversity priorities; and payments which take account of whole farm system costs, rather than being restricted to ‘income forgone’ calculations for specific changes in management practice.

4. Continue woodland schemes which support the creation and restoration of native woodland for biodiversity and other benefits, recognising the importance of follow-up management including grazing.

5. Ensure regulations do not disproportionately impact on livestock enterprises which are more extensive or those in more marginal areas by carrying out thorough impact assessments.

6. Continue to support grazing and land management projects run by NGOs and others which help to deliver positive results in terms of habitat restoration and/or species recovery. Ensure that future projects learn from existing experience, encourage cooperation and partnership working, and support valuable funding programmes such as INTERREG and LIFE+.

7. Undertake further research and dissemination to support positive cattle and sheep grazing systems that benefit wildlife and deliver wider public services. Specific areas include: a better understanding of how to restore and maintain habitats; the grazing attributes and biodiversity impacts of different cattle and sheep breeds; and developing more profitable and sustainable upland farming systems and enterprises.

8. Retain and promote the skills required for positive grazing and land management, including cattle management, close shepherding and burning. Encourage young farmers to obtain these skills and consider how suitable successors can be encouraged to take on the management of environmentally valuable sites.

9. Provide better support for initiatives which promote the products from positive cattle and sheep grazing in order to: help develop consumer awareness of the multifunctional nature of extensive grazing; enable strong branding and marketing; and foster supply chain development with the aim of building long term sustainability.

10. Explore ways in which livestock and biodiversity data can be collected in a more co-ordinated and coherent way in different parts of the UK, and establish key indicators, to enable better monitoring of grazing regime and biodiversity changes. In the meantime, the livestock and biodiversity data collected through this study represents an additional resource for future LFA research, nationally and locally.
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### Appendix 2: Survey of Expert Opinion - Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Country</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Jan Sherry</td>
<td>Countryside Council for Wales</td>
<td>W</td>
<td>Government/ecologist, policy</td>
</tr>
<tr>
<td>2 Richard Weyl</td>
<td>Department of the Environment Northern Ireland</td>
<td>NI</td>
<td>Government/ecologist</td>
</tr>
<tr>
<td>3 Gwyn Jones</td>
<td>European Forum for Nature Conservation and Pastoralism</td>
<td>S</td>
<td>Conservation organisation</td>
</tr>
<tr>
<td>4 Dr Phil Warren</td>
<td>Game and Wildlife Conservation Trust</td>
<td>UK</td>
<td>Research/adviser</td>
</tr>
<tr>
<td>5 Dr Peter Dennis</td>
<td>Institute of Biological Environmental and Rural Sciences</td>
<td>UK</td>
<td>Research/ag ecologist</td>
</tr>
<tr>
<td>6 Mariecia Fraser</td>
<td>Institute of Biological Environmental and Rural Sciences</td>
<td>W</td>
<td>Research/ag ecologist</td>
</tr>
<tr>
<td>7 Christopher Everard</td>
<td>National Beef Association</td>
<td>UK</td>
<td>Farming organisation/policy</td>
</tr>
<tr>
<td>8 Jonathan Hall</td>
<td>National Farmers Union Scotland</td>
<td>S</td>
<td>Farming organisation/policy</td>
</tr>
<tr>
<td>9 Phil Stocker</td>
<td>National Sheep Association</td>
<td>UK</td>
<td>Farming organisation/policy</td>
</tr>
<tr>
<td>10 Helen Buckingham</td>
<td>National Trust</td>
<td>W</td>
<td>NGO/ecologist</td>
</tr>
<tr>
<td>11 David Martin</td>
<td>Natural England</td>
<td>E</td>
<td>Government/ecologist</td>
</tr>
<tr>
<td>12 David Glaves</td>
<td>Natural England</td>
<td>E</td>
<td>Government/land management</td>
</tr>
<tr>
<td>13 Penny Anderson</td>
<td>Penny Anderson Associates</td>
<td>E</td>
<td>Consultancy/ecologist</td>
</tr>
<tr>
<td>14 Hilary Kehoe</td>
<td>PONT</td>
<td>W</td>
<td>Conservation organisation</td>
</tr>
<tr>
<td>15 Julian Jones</td>
<td>Radnorshire Wildlife Trust</td>
<td>W</td>
<td>Conservation organisation</td>
</tr>
<tr>
<td>16 Davy McCracken</td>
<td>Scottish Agricultural College</td>
<td>S</td>
<td>Research/ag ecologist</td>
</tr>
<tr>
<td>17 Patrick Krause</td>
<td>Scottish Crofting Federation</td>
<td>S</td>
<td>Farming organisation/policy</td>
</tr>
<tr>
<td>18 Bill Grayson</td>
<td>Self</td>
<td>E</td>
<td>Grazier/ecologist</td>
</tr>
<tr>
<td>19 John Waldon</td>
<td>South West Uplands Federation</td>
<td>E</td>
<td>Farming organisation/ adviser</td>
</tr>
<tr>
<td>20 Matt Lobley</td>
<td>University of Exeter</td>
<td>E</td>
<td>Academic/research</td>
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Appendix 3: Case Studies

See separate documents for individual case studies:

- Dartmoor
- Limestone Country
- Cambrian Mountains
- Snowdonia
- Uists
- Croick Estate
- Antrim Hills
- Fermanagh
**Changing livestock numbers in the UK LFA**  
**Case Study: Dartmoor (South West England)**

<table>
<thead>
<tr>
<th>OVERVIEW OF STUDY AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AREA</strong></td>
</tr>
<tr>
<td>954sq km (95,400ha)</td>
</tr>
<tr>
<td><strong>KEY HABITATS &amp; FEATURES</strong></td>
</tr>
<tr>
<td>Upland heathland, Blanket Bog, Purple Moor grass (Rhôs) Pasture, Bracken stands, Upland oak woodland, extensive archaeological sites.</td>
</tr>
<tr>
<td><strong>LAND USES</strong></td>
</tr>
<tr>
<td>Extensive grazing, MOD training range, Forestry, Tourism &amp; Recreation.</td>
</tr>
<tr>
<td><strong>DESIGNATED SITES</strong></td>
</tr>
<tr>
<td>National Park, SAC covering 23,165ha, SSSIs covering 26,169ha, 4 NNRs.</td>
</tr>
<tr>
<td><strong>LIVESTOCK</strong></td>
</tr>
<tr>
<td><strong>LANDOWNERS</strong></td>
</tr>
<tr>
<td>Duchy, Ministry of Defence, Forestry Commission, Dartmoor National Park Authority, National Trust, Private.</td>
</tr>
</tbody>
</table>

**BIODIVERSITY OF DARTMOOR:** The climate and diversity of habitats across Dartmoor give rise to a great diversity of wildlife including globally threatened and nationally rare species. Large open expanses of semi-natural blanket bog and upland heathland are continuous across the high moor, intersected by valley mires with springs and flushes feeding rivers leading off the higher slopes. The high moor is connected with the lowland farmland by both unimproved acid grasslands, bracken slopes and enclosed semi-improved pastoral farmland, interspersed by river valleys with fragmented unimproved hay meadows and Rhôs pastures. The upland blanket bogs and upland heathlands of the open moor and the upland oak-woods of the river valleys are three habitats of international importance on Dartmoor. Areas of blanket bog are the most southerly in England and support some of the best areas of this habitat in the UK. They also support the world’s most southerly populations of breeding dunlin. Dartmoor SAC has also been designated for southern damselfly, Atlantic salmon and otter.

**FARMING SYSTEMS ON DARTMOOR:** For over 5,000 years farming has shaped the upland habitats of Dartmoor, and livestock grazing is as important today as it has ever been. The majority of Dartmoor is moorland, exposed rough grassland used for extensive grazing of cattle, sheep and ponies; with only sheep and ponies surviving harsh winters without additional feeding. Around 36,000ha of open moorland is divided into commons, with associated rights. Newtakes are mainly enclosed areas of moorland, adjacent to the commons belonging to individual farms. Some of these have been agriculturally ‘improved’ but remain marginal in terms of production. The in-bye land comprises a patchwork of improved and enclosed fields, suitable for forage production or grazing lambing sheep or cattle with calves.
GRAZING LIVESTOCK ON DARTMOOR: Current farm survey data for Dartmoor National Park (Defra June 2010 survey) indicates the main agricultural land uses are permanent grass (67%), rough grazing (19%), temporary grass (6%) and crops and fallow (5%). Livestock data for the LFA in 2010 was 35,405 cattle and 133,759 sheep.

Analysis of Defra survey data for 2000-2010 (see below) shows an increase in cattle (14%), including beef (suckler) cows (12%). Dairy cows, while small in number, reduced by 37% over the same period. Sheep numbers reduced by 7%, with breeding ewes reducing by 10%.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dairy cows</th>
<th>Beef cows</th>
<th>Total cattle</th>
<th>Breeding ewes</th>
<th>Total sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1,139</td>
<td>11,188</td>
<td>30,982</td>
<td>75,196</td>
<td>143,651</td>
</tr>
<tr>
<td>2005</td>
<td>781</td>
<td>13,825</td>
<td>38,633</td>
<td>83,536</td>
<td>160,524</td>
</tr>
<tr>
<td>2010</td>
<td>722</td>
<td>12,508</td>
<td>35,405</td>
<td>67,972</td>
<td>133,759</td>
</tr>
<tr>
<td>Change</td>
<td>-37%</td>
<td>12%</td>
<td>14%</td>
<td>-10%</td>
<td>-7%</td>
</tr>
</tbody>
</table>

LFA cattle and sheep data for Dartmoor NCA (Defra, 2011)

Official pony numbers are not recorded however anecdotal evidence suggests that from an estimated high of 30,000 in the 1950s, the number on the moor today total around 1,000 foundation stock. It is also important to note that figures for pony numbers vary on the definitions being used; ponies can be purebred native breed Dartmoors or they could be ‘hill ponies’ which can be hybrids of Dartmoors, Exmoors, Shetlands and other pony breeds.

Changing livestock numbers only tell part of the picture. The way farmers manage their land and stock has changed drastically over the decades. The main grazing regime changes in Dartmoor, suggested by local stakeholders include:

- A significant decrease in pony numbers, with potential long term effects unknown.
- A move away from traditional cattle breeds like Galloways to continental breeds to increase production.
- More hill farms buying up lowland ground to produce commercially viable stock.
- Less hefting and shepherding on the hill makes management of specific sites difficult.
- Less burning on the hill leaving ranker grasses which livestock avoid.
- Farms being broken up with small, awkward sites sold off to non-farmers or abandoned.

CONDITION OF DESIGNATED SITES ON DARTMOOR: The unique and rich natural heritage on Dartmoor is recognised by the extensive areas afforded special protection as designated sites. Dartmoor SAC covers around 23,000ha and four NNR’s within the National Parks cover 594ha. There are over 40 SSSIs within the Dartmoor National Park covering 26,169 hectares. The two main sites of North Dartmoor and South Dartmoor total over 20,000 hectares. Whilst SSSIs, SPAs and NNRs cover vast swathes of the moor, designation has not necessarily resulted in these habitats being in favourable condition.

Data on the condition of SSSIs within the Dartmoor National Character Area show that 39% are in favourable condition, with the majority of the remainder in unfavourable recovering condition. The key reason for adverse condition is often linked to agriculture, with overgrazing most commonly cited.
GRAZING & IMPLICATIONS FOR BIODIVERSITY: A significant influence on the farming systems of Dartmoor was its designation in 1994 as an Environmentally Sensitive Area (ESA) introduced to encourage farmers to safeguard the natural environment and the historical features of the landscape. Reducing stocking densities was a key requirement of the ESA. Subsequently UELS/ELS and HLS have replaced the ESA schemes on Dartmoor but have similar requirements of restoring and maintaining moorland habitats. HLS has enabled greater flexibility in terms of tailoring prescriptions to suit each site.

The implications of grazing change on specific species are varied and complex. Some of the key impacts as highlighted by local stakeholders include:

- Pressure from commoners and owners to increase stock numbers on the moor, both in summer and winter, predominantly for economic reasons (with smaller herds/flocks being less economically viable).
- The concern in terms of site condition relates less to overall numbers of stock but more to the type (too many sheep vs cattle and also suitability of breed), distribution and timing of grazing.
- The decline in hefting and shepherding results in overgrazing on some areas and undergrazing and scrub encroachment on others.
- Little or no grazing is taking place on many Rhôs pasture sites, leading to scrub invasion; this then requires manual removal. Undergrazing also results in a dominance of purple moor grass or rush, which can shade out other floristic interest (a particular concern where larval foodplants are out-competed).
- Overgrazing takes place on some Rhôs pasture sites; this often leads to an increase in Devils’ Bit Scabious but not in a condition suitable for Marsh Fritillary. It creates a grassland sward which is less structurally diverse, with few patches of warm and sheltered habitat to support invertebrates. A relaxation of grazing can produce very good conditions for Marsh Fritillary.
- Undergrazing on bracken slopes can lead to a build-up of dead bracken material, creating sterile conditions in the ground flora and shading out Common dog-violet plants, the food plant of several fritillary butterflies.
- Intensification and improvement of species rich pasture and meadows has resulted in loss of floral diversity.
- Reduced burning on the moorland has led to an increase in Molinia and older stands of heather. Note, wild fires have decreased but swaling (controlled burning) may have increased.

GRAZING INITIATIVES: A selection of local initiatives with valuable lessons to learn are summarised below:

<table>
<thead>
<tr>
<th>GRAZING FOR BUTTERFLIES – THE TWO MOORS THREATENED BUTTERFLY PROJECT</th>
</tr>
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<tbody>
<tr>
<td>Dartmoor is a stronghold for five species of fritillary butterfly which depend on two habitat types, Rhôs pasture (Purple moor-grass and rush pasture) and bracken stands with abundant violets including Marsh Fritillary, Small Pearl-bordered Fritillary, High Brown Fritillary, Pearl-bordered Fritillary and Dark Green Fritillary. Changes in agriculture mean these areas of unimproved habitats have experienced abandonment or insufficient management, leading to dramatic declines in fritillary populations. Many of the Rhôs pastures are small fragmented sites with no statutory designations adding to the challenge of securing appropriate management. These habitats also support a number of other rare and declining species including Bog hover fly, Narrow-bordered Bee Hawk-moth, Reed Bunting, Grasshopper Warbler, Snipe, Dormouse, Whinchat and Lesser Butterfly Orchid.</td>
</tr>
</tbody>
</table>

The Two Moors Threatened Butterfly Project – a partnership project between Dartmoor National Park Authority, Exmoor National Park Authority, Natural England and the Environment Agency, led by Butterfly Conservation – aims to restore populations of the five priority species of butterfly in the area. Butterfly Conservation has been working with landowners to offer management advice on the restoration of sites to introduce appropriate grazing regimes, source livestock, manage scrub and help them access financial support through stewardship schemes. Suitable bracken habitats occur on sunny sheltered slopes, away from the high moor, where there is a mosaic of acid grassland, bracken and scrub. Abandonment or under grazing quickly leads to the bracken out-competing other species, whilst overgrazing leads to increased grass cover and loss of High Brown Fritillary habitats.
**Challenges:**
- Undergrazing on economically marginal land
- Non-farming landowners finding it difficult to secure suitable stock to graze their land
- Scrub encroachment due to low intensity grazing
- Fragmentation of small, scattered sites
- Habitats highly sensitive to change

**Successes:**
- Re-introducing grazing on abandoned sites
- Improvements in habitat condition and increases in the populations of key butterfly species over an 8 year period
- Safeguarding other rare species such as reed bunting, whinchat or orchids.
- Improving landowner knowledge via regular on site advice
- Improving connectivity of fragmented sites

## PONIES AS CONSERVATION GRAZERS

Moorland ponies have been an integral part of the Dartmoor landscape, grazing upland habitats and shaping the character of the moor. Due to changes in the market place, numbers of Dartmoor ponies have fallen sharply from an estimated 30,000 in the 1950s to around 1,000 foundation stock on the moor today. There are a number of individuals and groups on Dartmoor who breed and manage Dartmoor Pony herds as conservation grazers in an effort to both secure this native breed and improve management of difficult or marginal sites including Rhôs Pasture, Upland Heathland and unimproved grassland.

Dartmoor Pony Heritage Trust (DPHT) is one such charity; it runs a scheme working with a number of pony keepers who have herds on moorland sites and are breeding to sell elsewhere in the UK. DPHT lease 82ha of heather moorland from the Forestry Commission at Bellever, within an area of 450 hectares of forestry plantations. The 82ha of heathland is managed under a Higher Level Stewardship scheme with up to 26 ponies grazing during the summer months. The aim of the pony grazing is to reduce the *Molinia* on the site and maintain the heather. The DPHT has experienced some difficulties in managing the site mainly due to keeping the ponies in the desired areas to graze the *Molinia*. The 82ha of heathland is not fenced within the total area of 450ha so the ponies can range over a vast area. The low stocking rate means that they feel the *Molinia* is now undergrazed, to the detriment of the heathland habitat. The site is also significant for its archaeological interest with a number of cairns, cists and stone rows designated as scheduled monuments. These important sites require grazing at adequate levels to ensure they are visible but at a light stocking rate to avoid damage from poaching.

**Challenges:**
- Shepherding & stock management
- Fencing open moorland sites
- Lack of market value
- Projects needing facilitation
- Preference for cattle over pony grazing under scheme rules
- Finding suitable land for off-wintering

**Successes:**
- Using ponies as hardy, selective graziers suited to rough grazing, trample scrub and bracken.
- Delivering the grazing needed to benefit fritillary butterflies on many Rhôs pasture sites (which links to the Two Moors Threatened Butterfly Project).
- Maintaining distinctive tourism attraction
- Supporting ‘rare breed’ in case of pedigree Dartmoor pony and ancient herds which are the foundation stock locally known as Dartmoor Heritage Ponies
- Offsetting costs (e.g. passport, chipping) by loaning to graze conservation sites
AGRI-ENVIRONMENT SCHEMES ON COMMON LAND

On Dartmoor, the commons cover rough grassland, heather moorland, bracken and gorse and amount to 35,882ha. There are 2 main blocks of common land, one (around 17,000ha) lying to the north-west and the other in the south (around 14,000ha). In addition, there are other fragmented commons in the east.

The management of the Dartmoor commons is heavily dependent on the survival of the hill farmers, and their ability to graze animals. There are currently 850 registered commoners but less than a quarter of the farmers continue to use the commons for grazing. Within the Dartmoor ESA there were significant reductions in stocking rates of c.55%. However, accurate moorland stocking data is notoriously difficult to obtain, especially for commons. Numbers vary throughout the year with sheep and ponies and some cattle grazed on the commons all the year round, then more cattle turned out for the spring and summer months.

Natural England has recently announced one of its largest and most complex HLS agreements, covering the ‘Forest of Dartmoor’ – an area of more than 11,000 hectares at the heart of The Moor and one of England’s largest areas of common land. The agreement has involved working collectively with over 300 Dartmoor ‘commoners’ and provides financial support for the commoners to graze their livestock in ways that will deliver improvements in the condition of 9,000 hectares of the Forest of Dartmoor which is designated as SSSI and SAC. The main focus of the agreement has been to ensure that livestock numbers are set at an appropriate level and involves a number of organisations who already work in partnership managing and protecting The Moor. Alongside Natural England and the commoners other organisations involved in the HLS include the Duchy of Cornwall, Dartmoor National Park Authority and South West Water.

<table>
<thead>
<tr>
<th>Challenges:</th>
<th>Successes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reaching consensus between parties</td>
<td>• Maintaining hefted flocks</td>
</tr>
<tr>
<td>• Managing stock on open moorland</td>
<td>• Working together delivering ecosystem services such as food production or carbon sequestration</td>
</tr>
<tr>
<td>• Scheme payments not always regarded as sufficient to cover net costs associated with low stocking rates and off wintering.</td>
<td>• Supporting livelihoods on hill farms</td>
</tr>
<tr>
<td>• Inappropriate grazing of continental cattle breeds</td>
<td>• Collective working for a longer-term vision</td>
</tr>
<tr>
<td>• Lack of rights holders actively grazing commons</td>
<td>• Shepherding supplement available in HLS supports stock management</td>
</tr>
</tbody>
</table>

LESSONS LEARNT: The following lessons can be drawn from the local initiatives and interviews with stakeholders in the case study area:

- Upland habitats on Dartmoor are highly sensitive to changes in livestock numbers, with adverse effects from both under- and over-grazing; and once degraded they can take decades to restore.
- Many of the issues surrounding the management of diverse upland habitats on Dartmoor can be linked to the profitability of livestock farming. Initiatives that can support and link in with the farm business will have the biggest effect on grazing numbers and practice,
- Financial issues are also significant in ensuring sustainable pony grazing on Dartmoor, where they currently have no market value and heritage breed bloodlines are being lost.
- Continued management of many sites is dependent on agri-environment subsidy; often schemes require facilitation from advisors in order to come to fruition, particularly on common land.
- Facilitation is key on non-designated sites where advice and assistance for works such as scrub management is often undertaken by project officers or charitable organisations, which rely on short-term funding.
- Finding solutions to grazing stock on small, fragmented sites is hard.
- Livestock health issues e.g. TB, ticks, liver fluke etc are major barriers to grazing upland habitats; practical advice and effective solutions to reduce disease risk are required.
- Barriers associated with off-wintering stock such as winter housing, cost of feeding, muck or slurry disposal need to be addressed.
- Challenges in reaching agreement on management between farmers, graziers and statutory agencies can delay positive management on sensitive sites.
- A lack of livestock and farming knowledge means education is important for non-farming landowners in avoiding inappropriate grazing or abandonment.
FUTURE POLICY AND PRACTICE: To improve the way we graze our most important habitats to benefit biodiversity there is a need for policy development and commitment. The key areas to take forward from this case study are:

- There is generally a low profitability for upland livestock farms on Dartmoor, with a great dependence on SPS and agri-environment subsidy. Secure and well funded agri-environments schemes are critical for securing appropriate grazing regimes and safeguarding vulnerable species and habitats.

- Initiatives that build farm business resilience and competitiveness in appropriate ways can help secure the future of extensive livestock systems, for example, by facilitating local partnerships to differentiate high quality products from extensively managed, native breeds or stock with a strong place-based identity.

- Schemes and incentives need to be designed and implemented with the flexibility to tackle the range of site specific obstacles to grazing livestock on sensitive sites. For example, HLS has enabled tailoring of prescriptions to suit each site through a more targeted approach.

- Not only livestock numbers but the type, distribution and timing of grazing are all important to environmental outcomes. For example, the decline in cattle and a move towards continental breeds less suited to grazing more marginal land has led to an increase in ranker grasses and bracken.

Thank you to Jenny Plackett (Butterfly Conservation), David Powell (farmer & pony producer/grazier) Norman Baldock (Dartmoor National Park Association), Andy Guy (Natural England), Dru Butterfield (Dartmoor Pony Heritage Trust), John Waldon (Dartmoor Farming Futures) and Dartmoor Commoners Council for providing time, photos and information for this case study. Where not otherwise credited, photographs are copyright of Cumulus Consultants Ltd.
Limestone Country directly refers to areas within the Yorkshire Dales where carboniferous limestone dominates the landscape. The majority of Limestone Country is concentrated in the uplands around Ingleborough, Malham and Wharfedale, covering over 11,000ha. Much of the area is internationally important; designated as Special Areas for Conservation and a Ramsar.

Biodiversity highlights of Limestone Country include:

- The exceptional diversity of limestone grassland swards created and maintained by a long history of sheep and cattle grazing. They range from hard-grazed open grasslands through to tall herb-rich grasslands in woodland margins and around screes and pavement. The most species-rich meadows and pastures exist where grazing is less intense, with blue moor grass, bloody cranesbill, small scabious and common rock rose.
- The best wet meadows or pastures containing a species-rich mixture of grasses (such as purple moor grass) sedges, herbs and mosses. This type of habitat is extremely rare in the Yorkshire Dales. Purple moor grass and rush pasture is of high biodiversity importance.
- Being one of the best areas in the UK for limestone springs and flushes. Limestone springs arise from the underlying limestone substrate in many locations. The spring communities include bird’s-eye primrose, grass of Parnassus, butterwort and occasionally, yellow saxifragae.
- Areas of woodland (where grazing is absent) dominated by ash, typically with a hazel under layer and a species-rich ground flora including dark-red helleborine, giant bellflower, columbine and herb Paris.
- The area contains 33 of the 50 most botanically rich limestone pavements in the UK. The pavements range from those where grazing is completely excluded to areas with intensively grazed land. Where grazing is light the pavements support a rich and diverse flora including a range of scarce species such as limestone fern, baneberry, lily of the valley and rigid buckler fern.

Biodiversity of Limestone Country:

The Yorkshire Dales is one of the most important areas of the United Kingdom for its rich and diverse wildlife heritage and has the largest area of nationally and internationally important habitats of any National Park. This ranges from the species rich hay meadows and pastures in the dale bottoms, through to the moorland fringe with its rush pastures so important for wading birds and the windswept uplands with their open heather moorland and blanket bog, to the unique limestone pavements of limestone country.

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• Malham Tarn (left), the highest marl lake in the UK. Associated with the Tarn is a large area of species-rich alkaline fen with broad-leaved cottongrass, and alpine bartsia. Bog bean can also be seen at the Malham Tarn Nature Reserve.
• Nationally important populations of breeding waders visit limestone country, and yellow wagtail, twite and skylark are seen; and rare and scarce invertebrates such as the northern brown argus butterfly and dark green fritillary are of note. Black grouse are also starting to move back into the area.

FARMING SYSTEMS IN LIMESTONE COUNTRY: There are approximately 115 farming businesses in the study area, ranging in size from small part time units to large beef, sheep and dairy holdings. Most are family farms. The majority operate extensive sheep and cattle rearing enterprises, with dairy farming more important on the lower ground. Typically, 60% - 80% of farm income is made up of subsidy and agri-environment grants. High hills and dales occupy much of the project area and this produces a relatively harsh physical environment for agriculture. The land is classified by Defra as being poor or very poor in terms of agricultural quality, being a mix of DA and SDA.

GRAZING LIVESTOCK IN LIMESTONE COUNTRY: Sheep and cattle numbers have fluctuated across the region and within Limestone Country. Data sources, boundaries and methodologies have varied over time which makes comparison of census data hard but the following county trends are worth noting here:

In the North Riding of Yorkshire, between 1945 and 1965, total sheep numbers increased by 53% from 599,283 to 915,281. Cattle numbers saw a smaller increase of 33% from 233,693 to 311,247. In the remapped county of North Yorkshire between 1975 and 1995 sheep numbers continued to increase, rising from 1,426,036 to a peak of 2,101,826; an increase of 47%. Cattle numbers started to fall during this period, dropping from their peak of 562,370 down to 422,087; a decrease of 25%. By 2005, sheep numbers were falling. 1,817,514 were counted (a fall of 13% from 1975) and 379,033 cattle were counted (a fall of 10% from 1995 or 33% from 1975).

Using survey data for the Yorkshire Dales NCA (see below) the following changes are shown: a 6% decline in cattle numbers between 2000 and 2010 with a 4% reduction in beef cows and a 23% reduction in the number of dairy cows; the fastest declines in cattle have been after 2005, post decoupling; a 6% decline in sheep numbers since 2000. Total livestock units (LU) have dropped by 7% over the period, with the cattle LU decreasing by 8% compared to a reduction of 6.6% in sheep LU.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dairy cows</th>
<th>Beef cows</th>
<th>Total cattle</th>
<th>Breeding ewes</th>
<th>Total sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>16,509</td>
<td>14,554</td>
<td>71,866</td>
<td>387,506</td>
<td>815,277</td>
</tr>
<tr>
<td>2005</td>
<td>15,256</td>
<td>14,876</td>
<td>75,634</td>
<td>372,353</td>
<td>812,521</td>
</tr>
<tr>
<td>2010</td>
<td>12,691</td>
<td>14,044</td>
<td>67,861</td>
<td>350,428</td>
<td>765,539</td>
</tr>
<tr>
<td>Change</td>
<td>-23%</td>
<td>-4%</td>
<td>-6%</td>
<td>-10%</td>
<td>-6%</td>
</tr>
</tbody>
</table>

LFA cattle and sheep data for the Yorkshire Dales NCA (Defra, 2011)
Interviews with stakeholders working and farming in the study area confirmed that these trends hold true in Limestone Country. Although some farms have reacted differently to the key drivers, many farms in the Ingleborough, Malham and Wharfedale area have specialized in sheep, and cattle numbers have fallen. One stakeholder suggested that sheep numbers tripled in some parishes in the 1970s.

Changing livestock numbers are only part of the picture. The way farmers manage their land and stock has changed drastically over the decades too. The main grazing regime changes in Limestone Country, suggested by local stakeholders include:

- Intensification of the in-bye through reseeding, drainage and fertilization.
- Improvement of marginal areas, by all of the above methods.
- Less mixed stocking.
- A move away from hardy Swaledale and Dalesbred ewes, to heavier hill breeds like North Country Cheviots, and lowland and continental breeds on better land.
- A move away from traditional cattle breeds and forage based diet to continental breeds and higher protein feeds, mostly bought-in.
- More indoor lambing, twin lambing and fattening, driven by purchased inputs.
- Less out-wintering on the hill of both sheep and cattle.
- More away wintering.
- Less hefting and shepherding on the hill.
- Less burning on the hill.
- A move to earlier silage making from traditional late cut hay making.
- An increase in rabbit populations (milder winters and less predator/keeper control).

These grazing trends reflect the documented drivers of change such as post war agricultural intensification, the introduction of headage based subsidies, Foot-and-Mouth Disease (FMD) outbreaks, the decoupling of subsidies, and agri-environment destocking. It is worth noting that the 2001 FMD outbreak decimated many farms in the area, with long breed lines destroyed; this led in many cases to a change in mind set of whether to restock with cattle and sheep, or just sheep.

CONDITION OF DESIGNATED SITES IN LIMESTONE COUNTRY: Livestock numbers, types and regimes shape the landscape and habitats of Limestone Country. An analysis of the SSSI site condition data for Ingleborough SAC and Craven SAC revealed that overgrazing is still a problem on many sites but undergrazing has also become a significant issue:

- The two SACs contain 210 SSSI compartments, totalling 14,492ha.
- The most abundant habitat types are upland bog (4,722ha), Calcareous grassland (4,469ha) and inland rock/limestone pavement (2,466ha). Other key habitats include fen, marsh and swamp, broadleaved mixed and yew woodland, and dwarf shrub heath.
- Out of 210 compartments, 61 are classed as being in favourable condition, 125 are unfavourable recovering, 23 are unfavourable no change, and 1 site is declining.
- Where recorded, 40 sites were unfavourable due to overgrazing and 7 were being undergrazed.
GRAZING AND THE IMPLICATIONS FOR BIODIVERSITY: The implications of grazing change on specific species and habitats in Limestone Country are varied and complex. Some of the key regime changes and associated biodiversity impacts, as highlighted by local stakeholders, include:

- Increased grazing intensity, particularly with sheep in the spring and summer months, has reduced the frequency and flowering ability of many of the characteristic herbaceous plants, and completely removed them from heavily grazed sites.
- The loss of mixed grazing and increased sheep numbers has led to the development of more homogeneous swards.
- The decline in cattle has contributed to the spread of ranker grasses, scrub and bracken on some sites and hindered restoration attempts.
- Re-introduction of cattle to the limestone pavement/calcareous grassland mosaic has benefited much of the sward. Mixed grazing and/or lack of seed source have not allowed wooded pavements to regenerate, resulting in favourable grassland but unfavourable pavement.
- Intensification and improvement of species rich pasture and meadows has resulted in a drastic loss of floral diversity.
- The loss of host plants such as the common rockrose impacts directly on associated species e.g. the brown argus butterfly. Higher stocking rates lead to increased disturbance of ground nesting birds such as the lapwing and skylark.
- Winter feeding with big bales concentrates and intensifies grazing impacts on more accessible fields usually chosen for keeping flocks in late winter.
- The decline in hefting and shepherding results in overgrazing on some areas and under grazing and scrub encroachment on others.
- Reduced burning on the moorland has facilitated an increase in ranker grasses and older stands of heather. However, burning can promote dominance of *Molinia* whether appropriate seed sources do not exist.
- Overgrazing by rabbits (and deer in places) has led to tightly lawned areas on some sites. Similar to sheep, they also target delicate plants, ledges and gaps (grikes) between limestone pavements. Plants become miniaturised under a combined pressure of sheep and rabbit grazing
- Where cattle are kept indoors (as opposed to extensive outdoor systems) there can be diffuse pollution issues arising from manure storage and application. This has had implications on the sensitive habitats around Malham Tarn and on some limestone flushes.

In addition to the effects of grazing on biodiversity, a number of additional pressures were also noted of being significant. These include the spread of invasive species such as thistle and bracken, pavement damage and quarrying, afforestation and modification of woodland, and recreational pressures.

GRAZING INITIATIVES: Over recent years there have been a number of initiatives that have helped address the negative impacts of grazing regimes and farm intensification. Starting with the Pennine Dales Environmentally Sensitive Area scheme in 1987 and the Countryside Stewardship Scheme in 1991, farmers have been encouraged to reduce stocking and to protect the highest priority habitats and landscape. FMD in 2001 and the removal of headage based payments in 2005 forced considerable change for many farmers but with support and advice from projects such as the Limestone Country Project (see below), the Environmental Stewardship Scheme and bodies including the National Trust, Natural England (see below) and the Yorkshire Dales National Park Authority, many have embraced biodiversity conservation and are now delivering positive grazing on their farms.
The Limestone Country Project (LCP) ran from 2002 to 2008 with the objective to improve the SAC habitats by encouraging a return to mixed farming using hardy upland cattle breeds. The LCP provided a successful model for the promotion of conservation grazing, establishing 18 new cattle herds (12 different native breeds) across 1800ha. Ecological and socio-economic monitoring has helped show the benefits of mixed grazing and sound land management. All the farmers who signed up to the project have maintained or developed their herds further and are now using Environmental Stewardship (HLS) to help refine their grazing and management practices.

The successful marketing of traditional breed beef followed for some of those involved through a linked initiative. Limestone Country Beef Ltd is owned and run by the farmers and is selling beef through the local butchers and box schemes.

Economic modelling showed that upland farms in the project rely heavily on public support with 60%-80% of net gross margin coming from subsidies and agri-environment schemes. Importantly, substituting sheep with traditional breed cattle improved returns if a premium price could be achieved e.g. through direct sales via Limestone Country Beef Ltd.

An important part of the project was the ecological monitoring designed to show vegetation and invertebrate changes following the reintroduction of cattle on representative sites. Some of the key findings included:

- Calcareous grassland (NVC CG9) was botanically more diverse when grazed by cattle than by sheep.
- Acid grassland (NVC U4) was more diverse when mixed grazed.
- Calcareous mires (NVC M10) were more species rich when grazed by sheep only.
- Most limestone pavements benefit from no grazing.
- Although change was only monitored for 3 years (2003 to 2006) species diversity on the SSSI sites was greater on cattle grazed areas.
- The effect on invertebrate diversity was mixed across vegetation types.

**Challenges:**

- Finding ways to benefit farm viability and biodiversity in combination
- Tackling overgrazing and farm intensification in areas of international biodiversity significance
- Engaging with farmers and securing their support for conservation measures
- Supporting farmers following FMD destocking
- Seeking a premium price for conservation grazed beef to help compensate for reduced levels of productivity

**Successes:**

- Demonstrated that positive farmer outreach and advice, and targeted funding can work
- Proven grazing outputs establishing 18 new cattle herds (12 different native breeds) across 1800ha
- Good ecological and economic monitoring
- Positive marketing support making the most of local butchers, farm shops, box schemes and the web, creating a number of sustainable enterprises
Ingleborough, with its tableland summit, is a dramatic 1014ha corner of Limestone Country. Managed by Natural England and Yorkshire Wildlife Trust as a National Nature Reserve it is mostly SSSI and SAC. A fine mosaic of limestone pavement (some of the best in the UK), limestone grassland, base-rich flushes (with bird’s-eye primrose), blanket bog and traditional hay meadows can be seen.

Like many areas Ingleborough has suffered from decades of overgrazing with sheep and the decline in cattle. In the 1950s and 60s local beef cattle and agisted dairy heifers or dry cows from Cheshire and Lancashire would have been brought to the hill. Wether lambs and hefted ewes would have grazed alongside cows. Economics, policy and disease risk all contributed to the end of these mixed regimes, which became increasingly sheep-dominated through the 1980s and 90s. Areas like South House Moor were once notable grouse moors as the estate bag records confirm but today the heather cover is almost gone and Red and Black Grouse are seldom seen.

Farming intensification has put additional pressure on the limestone uplands of Ingleborough. Accessible limestone pastures have been fertilised to increase sward-productivity for higher numbers of stock and to help maintain larger modern cattle breeds. Bought-in feed, to help maintain stock condition, has also resulted in damage to grassland by introducing foreign species, excessive poaching on feeding areas and increased soil fertility.

The introduction of the ESA scheme in 1987 supported significant reductions in sheep stocking rates on land entering the scheme along with less winter grazing. FMD and decoupling speeded up the process. While less intensive grazing has allowed some vegetation types such as dwarf shrub to regenerate it has also facilitated the dominance of tussocky purple moor grass and ranker swards overall.

The need for more sensitive grazing management and the inclusion of cattle within the mix led to close involvement with the Limestone Country Project. The reserve purchased its own herd of hardy blue grey, shorthorn and redpoll cattle in 2003. These are now managed and form part of the wider Morecambe Bay Local Grazing Scheme run by Bill Grayson. On Ingleborough, Bill’s main focus is the Sulber and High Brae SSSI compartments.

Interesting findings from this grazing work include:

- Cattle can thrive and finish entirely on the hill. They grow slowly on the natural forage, eventually producing a beef carcase of commercially marketable size and quality, at 5 or 6 years of age. The meat produced by these cattle has been shown to be high in Omega 3s and of very good eating quality, albeit somewhat less tender than beef from younger faster-grown animals. Successfully marketing it as a premium product is therefore crucial.

- GPS tracking have shown that the cattle prefer certain areas such as watering points, flatter areas, previously grazed areas and swards containing the most palatable mix of species. However, given time the cattle did move into other ranker areas in search of bulk and a wider diet, a trend that has become increasingly evident over the years.

- Cattle do not graze on the pavements although they do eat scrub and regenerating woodland on the edges. Despite this, there is considerable evidence of hawthorn regeneration on the lower parts of High Brae wherever the ground is less accessible.

- Even with zero sheep and only light cattle grazing, woodland on the pavement (an important element of the mosaic) will not regenerate if the seed source is not available (so not all well grazed pavement mosaics will be favourable without intervention).

- Although sheep can overgraze and reduce flowering they do keep the sward open and stop scrub encroachment. They are also very important for aftermath grazing on the meadows. They also help to contain the spread of common ragwort, a trend that is becoming increasingly evident wherever cattle graze unaccompanied.

- Dark Red Helleborine and Frog Orchid populations have increased following sheep reductions and light summer cattle grazing.

- Breeding pairs of lapwing have fallen drastically since the 1990s. This may be due to the loss of mosaic and too much tussocky grassland.

By working with the Ingleborough farming tenants, over 95% of the reserve is currently assessed as being in a ‘favourable’ or ‘unfavourable recovering’ condition. While over and under grazing is still a problem great progress is being made. During interviews, stakeholders suggested that the following support is desirable to ensure further successes in the future:

- Better financial support for farming tenants on NNRs from HLS (there is currently an inconsistent approach within NE to NNR funding and tenants/graziers rights to claim HLS and UELS/OUELS. The latter have been particularly problematic since the end of HFA payments).
• More support for cattle and cattle infrastructure via HLS and Catchment Sensitive Farming/Water Framework Directive funds.
• Improved knowledge transfer – cattle grazing economics, benefits of slow growing pasture fed animals etc. More research into performance characteristics of different breeds of cattle reared under conservation grazing regimes.
• More practical advice for farmers.
• More research on vegetation management, niche/mosaic management, grazing attributes, GPS work etc.
• Ongoing support for the LFA.
• Develop initiatives that foster young farmers with livestock skills and environmental motivation. Such graziers are very hard to find.
• Improved linkage with the RSPB and other organisations.

<table>
<thead>
<tr>
<th>Challenges:</th>
<th>Successes:</th>
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</thead>
<tbody>
<tr>
<td>Working with tenants on the NNR</td>
<td>Working in partnership with a conservation grazier</td>
</tr>
<tr>
<td>Bringing back native cattle to Ingleborough</td>
<td>Developing a sustainable grazing model</td>
</tr>
<tr>
<td>Managing a complex habitat mosaic</td>
<td>Innovation – GPS tracking, rewilding etc.</td>
</tr>
<tr>
<td></td>
<td>Conservation grazing apprenticeships pioneered</td>
</tr>
<tr>
<td></td>
<td>Proven role in demonstrating practical benefits to farmers and land managers</td>
</tr>
</tbody>
</table>

**LESSONS LEARNT:** The following lessons can be drawn from the local initiatives and interviews with stakeholders in the case study area:

• Traditional breed cattle have a positive and proven effect on grazed habitats and biodiversity.
• Sheep grazing and total stock exclusion are also important tools.
• On large open sites cattle don’t always graze where needed or where expected so monitoring is required and manipulation may be needed.
• Ensure the appropriate restorative grazing is available before destocking. Restoration of some habitats will be disappointing if the rights levels of extensive cattle and/or mixed grazing are not available.
• The introduction of cattle, even at conservation grazing levels, can have negative impacts such as shrub/tree layer damage.
• Financial support for improving/adapting infrastructure coupled with practical business, marketing and environmental advice/hand holding is needed to facilitate system/breed change and adoption of extensive grazing practice. However, if a sustainable business model can be developed, farmers will run with it. Farmer advocates and entrepreneurs have a crucial role in promoting ongoing development.
• Ecological and socio-economic monitoring is crucial to demonstrate the benefits of extensive grazing, to develop optimal site-specific regimes and to allow systems to become economically sustainable.

**FUTURE POLICY AND PRACTICE:** To improve the way we graze our most important habitats to benefit biodiversity there is a need for policy refinement and better practice. The key areas to take forward are:

• Develop and disseminate further work on the grazing attributes and habits of traditional cattle and sheep breeds, and biodiversity responses to different types of grazing.
• Support knowledge transfer and sound practical advice at ground level given by advisory teams including the Yorkshire Dales National Park Authority, National Trust, the Grazing Animals Partnership (now managed by the RBST) and Natural England as this is crucial to change facilitation.
• Continue to develop understanding of the economic viability of extensive cattle grazing, in terms of both the capital costs of reintroduction such as cattle purchase and infrastructure changes, and ongoing business planning taking into account realistic expectations for the performance characteristics of native breed cattle and the nutritional properties of unimproved grassland and other semi-natural vegetation.
• Provide support for initiatives developing marketing schemes which allow a price premium to be realised for products from conservation grazing schemes.
• Seek ways of better supporting cattle/mixed grazing and livestock infrastructure, using HLS and Catchment Sensitive Farming/Water Framework Directive monies, and measures targeted at High Nature Value farming.

Thank you to Bill Grayson (grazier), Colin Newlands (NE), Helen Keep and Adrian Shepherd (YDNPA), Martin Davies (NT) and Roy Newhouse (NT tenant farmer) for providing time and information. Photos are copyright of Martin Davies, Robin Sutton and the LCP.
The Cambrian Mountains are a distinctive upland area straddling the counties of Powys, Ceredigion and Carmarthenshire. They form the backbone or heartland of Wales. Running from the borders of Snowdonia National Park and Machynlleth in the north to the Brechfa Forest in the south they are an area of exceptional upland landscape that supports priority habitats and species and ways of farming that have traditional roots stretching back to the Middle Ages.

This is not a mountainous landscape but more a smooth undulating plateau moulded by glaciation into huge sweeping landforms on a grand scale. Moorland dominates the plateau with peaks rising to 700 metres, including the highest mountain in central Wales – Pumlumon at 752 metres. Narrow valleys carve the plateau and its fringes. These range from narrow ravines and gorges to U-shaped river valleys. Enclosed farmland and settlements follow these broader river corridors.

**OVERVIEW OF STUDY AREA**

<table>
<thead>
<tr>
<th>AREA</th>
<th>197,000 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY HABITATS &amp; FEATURES</td>
<td>Blanket bog, acid grassland, upland heath, west atlantic oakwood, freshwater</td>
</tr>
<tr>
<td>LAND USES</td>
<td>Livestock farming, forestry, water catchment, tourism, renewable energy</td>
</tr>
<tr>
<td>DESIGNATED SITES</td>
<td>SPA, SAC, SSSI, National Nature Reserve</td>
</tr>
<tr>
<td>LIVESTOCK</td>
<td>Sheep, beef cattle and dairy</td>
</tr>
<tr>
<td>LANDOWNERS</td>
<td>Private estates, family farms, Forestry Commission, Elan Valley Trust, Dwr Cymru, National Trust, Montgomery Wildlife Trust, Crown Common land</td>
</tr>
</tbody>
</table>

**Biodiversity of the Cambrian Mountains:** The significance of the natural environment within the Cambrian Mountains is evident. In total 29,489 hectares or 15% of the area is designated as internationally important for wildlife (as Special Protection Areas (SPAs) or Special Areas for Conservation (SACs)). In addition, a further 4,971 hectares or 2% are nationally important as Sites of Special Scientific Interest (SSSIs).

In all, the Cambrian Mountains support 15 habitats included in the UK Biodiversity Action Plan and on the List of Habitats of Principal Importance, including blanket bogs and upland and lowland heath and oak woodlands. In turn, these habitats support a great diversity of species with 35 species on the UK and Wales Priority/Principal Lists, such as otter, red squirrel, polecat, black grouse, merlin, ring ouzel, golden plover, and red kite (with the Cambrians being the last stronghold of the red kite in the UK in the 1930s).

**Farming Systems in the Cambrian Mountains:** More than 19% of the resident working population in the Cambrian Mountains is employed in agriculture and forestry, a very high level compared to regional and national averages. The area is overwhelmingly characterised by extensive pastoral farming with 1,572 farm holdings, and two-thirds of active farms supporting a full-time farmer, although now only 18% employ additional labour. These farms are dominated by sheep rearing with 80% of farms keeping sheep. In 2005 the Cambrian Mountains supported 591,000 breeding ewes (14% of the nation’s breeding ewe population), 21,500 beef cattle (9% of the Welsh breeding suckler herd) and 2,400 dairy cattle. Most of the land is categorised as being a Severely Disadvantaged Area (SDA).

**Grazing Livestock in the Cambrian Mountains:** Sheep, cattle and native pony numbers have fluctuated over the decades in the region. Mixed grazing was once common. Today, most of the higher Cambrian Mountains are grazed by sheep although cattle still play an important role on some farms. They were once used to graze the hills tackling the starchy Molinae grass swards but due to the high labour input required and poor returns this practice has almost died out except where agri-environment schemes have specifically supported this practice. Most cattle in the area graze the improved in-bye land and are housed through the winter. There are few ponies left on the hill.
Using recent survey data for the central Pumlumon and Elenydd areas (see below) the following livestock trends between 2002 and 2010 are shown: a 26% decline in sheep numbers with the biggest decline seen post CAP headage reform; and a modest 3% decline in cattle numbers between with the biggest reduction seen in the beef cows (11%).

<table>
<thead>
<tr>
<th>Year</th>
<th>Dairy cows</th>
<th>Beef cows</th>
<th>Total cattle</th>
<th>Breeding ewes</th>
<th>Total sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>2,036</td>
<td>3,069</td>
<td>10,101</td>
<td>151,488</td>
<td>276,221</td>
</tr>
<tr>
<td>2005</td>
<td>2,182</td>
<td>3,131</td>
<td>10,591</td>
<td>131,849</td>
<td>251,304</td>
</tr>
<tr>
<td>2010</td>
<td>1,936</td>
<td>2,741</td>
<td>9,810</td>
<td>106,075</td>
<td>205,135</td>
</tr>
<tr>
<td>Change</td>
<td>-5%</td>
<td>-11%</td>
<td>-3%</td>
<td>-30%</td>
<td>-26%</td>
</tr>
</tbody>
</table>

Interviews with stakeholders working and farming in the study area confirmed that these trends hold true in the Cambrian Mountains generally. The role of the various agri-environment schemes on sheep destocking was highlighted as most significant factor alongside the economics of sheep production post CAP reform and the impact of FMD. These figures show only a modest fall in total cattle numbers as the most significant declines were thought to be prior to this census data. However, the fall of 11% in beef cattle suggests the loss of traditional grazed suckler herds.

Jessica Tyler

Herds of native Welsh ponies were once common on most farms in the Cambrian Mountains

Welsh Blacks grazing the *Molinia* dominated reservoir banks in the Elan Valley

The way farmers manage their land and stock has changed drastically over the decades too. The main grazing regime changes in the Cambrian Mountains, suggested by local stakeholders include:
• Intensification of the in bye.
• Less mixed stocking.
• Loss of native Welsh pony herds.
• A move to continental breeds and their crosses.
• More indoor lambing and finishing.
• Higher lambing percentages.
• Less feeding on the hill
• Less out-wintering on the hill of both sheep and cattle.
• Less wether lambs run on for a second year.
• Less hefting and virtually no shepherding on the hill.

• More animal health issues due to ranker grasses and lack of drainage etc such as redwater and ticks.
• Reduced availability of cattle grazing in the Elan Valley water catchment due to cryptosporidium risk.
• Fewer active commoners grazing sheep and cattle.
• Less controlled burning on the hill.
• A move to earlier silage making from traditional late cut hay making.

CONDITION OF DESIGNATED SITES IN THE CAMBRIAN MOUNTAINS: Analysis of the site condition data for the region reveals that overgrazing is still the major problem on many sites. Undergrazing and timing of grazing is also a significant issue. As outlined below, a review of the Elenydd SAC Management Plan (2008) revealed a diverse and challenging range of grazing requirements specific to the key sites/vegetation types found in the area. Most of the key features looked at are currently classed as being in unfavourable condition.

<table>
<thead>
<tr>
<th>Key Feature</th>
<th>Status within Elenydd SAC/SSSI</th>
<th>Summary of Grazing Requirements for this Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blanket Bog</td>
<td>Unfavourable</td>
<td>Bog vegetation is particularly sensitive to grazing damage, which may lead to serious erosion. Grazing in autumn and winter, particularly by sheep, is damaging to the dwarf shrubs and should be avoided. Areas used by breeding waders and other ground nesting birds should not be grazed too heavily during the breeding season so as to prevent trampling damage to nests and young. A suitable mixed grazing regime should be established/maintained across the unfenced parts of the sites.</td>
</tr>
<tr>
<td>Dry Heath</td>
<td>Unfavourable</td>
<td>Heavy grazing, particularly in autumn and winter, is damaging to the dwarf shrubs and should be avoided. A suitable mixed grazing regime should be established/maintained across the un-fenced parts of the sites.</td>
</tr>
<tr>
<td>Oak Woodland</td>
<td>Unfavourable</td>
<td>Low levels of sheep grazing can be beneficial to the mosses, liverworts and lichens in the oak woodland. However, continuous grazing is likely to prevent tree regeneration in the long term and may damage the field and shrub layers, where these elements are present. Heavy stocking could also damage moss and liverwort carpets and cause soil erosion on the steeper slopes.</td>
</tr>
<tr>
<td>Calaminarian grasslands</td>
<td>Unfavourable</td>
<td>Continued light grazing is required to prevent the growth of tall herbs, scrub and woodland, which could shade-out lichen communities. Heavy grazing could lead to disturbance of the substrate and nutrient enrichment, and stock feeding would cause similar problems.</td>
</tr>
</tbody>
</table>

GRAZING AND THE IMPLICATIONS FOR BIODIVERSITY: The implications of livestock numbers and grazing regime change on specific species and habitats in the Cambrian Mountains are varied. Some of the key regime changes and associated biodiversity impacts, as highlighted by local stakeholders, include:

• Increased grazing intensity, particularly with sheep in the spring and summer months, has reduced the frequency and flowering ability of many of the characteristic herbaceous plants, and completely removed them from heavily grazed sites.
• With declining levels of sheep grazing there has been an explosion of rank grasses, particularly molinia.
• The decline in cattle has contributed to the spread of ranker grasses, scrub and bracken on some sites and hindered restoration attempts.
• Reduced controlled burning on the moorland has further facilitated an increase in ranker grasses and older stands of heather.
• Generally species-poor acid grassland dominates in areas that are overgrazed with sheep often at the expense of dwarf shrub heath.
• Agricultural improvement of rushy pasture reduces its biodiversity value and tends to lead to a dominance of soft rush and ranker grasses such as Yorkshire fog.
• The loss of mixed grazing and a focus on sheep has led to the development of more homogeneous swards.
• Intensification and improvement of species rich pasture and meadows has resulted in a drastic loss of floral diversity.
• Higher stocking rates lead to increased disturbance of ground nesting birds such as the lapwing and skylark.
• The decline in hefting and shepherding results in overgrazing on some areas and under grazing and scrub encroachment on others.

**GRAZING INITIATIVES:** A selection of local initiatives with valuable grazing associated lessons to learn are summarised below.

### Managing Abergwesyn Commons - The National Trust

**Welsh Blacks on the Hill**

**Collecting and Spreading of cut *Molinia***

#### Background

Abergwesyn Commons (approx 6677ha) stretch for 12 miles between the Nant Irfon valley in the west and Llanwrthwl in the east. Drygarn Fawr is the highest point on the commons, lying above the Nant Irfon valley. The commons are a mosaic of blanket bog and acid grassland, with around 25% being designated SSSI/SAC. The National Trust purchased the property in 1986.

#### Grazing on the Commons

- There are 30 – 40 active commoners (out of 240 with rights).
- Mostly Welsh Mountain sheep on the hill, with Mules and Texels used further down the hill.
- Flocks are generally hefted but less shepherding is apparent.
- The largest grazier runs around 5000 ewes, but not all on the commons.
- Sheep numbers have fallen over recent years and there are no cattle now on the hill.
- Pony herds have now disappeared (a few hobby keepers) as no market for youngstock or meat.
- There is less feeding on the hill nowadays.
- Most of the common is not in the ESA area and hence much of the destocking seen has been caused by farm economics, decoupling and the breakdown of the commons system.
- The SSSI is currently classed as unfavourable recovering. The unfavourable condition was due to destocking, lack of stock and unbalanced grazing of the area as well as possible nitrogen deposition and uncontrolled burning.

#### Biodiversity

The key biodiversity objectives are:

- Restoration of the blanket bog.
- Creating and managing the mosaic of habitats for breeding waders (curlew, snipe), golden plover, ring ouzel and red kite.
- Managing heather for red grouse.
- Managing the various habitats for invertebrates.
- Works to benefit cranberry, bog bean, sphagnum mosses etc.
- Managing fire risk.
**Tackling Molinia**

Increased *Molinia dominance* has been seen due to the reduction in sheep and cattle numbers, less controlled burning (to protect peat) and the impact of sulphur deposition. There is also a loss over time of the natural heather seed banks etc. to facilitate natural regeneration. To help tackle the *Molinia* two key areas of work have been initiated:

1) Cattle reintroduction (2010 -12). Experience has shown that non hardy animals are not suited to grazing the open hill land hence the NT decided to try a traditional breed with hardy traits. A dozen Welsh Black cows were purchased by the NT and run by a commoner on Abergwesyn Hill to test their grazing attributes and the management practicalities. The key findings so far are:

- GPS monitoring showed the cattle preferred grazing the unimproved acid grass, followed by the marshy areas and dry acid heath. They rarely ventured into blanket bog. They delivered a valuable grazing effect.
- Most cows coped well with the hill environment.
- The economics of regular finding/checking the stock, slow finishing, wintering the cattle and health issues have resulted in the grazier pulling out of the project. Although has been a major set back it helps reflect and demonstrate the key issues. A new solution must now be found.

2) *Molinia* cutting. To reduce the amount of *Molinia* on areas of wet modified bog etc, 85 ha of grass were cut to 4cm (1000 tonnes), raked up and removed. 300 tonnes were flown by helicopter and spread in the eroded peat gullies to help block and restabilise. Key findings so far are:

- The cut areas reduce fuel load causing fire to burn with less intensity during burning.
- Golden plover target the shorter more open swards.
- The quality of the grazing is increased and sheep will graze these areas.
- There may not be enough stock to keep on top of the regrowth year on year.
- Heather is starting to regenerate

**Needs for the Future**

Many lesson have been learnt at Abergwesyn:

- There is a need for more cattle with hardy traits on the hill.
- Mixed grazing and shepherding is needed.
- Mechanical intervention is needed where grazing is not adequate.
- Controlled burning has many benefits (biodiversity, grazing, local economics, risk management) and has a role to play. Benefits of local controlled burning teams/contractors should be looked at.
- The barriers to cattle grazing are very hard to overcome – funding, co-operation, innovation and cultural changes are needed.

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**The Pumlumon Project - The Wildlife Trusts in Wales**

The Pumlumon Project, managed by the Wildlife Trusts in Wales, covers over more than 40,000 hectares of the northern Cambrians. The area is the largest watershed in Wales and is the source of the rivers Wye, Severn and Rheidol. The landscapes of Pumlumon are breathtaking, not only for their raw natural beauty, but for their wide horizons and sense of space. However, like most of the uplands across Wales, intensive land use activities have resulted in a significant loss of biodiversity, with many of the habitats being either lost or degraded to poor condition. Overgrazing by sheep has induced soil compaction, which has resulted in increased flooding of the lowland areas. Cattle grazing has been lost on many sites.

Following a landscape scale ecosystem services approach, since 2007 the Trust has been focusing on blocking drains, rewetting and soil improvement as well as linking habitats, tree planting and promoting access and tourism. It has also supported the reintroduction of native Welsh White cattle on the hill.

**Challenges:**

- Finding sufficient funding to support change over a large area and into the long term.
- Practicalities of reintroducing cattle grazing on an open hill – health issues, loss/injury on slopes etc.

**Successes:**

- Habitat improvements through drain blocking and extensive grazing - early signs of recovery of blanket bog and increased dwarf shrub noted.
- Improved farmer buy-in for native cattle grazing on the hill.
- Foundation herd of Welsh White cattle and a beef box scheme.
The Elan Valley Estate, managed by the Elan Valley Trust since 1989 is the largest single area of land owned by any of the national water companies (Welsh Water). The majority of the Estate is included in a Special Protection Area under the EC Directive on Wild Birds. In addition, over 6,000 ha of the Estate is included in three Special Areas of Conservation. Almost 80% of the Estate is contained within 12 separately designated Sites of Special Scientific Interest (SSSI). These cover a range of habitats, from unimproved pasture and species-rich meadows to ancient woodland, upland mire and the major upland block within the boundary of the 20,000ha Elenydd SSSI. The Elan Estate is divided into 43 farm holdings covering some 17,402 hectares. Five of these are in-hand farms while the others are all tenants of the Elan Valley Trust.

There are approximately 40,000 sheep in the Elan Valley today although numbers have fallen in recent years. They are mainly hardy Welsh Mountain ewes as these can tolerate the harsh mountain conditions. Very few twins are born - these are not encouraged as the grazing is too poor. 15,000 hoggs (first year females) are wintered off the Estate to protect the sensitive vegetation. Although cattle grazing is desirable from a nature conservation perspective numbers are limited on the Estate due to the risk associated with pollution and cryptosporidia. They can also churn-up the ground causing soil erosion and run-off into the reservoirs. A few native ponies are also seen on the hill but these are now few and far between.

The Estate is, primarily, managed to protect the quality and quantity of the reservoir water. Grazing for biodiversity is a secondary objective which can cause obvious conflict. Speaking with an Elan Valley farm tenant the following points were raised:

- ESA payments have had a mixed impact – some environmental gains (heather regeneration where sheep numbers have declined) but also some losses (explosion of *Molinia* etc).
- Decoupling encouraged the biggest change in stock numbers and management
- Thick and thatchy swards have developed due to the lack of controlled burning resulting in reduced grazing quality and increased health issues (ticks, red water etc).
- Although cattle grazing is much needed on the hill few Commoners actually have cattle grazing rights.
- Cattle are not encouraged near the reservoirs due to the risks associated with pollution and cryptosporidia

### Challenges:
- Balancing farming and conservation grazing needs with water quality issues.
- Managing the rank *Molinia* hills
- Lack of controlled burning
- Managing Common grazing
- Future of agri-environment and CAP funding

### Successes:
- Reduced stocking on the most sensitive sites.
- Improving woodland biodiversity
- The work of the Countryside Ranger service – interpretation, education, access, practical conservation works etc.
- Developing relationships with farming tenants.
- Red Kite conservation
The Cambrian Mountains Initiative – Supporting Sustainable Farming

The Cambrian Mountains Initiative is a wide-ranging project that aims to help promote rural enterprise, protect the environment and add value to products and services in Mid Wales. The initiative is a community-inclusive strategic approach to development across the whole area, aimed at sustaining the unique landscape, environment, heritage, communities, and culture. Importantly it recognises the importance of traditional farming and grazing systems to livelihoods and biodiversity, and aims to promote sensitive cattle and sheep grazing from farm to fork.

Challenges:
• Building partnerships across a disparate area with no formal boundary or designation.
• Supporting farmers through the next round of CAP and agri-environment reform
• Finding new ways of delivering sustainable grazing

Successes:
• Developing partnerships and a community approach
• Branding and marketing
• Linking traditional farming systems to the food chain
• Valuing the environment

LESSONS LEARNT: The following lessons can be drawn from the local initiatives and interviews with stakeholders in the case study area:

• Agri-environment support and good advice is crucial to change management.
• There is a proven need for the use of cattle with hardy traits – not all Welsh Black have these traits.
• Sheep numbers may be too low to manage some sites.
• Mixed grazing and shepherding is needed.
• Molinia dominance is having negative effects on grazing, fire risks, animal health (due to low nutritional value and forage diversity), as well as biodiversity.
• Mechanical intervention and innovation is needed where grazing is not possible or adequate. Although such solutions do not replace appropriate and sustainable grazing regimes they may be the only answer in some situations either as first step to better site condition or as a long term vegetation control strategy. The costs and benefits, and outcomes, need further research.
• The barriers to cattle grazing are very hard to overcome – funding, cooperation, innovation and cultural changes are needed.
• Improved farmer buy-in for native cattle grazing on the hill is important and can be won through communication and relationship building, advice packages, demonstration and financial support. Finding and nurturing farming advocates of native cattle and extensive systems in the local area is crucial.
• In-hand stock maybe the only answer on some sites – take a risk where farmer led solutions are not viable. Use these sites to help test ideas and demonstrate solutions.
• Controlled burning has many benefits (biodiversity, grazing, local economics, risk management) and has a role to play.

FUTURE POLICY AND PRACTICE: To improve the way we graze our most important habitats to benefit biodiversity there is a need for policy development and commitment. The key areas to take forward from this case study are:

• Agri-environment schemes have been central to the environmental improvements achieved in the Cambrian Mountains. Glastir must overcome its teething problems and develop into a future funded scheme that builds on the positive grazing and habitat work already achieved by previous schemes. Going forward, more work is needed to deliver optimum grazing through site specific mechanisms and flexible prescriptions. Importantly Glastir needs to deliver the ecological requirements for all of the priority species in the area.
• When changing grazing regimes, it is important to consider how grazing needs may vary in the future and whether farming systems will be able to respond to these changes.
• Targeted support is needed to help overcome the barriers to increasing cattle grazing on the hill, including premiums to support traditional breeds suited to these environments. The hill hardy traits of the Welsh Black cattle (and other native breeds) need to be understood, preserved and promoted alongside the current production values.
• There is a need to foster more co-operation and partnership working at local level between graziers, land managers, farmers and key stakeholders (for example, securing farmer buy-in to graze native breeds of cattle at Pumlumon).

Thank you to Jessica Tyler and Joe Daggett (NT), Liz Lewis-Reddy (MWT) and the Elan Valley farmer (who wishes to stay anonymous) for providing time, photos and information for this case study. Where not otherwise credited, photographs are copyright of Cumulus Consultants Ltd.
Snowdonia National Park was established in 1951 and is the third largest of the 15 National Parks in the UK. The Park covers 2,132 square km (823 square miles) and stretches from Cardigan Bay's High Water Mark in the west, to the Conwy Valley in the east and from the River Dyfi and its estuary in the south to the coast of Conwy Bay as far as Conwy in the north. Snowdonia is synonymous with extensive areas of windswept uplands and jagged peaks, the "raison d'être" for its National Park designation. The nine mountain ranges cover approximately 52% of the Park and include many peaks that are over 3,000 feet (915m).

**OVERVIEW OF STUDY AREA**

<table>
<thead>
<tr>
<th>AREA</th>
<th>2,140sq km</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY HABITATS &amp; FEATURES</td>
<td>Blanket bog, raised bog, acid grassland, dwarf shrub heath, upland oak/ash woodland</td>
</tr>
<tr>
<td>LAND USES</td>
<td>Livestock farming, recreation and quarrying</td>
</tr>
<tr>
<td>DESIGNATED SITES</td>
<td>SAC, Ramsar, SSSI, National Nature Reserve, National Park</td>
</tr>
<tr>
<td>LIVESTOCK</td>
<td>Sheep, beef cattle, dairy and feral goats</td>
</tr>
<tr>
<td>LANDOWNERS</td>
<td>Private estates, family farms, Forestry Commission, Dwr Cymru the National Trust, Crown Common land, Snowdonia National Park Authority</td>
</tr>
</tbody>
</table>

**Biodiversity of Snowdonia**: Approximately 20% of the Snowdonia National Park is designated for nature conservation. About half of that area is covered by the European Habitats Directive as Special Area of Conservation (SAC). Amongst the arctic alpine plants found in the high peaks, the Snowdon Lily is unique to Snowdon. So too is the Rainbow Beetle. Three areas - the Dyfi Estuary Biosphere Reserve, Cwm Idwal and Llyn Tegid are RAMSAR Sites - wetlands of international importance. The entire coast and marine environment below low water mark has been selected for designation as a marine Special Area of Conservation. There are 17 National Nature Reserves in Snowdonia; more than in any other National Park in England and Wales; and 56 Sites of Special Scientific Interest. Although Snowdonia has a rich variety and abundance of wildlife, and is well designated, national trends of reduced species abundance and habitat degradation are reflected here.

Plants of notable interest include the arctic-alpines which are found in the high mountains. For example, the Snowdon Lily is only found in Snowdonia in the UK, whilst other nationally rare plants, like the tufted saxifrages have nationally important populations in Snowdonia. Some of the oakwoods are internationally important because of their unusual communities of mosses and liverworts. The estuaries of Snowdonia are important for waders, sea birds and birds of passage such as lapwing, black tailed godwits and shelduck. The craggy mountain tops of Snowdonia are home to many birds of prey including buzzards, kestrels, merlins, and peregrine falcons. Snowdonia is one of the only places in Britain where the chough nests inland, using the artificial crags of abandoned quarries. Red and black grouse are to be found in the heather moorland. Mammals including the brown hare, dormouse, water vole and the elusive pine marten are of note. A fine selection of butterflies and moths may be seen in Snowdonia. Purple hairstreaks are distinctive in the oakwoods, whilst green hairstreak is much more local. The common blue is especially abundant in the coastal dunes, while the endangered marsh fritillary can occasionally be found in the heathland and wet grassland. The beautiful, rainbow coloured Snowdon beetle is restricted to the Snowdon massif.

In April 1997, led by the National Park Authority, work started on the Snowdonia Local Biodiversity Action Plan. Ranking conservation criteria can be fraught with contention, however, the process has proven useful for prioritising the habitats which require immediate action and which habitats are most important in broad landscape and ecological terms. Tackling grazing issues were identified as a priority for many BAP species and habitats.
FARMING SYSTEMS IN SNOWDONIA: Since Neolithic times, Snowdonia has been dominated by a pastoral tradition. A variety of livestock was farmed in the area until the Enclosure Acts in the late 18th Century when sheep displaced cattle as the predominant livestock. With the onset of the Industrial Revolution, numerous mines and hillside galleries were opened with significant impacts on the region and its communities. However, throughout this period traditional farming practices were largely maintained. After the Second World War an enormous increase in recreational use, together with rapid changes in agricultural practice had a significant impact on the landscape of Snowdonia. Today the main land-use is sheep farming and, to a lesser extent, cattle farming with coniferous forestry becoming more important relatively recently.

Snowdonia is essentially owned by its inhabitants with approximately 75% in private ownership. The remaining land is divided between the Forestry Commission, Dwr Cymru, the National Trust, Crown Common Land and others including Snowdonia National Park Authority.

- 80% of the land in Snowdonia is farmed.
- 14% of the working population depends on agriculture for its livelihood.
- There has been an increase in the number of part time farming units with 50% of the farm units within Snowdonia now fitting this category.
- Most of Snowdonia’s land is categorised as being a Severely Disadvantaged Area (SDA).

GRAZING LIVESTOCK IN SNOWDONIA: Much of Snowdonia was once forest. Clearance for fuel and farmable land, and then enclosure, created the fields and rough grazing we see today. Sheep, cattle, pony and goat numbers have fluctuated over the decades. Today, most of the uplands of Snowdonia are grazed by sheep, whilst the less numerous cattle tend to be confined to the lower slopes. Goats are now confined to feral flocks in a few areas including Yr Wyddfa and the Glyderau. Mountain ponies are confined to the Carneddau.

Sheep grazing is probably the single most important factor affecting upland vegetation in Snowdonia. Hughes et al (Studies in sheep populations and the environment in the mountains of north-west Wales, 1973) suggests there are now up to 25 times more sheep in some areas than there were during the mediaeval period. In the 1970s we saw peak stocking rates of up to 3 adult sheep/ha (or 0.24LU/ha where a hill ewe is 0.08LU) compared to medieval times when between 0.1 and 0.5 sheep per ha where common.

Using recent survey data for Snowdonia (see below) the following livestock changes between 2002 and 2010 are shown: a 16% decline in cattle numbers, with a 40% decrease in dairy cows and 19% decrease in beef cows; the fastest declines in cattle have been after 2005, post CAP reform and the de-coupling of subsidies from livestock numbers; a 14% decline in sheep numbers.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dairy cows</th>
<th>Beef cows</th>
<th>Total cattle</th>
<th>Breeding ewes</th>
<th>Total sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>2,033</td>
<td>9,576</td>
<td>24,697</td>
<td>281,583</td>
<td>525,954</td>
</tr>
<tr>
<td>2005</td>
<td>1,882</td>
<td>10,073</td>
<td>24,692</td>
<td>254,333</td>
<td>489,764</td>
</tr>
<tr>
<td>2010</td>
<td>1,223</td>
<td>7,766</td>
<td>20,747</td>
<td>235,174</td>
<td>453,278</td>
</tr>
<tr>
<td>Change</td>
<td>-40%</td>
<td>-19%</td>
<td>-16%</td>
<td>-16%</td>
<td>-14%</td>
</tr>
</tbody>
</table>
Interviews with stakeholders working and farming in the study area confirmed that these trends hold true in Snowdonia. The role of the various agri-environment schemes on reducing stocking was highlighted as most significant.

Changing livestock numbers are only part of the picture. The way farmers manage their land and stock has changed drastically over the decades too. The main grazing regime changes in Snowdonia, suggested by local stakeholders include:

- Intensification of the inbye and more pressure on the marginal ffrrdd (see case study below) zone.
- Less mixed stocking.
- Welsh mountain ewes are still abundant but there has been a definite move to continental breeds and their crosses which are less suited to grazing the unenclosed land.
- A general move away from traditional cattle breeds. However, promotion of the Welsh Black by the breed society and Hybu Cig Cymru - Meat Promotion Wales (HCC), and incentives through Tir Gofal and Section 15/16 agreements (see below), has had some success and new herds have been developed.
- Importantly it is felt that some Welsh Black strains are not hardy enough now for the job on the hill.
- Some easy care systems have been developed but these have not taken off as more intensive systems and flocks are often favoured.
- More indoor lambing and finishing.
- Higher lambing percentages due to breed improvement and selection, and better inbye grass, ewe condition and flushing are the norm. The ewes and lambs then are put up on the hill later which isn’t ideal as early grazing is often desired.
- Less out-wintering on the hill of both sheep and cattle.
- More away wintering to the Llyn Peninsula etc. and they seem to be away on tack longer.
- Less hefting and virtually no shepherding on the hill.
- Less burning on the hill.
- A move to earlier silage making from traditional late cut hay making.

Relevant Management Agreements

SSSI landowners can enter into Section 15 or 16 Management Agreements (for positive management) with Countryside Council for Wales (CCW) to further protect the special qualities and important features of an SSSI. Agreements are made under Section 15 of the Wildlife and Countryside Act for most SSSIs, or Section 16 of the National Parks and Access to the Countryside Act for National Nature Reserves (NNRs). Under such an agreement the owner may be offered payment towards conservation work, such as changing grazing practice, raising water levels or removing scrub. Such agreements have been used to good effect in Snowdonia to help reintroduce cattle to under grazed sites etc.

CONDITION OF DESIGNATED SITES IN SNOWDONIA: Livestock numbers, types and regimes have helped shape Snowdonia. Analysis of the SSSI site condition data reveals that overgrazing is still a problem on some sites and that undergrazing or timing of grazing is also a significant issue.

The Snowdonia SAC contains 117 SSSI compartments:
- 20 compartments are being overgrazed;
- 24 compartments are suffering from undergrazing, the wrong type of grazing or the timing of grazing.

A review of the SAC Management Plan (2008) revealed a diverse range of grazing management issues specific to each site. A small selection is shown below to highlight the complexity of future management needs.

<table>
<thead>
<tr>
<th>CCW Number</th>
<th>Unit Name</th>
<th>Issue</th>
<th>Size (ha)</th>
<th>Summary of Management Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1415</td>
<td>Blaen y Nant valley floor</td>
<td>Grazing type and/or timing</td>
<td>50</td>
<td>Ditches are silting up and causing a hazard to grazing sheep. Cattle would be more suitable for this marshy habitat with wet heath and blanket bog, but fencing is needed to prevent them from damaging the river banks.</td>
</tr>
<tr>
<td>1376</td>
<td>Pen y Bryn</td>
<td>Grazing type and/or timing</td>
<td>34</td>
<td>Heath exists in a mosaic with grassland and the cover and structure could be improved with better management to even out the grazing pressure.</td>
</tr>
</tbody>
</table>
SUMMIT AND MONTANE HEATHS have been heavily degraded by excessive grazing and probably recreational pressure and need a mechanism for restoration. Efforts are being made to reduce stock on the mountain but there is presently no effective way of keeping sheep off the summits as there are no physical barriers. Clearing all stock from the mountain is not possible or desirable. Fencing out the summits is the only way that stock can be excluded to allow the summit and montane heath to recover, but this is controversial, especially with farmers and walkers.

GRAZING AND THE IMPLICATIONS FOR BIODIVERSITY: The implications of livestock numbers and grazing regime change on specific species and habitats in Snowdonia are varied. Some of the most significant impacts on priority habitats as highlighted in the Local Biodiversity Action Plan (LBAP) and by local stakeholders during interview are outlined below, with more detail given in case study appendix.

- **Upland Calcareous Grassland** - characterised by close-cropped, closed sward and species poor vegetation due to heavy sheep grazing. The more species-rich vegetation often develops on ledges inaccessible to sheep. Feral goats and rabbits often target these ledges.
- **Purple Moor Grass and Rush Pastures** - agricultural improvement and over grazing is common although often unsuccessful but it dramatically reduces its biodiversity value tending to lead to a dominance of soft rush and ranker grasses such as Yorkshire fog.
- **Upland Acid Grassland** - often species-poor and dominates in areas that are overgrazed with sheep at the expense of dwarf shrub heath.
- **Upland Dwarf Shrub Heathland** - mostly found only on steeper slopes where grazing levels are low. Shepherding benefits this habitat.
- **Raised Bog and Blanket Bog** - drainage and attempted improvement is common and the bog habitat is lost. Grazing with suitable cattle is often needed to help manage the sward but suitable stock are not often available. Cattle can get stuck in boggy ditches.
- **Montane Heath and Montane Acid Grasslands and tall herb and ledge communities** - key habitats within Eryri SAC; their current range and condition is chiefly limited by overgrazing along with atmospheric pollution and recreational pressure.
- **Upland Oak, Upland Mixed Ash and Scrub Woodland** - grazing pressure alters the understorey and shrub layers of these habitats.
- **Lowland Hay meadow and Unimproved Neutral Grassland** – heavily reliant on traditional and extensive management and grazing systems. Large decline in area in recent decades due to agricultural improvement.

Within the habitat mosaic of Snowdonia a range of species depend on suitable grazing practice for their survival. The main grazing factors that affect a representative range of key BAP plant, bird, mammal and insect species in the area are summarised below. Further detail is given in case study appendix.

- **Slender green feather-moss** - over-run by coarse vegetation if grazing pressure is reduced significantly.
- **Snowdon lily** - grazing restricts the populations to the cliff faces it inhabits with no chance of expansion.
- **Western gorse** - believed to be vulnerable to heavy grazing pressure.
- **Water vole** – habitats are damaged by over-grazing and trampling of watercourse and wetland margins.
- **Dormouse** - grazing in woodlands reduces the essential understorey and causes fragmentation of habitat.
- **Snowdon Beetle** - the eggs are very vulnerable to sheep grazing.
- **Marsh Fritillary** - populations are dependent on a mosaic of unimproved and extensively grazed habitat patches where new colonies can establish as old ones become extinct.
- **Twite** – susceptible to increased in grazing pressure, loss of grazing mosaic and weed seeds.
- **Golden Plover** - habitat loss due to agricultural intensification, changes in stocking levels and the decline of traditional stock management.
- **Chough** - extent and quality of foraging habitat affected by grazing reduction/exclusion in feeding areas affecting sward height; bracken encroachment and associated reduction of feeding areas.
GRAZING INITIATIVES: There have been a number of initiatives that have helped address the negative environmental impacts of inappropriate grazing regimes and farm intensification in Snowdonia, and the work of the National Park Authority, Countryside Council for Wales and the National Trust has been positive. A selection of initiatives with valuable lessons to learn are summarised below.

### Grazing The Ffridd At Hafod y Llan

**Background**

On the flanks of Snowdon and its adjoining mountains is Hafod y Llan, an upland hill farm rich in Welsh history and tradition, and loaded with exceptional and diverse habitats. It is part of the Snowdonia NNR and SAC, designated for its upland and montane heaths, blanket bogs, and oak woodlands. It is also the site of two hefted Welsh Mountain sheep flocks. In 2000, the National Trust bought Hafod y Llan in order to safeguard the habitats, traditions, and landscape of Snowdon, but also to demonstrate a sustainable approach to farming.

On a traditional hill farm, the enclosed ffridd, which lies between the lowland fields and the open mountain and comprises a diverse mixture of grass and heathland with bracken, scrub and rock exposures, offers a moderate and practical place to keep sheep at critical times in the farming calendar, such as tupping in the autumn and weaning in the spring.

Here, the vegetation and climate are literally halfway up the mountain: coarser than the lowland, but less harsh than the open mountain above. The combination of pulse grazing with localised climatic and geographic influences means that ffridd habitats often show more potential to recover into favourable condition than their counterparts on the open mountain. For this reason, conservation plans often exclude or severely limit sheep numbers in these areas. However, with such limited access to the middle land, grazing pressure on the lower fields can become disproportionately high, thus compromising the overall integrity of hill farming systems.

To ensure a functioning hill farm for the future, it is therefore important to retain the traditional use of at least some of the enclosed ffridd, while maximising the conservation benefits of the remaining livestock through active and adaptive management. At Hafod y Llan, the National Trust are having to continually adapt their management to address this issue.

**Grazing Management**

Before the NT took over the farm most of the sheep were turned up to the open mountain where they kept to their flock’s historic region, or cynefin in Welsh, as established over years of active shepherding. Ewes would have the entire summer to teach this heft to their lambs, ensuring that each generation of sheep on the farm graze the same mountain area even today. The ffridd compartments came into play during key periods of the farming calendar when the animals required more shelter and attention such as during lambing and tupping, when the rams were put to the ewes.

When the farm was entered in an agri-environment scheme and a Section 16 agreement (a positive management agreement for farmers with SSSIs) in 2000, three new ffridd compartments were created from the lower mountain slopes on the eastern side of the farm, Wenallt, Cwm Erch, and Yr Ysgwydd. To encourage habitat recovery in all of the ffridd compartments, sheep grazing was dramatically reduced in the upland compartments, and totally excluded from the woodlands. The restrictions imposed on the use of the ffridd during tupping, lambing, and winter have enabled designated habitats to begin recovering from decades of overgrazing, but also mean greater reliance on lowland areas at and beyond Hafod y Llan. In summary the current grazing regime is as follows:

- Most of the woodland compartments are now free of any livestock. Reduced grazing pressure was deemed critical to ensure woodland regeneration. Cattle graze one woodland compartment in the summer and winter to reduce and open up the cover of rank grasses.
- Two of the new upland ffridd compartments, Yr Ysgwydd and Cwm Erch, are entirely free of sheep in order to encourage full heathland recovery, and the expansion of the woodland into a natural treeline.
- As on the open mountain, sheep are excluded from almost all ffridd compartments in the winter to protect the dwarf shrubs, which are more susceptible to browsing during the colder months. The exception is the central ffridd compartment, Dan Wal, which is a critical part of the farm system throughout the year.
- When livestock exclusion is not possible due to the land’s value in the farming system, restrictions can be helpful. One example is Bylchau Terfyn, on the western side of the farm, where sheep are allowed to graze during tupping. The compartment is otherwise free of sheep in order to encourage heathland recovery.
The ffridd at Hafod y Llan is grazed by spring calving Welsh Black suckler cows. The cows calve in March/April and graze the various compartments from mid May. Cattle are placed in compartments where blanket bogs and other habitats are suffering from rank Purple moorgrass carpets. Grazing, particularly in the early summer, is helping to restore these sites.

Cattle and pigs are also being used in the woodland compartments to introduce soil disturbance and thus encourage shrub and tree regeneration. This is done mainly in the summer, but some cattle are left in the woods into the winter.

**Results of Grazing Change**

Most of the upland habitats of the enclosed ffridd, which were once classified as in unfavourable condition, are now in recovering condition. The condition of the grazing cattle of the ffridd also demonstrates the successes of conservation grazing. The cows that graze here in summer can rear a calf, conceive, and maintain condition up until the end of September. These resulting calves are healthy, but have a lower liveweight gain than those reared in a lowland environment. Regular weighing and blood testing have allowed us to identify the cows which can graze the higher compartments later into the year, with the female offspring of these animals being selected as future breeding stock.

Unfortunately, monitoring results also highlight some areas where habitats are not recovering, and are even declining: grazing hotspots, such as sheltered clearings in the woodlands, or the dry, south facing slopes in the uplands, mean that the related heaths remain suppressed or have even lost dwarf shrub cover. The blanket bogs and Molinia mires, if not pulse grazed by cattle in the early summer have also been found to be losing condition due to an increase in dominance of Purple moor grass. This problem however, is believed to be a temporary response to the reduced grazing pressure and is expected to recover with increased cattle numbers and control. Finally, the woodlands of Hafod y Llan remain in unfavourable condition due to poor regeneration, and continued grazing pressure by feral goats, as well as the rank grass sward.

<table>
<thead>
<tr>
<th>Future Issues</th>
<th>Possible Solutions</th>
</tr>
</thead>
</table>
| **Patchy grazing patterns resulting in grazing hotspots and undergrazed bogs** | • Active shepherding and feral goat control to reduce grazing pressure.  
• Burning or raking of grass thatch build-up in the bogs to increase palatability of the bog grasses for cattle.  
• Temporary, small-scale fencing of cattle to pulse graze bogs. |
| **Low tree and shrub regeneration due to tight grass sward and continued grazing pressure from goats and sheep** | • More summer cattle, and autumn feeding in ffridd to increase disturbance.  
• Use pigs in and around the woodlands.  
• Continued control of feral goat population. |
| **Grazing pressure on lowland fields particularly during tupping and lambing due to restricted use of the ffridd during these periods** | • Consider rotational pulse use of all montane and ffridd compartment to give a break to the lowlands.  
• Accept habitat condition loss of lowland fields (but consider the importance for biodiversity value e.g. for waders etc) |
| **Cost of away wintering** | • Seek more land closer to Hafod y Llan |

**Snowdonia Mountain Lamb**

Finding a way to market lamb and beef from sustainably grazed sites helps to encourage and reward good practice and supports farm viability and traditional breeds. One local example of this activity is Snowdonia Mountain Lamb supported by the Snowdonia National Park Authority CAE Fund.

Snowdonia Mountain lamb & beef is purchased only from the best run farms from within the Park selected for low stocking rates, excellent animal husbandry and livestock quality. They only offer Welsh Mountain Lamb & Welsh Black Beef.
PONT was founded in 2005 by the key players in nature conservation and agriculture in Wales. PONT works with individuals and organisations to deliver appropriate grazing regimes for the benefit of wildlife, both on individual sites and at a local and regional level. They have helped with projects in Snowdonia and across Wales. In addition to delivering on the ground solutions, PONT collects and shares information about local grazing schemes and examples of best practice. PONT also works to ensure that the importance of grazing animals in the management of habitats for wildlife benefit is recognised at all levels. PONT representatives sit on the Wales Biodiversity Partnership policy and ecosystem groups, as well as the UK Grassland Forum. They seek to inform and influence government policies on environmental and wider countryside issues.

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Successes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Getting people to work together</td>
<td>• Delivering practical grazing advice</td>
</tr>
<tr>
<td>• Finding a market for conservation grazed products</td>
<td>• Driving projects forward with enthusiasm</td>
</tr>
<tr>
<td>• Ongoing need for funding and support</td>
<td>• Raising awareness of the role of conservation grazing</td>
</tr>
<tr>
<td>• How to scale up the operation and reach more farmers</td>
<td>• Accredited conservation grazing training</td>
</tr>
</tbody>
</table>

LESSONS LEARNT: The following lessons can be drawn from the local initiatives and interviews with stakeholders in the case study area:

- Successful grazing projects need to be driven by people with enthusiasm and a pragmatic approach.
- Grazing patterns result in grazing hotspots and undergrazed areas - close shepherding or exclusion is often needed.
- Always consider the knock on effects of grazing change i.e. exclusion of stock from one area may result in increased stocking on another part of the farm or expensive/unsustainable away wintering. Compromises and site specific solutions have to be found.
- There is a market for conservation grazing products – good branding and marketing is crucial.
- Make sure the right grazing is available in the future before simply destocking.
- Don’t ignore the grazing role of ponies, pigs and goats.

FUTURE POLICY AND PRACTICE: To improve the way we graze our most important habitats to benefit biodiversity there is a need for policy development that shows a commitment to wildlife over the long term. The key areas to take forward from this case study are:

- Better support is needed for initiatives which promote conservation grazing products, to help develop consumer awareness of the multifunctional nature of extensive grazing, to enable strong branding and marketing and to foster supply chain development with the aim of building long term sustainability.
- Extensive grazing systems are typically not commercially viable and need an integrated package of support in order to compensate for market failings and reward the public goods they deliver. Means of rewarding farmers for delivering environmental benefits beyond present support mechanisms must be developed.
- Although the suite of previous agri-environment schemes have delivered reduced grazing pressure leading to some habitat recovery, more work is needed on site specific mechanisms and flexible prescriptions to support traditional breeds, cattle grazing, better timing of grazing and close shepherding on the hill.
- There is a need to foster more co-operation and partnership working at local level using brokers such as PONT/GAP to overcome site specific and often challenging barriers.

Thank you to Sabine Nouvet and Arwyn Owen (NT Hafod Y Llan), Tom Harrison and Pete Jones (CCW), Dave Lamercraft (RSPB) and Sarah Mellor (NT) for providing time, photos and information for this case study. Where not otherwise credited, photographs are copyright of Cumulus Consultants Ltd.
### Changing livestock numbers in the UK LFA Case Study: Snowdonia (North Wales)

### Appendix

**GRAZING AND THE IMPLICATIONS FOR BIODIVERSITY:** The implications of livestock numbers and grazing regime change on specific species and habitats in Snowdonia are varied. Some of the most significant impacts on priority habitats as highlighted in the Local Biodiversity Action Plan (LBAP) and by local stakeholders during interview are summarised in the main Snowdonia case study. More detail is shown below.

<table>
<thead>
<tr>
<th>BAP Habitat</th>
<th>Habitat Description and Impact of Grazing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upland Calcareous Grassland</strong></td>
<td>This habitat is scattered in Snowdonia, being restricted to areas of base rich bedrock in the predominantly acidic uplands. It is generally a habitat characterised by close-cropped, closed sward and species poor vegetation due to heavy sheep grazing. The more species-rich vegetation often develops on ledges inaccessible to sheep. Feral goats and rabbits often target these ledges.</td>
</tr>
<tr>
<td><strong>Purple Moor Grass and Rush Pastures</strong></td>
<td>This vegetation is found on waterlogged, but not stagnant, soils. It is a highly structured habitat, with tall tussocks of purple moor grass and rushes visually dominating the vegetation. Traditionally managed by cattle grazing or mixed grazing, it is a species-rich habitat, and supports uncommon species of plants and animals. Agricultural improvement and over grazing is common although often unsuccessful but it dramatically reduces its biodiversity value tending to lead to a dominance of soft rush and ranker grasses such as Yorkshire fog.</td>
</tr>
<tr>
<td><strong>Upland Acid Grassland</strong></td>
<td>An extensive upland habitat. Generally species-poor and dominates in areas that are overgrazed with sheep at the expense of dwarf shrub heath.</td>
</tr>
<tr>
<td><strong>Upland Dwarf Shrub Heathland</strong></td>
<td>Plant communities dominated by ericoid species such as <em>Calluna vulgaris</em>, <em>Erica cinerea</em> and <em>Erica tetralix</em>. This community used to cover large tracts of moorland on gently sloping land where grazing was restricted but it is now mostly found only on steeper slopes where grazing levels are low. Shepherding benefits this habitat.</td>
</tr>
<tr>
<td><strong>Tall Herb And Ledge Communities</strong></td>
<td>Vegetation dominated by tall herbs and grasses on ungrazed ledges or other no/low grazed sites. There is a rich assemblage of species with luxuriant growth dominated by the wood-rush, wild angelica and supporting northern species such as the globeflower.</td>
</tr>
<tr>
<td><strong>Raised Bogs</strong></td>
<td>Raised Bogs are peatlands that are fed solely by rainfall rather than by surface ground water. Raised bogs are associated with distinctive plant communities that are low in overall diversity but support specialised plant and animal species. Drainage and attempted improvement is common.</td>
</tr>
<tr>
<td><strong>Blanket Bog</strong></td>
<td>Blanket Bogs are found on badly drained land subject to high rainfall where acid peat builds up formed from the remains of bog plants. The peat is poor in nutrients and supports plants such as the cotton grasses in addition to <em>Calluna vulgaris</em>. Grazing with suitable cattle is often needed to help manage the sward. Drainage and attempted improvement is common. Cattle can get stuck in boggy ditches.</td>
</tr>
<tr>
<td><strong>Upland Oak Woodland</strong></td>
<td>Comprise woodlands where the main tree species is sessile oak but birch is also common, together with an understorey of small trees and shrubs of hazel, rowan, and holly. The composition of the ground flora varies in relation to a number of factors including soil fertility, drainage conditions and whether or not grazing is present.</td>
</tr>
<tr>
<td><strong>Upland Mixed Ash Woodland</strong></td>
<td>Upland mixed ash woods comprise a broad range of woodland types on base-rich soils, in most of which ash is a major species, but locally oak, birch, elm and small leaved lime may be abundant. Mixed Ash woodlands are amongst the richest habitats for wildlife in the uplands, notable for bright displays of flowers such as bluebell, primrose, and wild garlic. Grazing pressure alters the understorey and shrub layers of these woods.</td>
</tr>
</tbody>
</table>
### Scrub Woodland
Covers a variety of vegetation types, often seen in the *ffridd* (see section below), in which small trees dominate, for example, hawthorn scrub growing on moderate to steep valley sides; gorse-bramble scrub; birch scrub, often with an understorey of bog myrtle; willow scrub and ash scrub in base-rich rocky fields and boulder slopes.

### Lowland Heath
Lowland Heath generally corresponds to the upper limit of intensive farming. Lowland heath includes heath below the 240 m contour. In Snowdonia it is usually found on the lower slopes of hills, or the *ffridd*, where it forms part of an altitudinal zonation of vegetation types from valley bottom to lowland heath to upland heath and, in some sites, to montane heath and grassland.

### Lowland Dry Acid Grassland
This could be considered to include all dry acid grassland below the mountain wall. This part of the *ffridd* land tends to be more intensively managed due to better accessibility. The vegetation occurs on mineral soils which are shallow and free draining. It often becomes infested with bracken if it is not grazed appropriately, and will eventually succeed to woodland with time.

### Lowland Hay meadow and Unimproved Neutral Grassland
This includes all unimproved and semi-natural neutral grassland. They are wildlife havens, supporting a rich variety of native common and uncommon plants and animals which rely on traditional and extensive management and grazing systems. Large decline in area in recent decades due to agricultural improvement.

### Lowland Wood Pastures and Parklands
Due to the common use of woodlands in Snowdonia as sheltered grazing for sheep, it is often the case that they have become essentially open grassy fields with a loose canopy of over-mature trees superimposed onto them, and no shrub layer due to lack of regeneration/stock exclusion.

Within the habitat mosaic of Snowdonia a range of species depend on suitable grazing practice for their survival. The main grazing factors that affect a representative range of key BAP plant, bird, mammal and insect species in the area are summarised in the case study. Further detail is given below.

<table>
<thead>
<tr>
<th>BAP Species</th>
<th>Factors affecting species in Snowdonia</th>
</tr>
</thead>
</table>
| **Slender green feather-moss** *(Drepanocladus vernicosus)* | • Over-run by coarse vegetation if grazing pressure is reduced significantly  
• Lowland sites, if present are likely to be threatened by lowering of the water table, pollution and scrub encroachment |
| **Snowdon Lily** *(Lloydia serotina)* | • Grazing restricts the populations to the cliff faces it inhabits with no chance of expansion  
• Small populations are vulnerable to loss or extinction due to chance demographic or stochastic events, genetic erosion, habitat loss and climate change |
| **Western Gorse** *(Ulex gallii)* | • Agricultural improvements including fertilisation and reseeding eliminate it  
• Believed to be vulnerable to heavy grazing pressure  
• Burning has a positive effect in assisting regeneration  
• Vulnerable to invasion and hybridisation by more vigorous species, e.g. European gorse |
| **Water Vole** *(Arvicola terrestris)* | • Over-grazing and trampling of watercourse and wetland margins.  
• Agriculture improvement, especially wetland and minor water course drainage.  
• River and flood plain engineering works.  
• Increased levels of predation.  
• Pollution, disease and poisoning may threaten local populations. |
| **Dormouse** *(Muscardinus avellanarius)* | • Fragmentation and loss of suitable habitat  
• Grazing in woodlands reducing essential understorey  
• Grey squirrels tend to eat hazel nuts before they are ripe enough for the Dormouse  
• Climatic factors |
| **Snowdon Beetle** *(Chrysolina cerealis)* | • Vulnerability of the eggs to sheep grazing  
• Climate change |
<table>
<thead>
<tr>
<th>Species</th>
<th>Threats</th>
</tr>
</thead>
</table>
| **Marsh Fritillary**<br>(*Eurodryas aurinia*) | - Habitat destruction due to pasture improvement, land drainage and inappropriate grazing and afforestation has led to national decline of the species.  
- Agricultural trends in Snowdonia, concentrating on sheep over cattle breeds.  
- Current and increasing trends of habitat fragmentation  
- Populations are dependent on a mosaic of unimproved habitat patches where new colonies can establish as old ones become extinct.  
- Difficulties in implementing appropriate grazing at the largest sites due to common grazing rights. |
| **Twite**<br>(*Carduelis flavirostris*) | - The reduction in tall heather has reduced availability of nest sites  
- The increase in grazing pressure, and associated agricultural improvement of land, has led to the loss and/or overgrazing of herb rich meadows lightly grazed pastures which are used for feeding  
- Although twite avoid fields with a substantial litter layer, they require plants to set seed, so late cutting or leaving uncut margins produces desired food source.  
- The loss of small-scale mixed farming and arable crops which provided winter feeding.  
- Heather-burning regimes which do not expose seeds (ideal burning regime is a 3 year rotation, not at edges of stand in late-winter/early spring)  
- Reduction in weedy cattle-grazed pasture/road verges and excessive cutting. |
| **Golden Plover**<br>(*Pluvialis squatarola*) | - Habitat loss due to agricultural intensification, changes in stocking levels and the decline of traditional stock management  
- Potential increased predation, especially by corvids  
- Deteriorating suitability of feeding pastures caused by intensive agricultural management which reduces food availability, e.g. invertebrate impoverishment and reduction of floral diversity especially ephemeral weeds  
- Historic decline of grouse moorland management which, in some areas, indirectly maintained a suitable habitat matrix for golden plover. |
| **Chough**<br>(*Pyrrhocorax pyrrhocorax*) | - Extent and quality of foraging habitat affected by grazing reduction/exclusion in feeding areas affecting sward height; bracken encroachment and associated reduction of feeding areas.  
- Human disturbance, largely from recreation e.g. hang gliding, parascending, egg collecting, inadvertent shooting, loss of nesting sites (quarries etc) etc.  
- Presence of natural predators such as peregrine  
- Climate - drought in summer/extended cold spells in winter. |
North Uist, Benbecula and South Uist comprise three interlinked islands in the central part of the Outer Hebrides. The Uists have a complex topography of moors, bogland, machair, lochs and lochans, both salt water and fresh water. While Benbecula is relatively flat, North Uist and South Uist both have hill or mountainous areas. The whole of the Uists is designated SDA.

**OVERVIEW OF STUDY AREA**

| AREA | 705 sq km (70,534ha) |
| KEY HABITATS & FEATURES | Coastal sand dune, machair, coastal saltmarsh, saline lagoons, lochs and lakes, blanket bog, upland heathland. |
| LAND USES | Crofting, extensive grazing, tourism & recreation. |
| DESIGNATED SITES | SAC, SPA, Ramsar, SSSI, NNR, NSA – on the Western side of the Uists |
| LIVESTOCK | Beef cattle (Highland, Aberdeen Angus, Beef Shorthorn, Hereford, Continentals) and sheep (Scottish Blackface, Cheviot) |
| LANDOWNERS | Scottish Government, North Uist Estate, South Uist Community Trust, RSPB, Church of Scotland, Private |

**Biodiversity of the Uists**: Geology, topography, location and climate combine to support a unique set of habitats and species on the Uists. Priority habitats include machair, cereal fields, coastal sand dunes, coastal saltmarsh, saline lagoons, oligotrophic and mesotrophic lochs, eutrophic standing waters, upland heathland and blanket bog. The Uists are well known for machair, a rare bio-diverse coastal grassland formed when fine shell sand is blown onto land by prevailing westerly winds to create a fertile low-lying plain. Priority species associated with machair and other priority habitats in the Uists include birds (dunlin, ringed plover, corncrake, redshank, corn bunting and white-tailed eagle), invertebrates (great yellow bumblebee, belted-beauty moth and freshwater pearl mussel) and plants (Irish Lady’s tresses, lesser butterfly orchid and birds nest stonewort). The Western part of the Uists is internationally designated for nature conservation including: three SPAs designated for corncrake, waders, tern and wintering Greenland Barnacle Goose; five SACs designated for machair, salt marsh, blanket bog, lochs and lakes; and two Ramsar sites covering a transition of habitats, from acidic moorland to calcareous coastal plain, and from freshwater to saltwater habitats, all of which are important for populations of wintering and breeding waterfowl. National designations include a number of SSSIs and Loch Druidibeg NNR. The Eastern part of the Uists, including the hill ground, is largely undesignated.
FARMING SYSTEMS IN THE UISTS: The landscape and habitats of the Uists have been moulded by man for generations. The traditional farming system is crofting; with the majority of individuals renting crofts (small holdings) from landowners including government bodies, private estates and more recently, community-owned estates (such as South Uist Community Trust). Crofters keep cattle and sheep and, where feasible, grow arable and grass crops for forage. This cattle-based system lies at the heart of, and sustains, the machair. Machair is cropped for small oat, bere, barley and rye to provide ‘whole crop’ silage and dry corn fodder, cut by combine or binder; then left fallow for two to three years. Important associated practices include the collection and application of seaweed to bind the sandy soil and build organic matter, and traditional harvesting methods using reaper binders to form stacks, from which seed is threshed and cattle are fed in the winter. The fallow provides for the growth of perennial plants, attracts seed eating birds, waders and nectar loving insects (e.g. great yellow bumblebee). Ground nesting birds such as lapwing benefit from late cropping, sympathetic techniques and fallow.

Crofts tend to be small and part-time units. Crofts are smaller in South Uist than North Uist, as are herd and flock sizes, see Table 1 (note Benbecula is included in the figures for North Uist). Since the 1970s, the number of active crofters has halved, partly related to an ageing crofting population and some new crofters being less active in terms of land management. There has been a slow amalgamation of units. Crofters benefit from special support including grants for agricultural improvement, cattle improvement, and housing (via the Crofting Counties Agricultural Grants Scheme, as well as Rural Priorities and Land Managers Options).

Some crofters have access to and graze other land aside from their own crofts, including: their own land; common land, managed by townships; and additional ground rented directly from estates. The estates also generate income from stalking, shooting and fishing from this let land.

Much of the farmland on the Uists, and the associating farming systems, can be regarded as High Nature Value (HNV). The designations, habitats and species indicated above are a reflection of this. The farmland is also categorised as SDA, being poor or very poor in terms of agricultural quality.

GRAZING LIVESTOCK IN THE UISTS: Farm survey data is available for North Uist and South Uist separately for the period 1995 to 2011, see Tables 2 and 3, and Figures 1 and 2. There has been a modest increase in total cattle numbers in North Uist (a result of an increase in cattle being fattened, as opposed to breeding stock), compared to a significant reduction in South Uist. Both areas have also experienced a significant reduction in sheep numbers, although this has been less in North Uist compared to South Uist. Breeding stock has decreased relative to total stock for both cattle and sheep on both islands. The dairy herd is very small on both North and South Uist.

Contributing factors to these trends include relatively poor profitability over the period, the change from headage to decoupled payments, and labour availability. There has been a levelling off in terms of stock reduction in the past year, due to improved market conditions, with a slight increase in stock numbers in North Uist.

Herd sizes have increased marginally on both islands over 1995-2011, but flock sizes have decreased, especially on South Uist. Overall stocking density (including common land) is very low, comprising 0.09 LU/ha in North Uist and 0.06 LU/ha in South Uist.
Changing livestock numbers only tell part of the picture. The way crofters manage their land and stock has changed over the decades. The main grazing regime and related changes in the Uists suggested by local stakeholders and relevant reports include the following:

- Crofters have tended to specialise in (store) cattle or sheep.
- North Uist has large commercial units specialising in beef cattle. South Uist has fewer of these and more small, less intensive crofts.
- Livestock has become concentrated in fewer hands, as the number of holdings with cattle and sheep has decreased.
- Stock breeds have changed from traditional native stock breeds to more continentals and non-native lowland sheep breeds.
- The machair has experienced a simplification of cropping practice and some intensification with greater use of organic and inorganic fertilisers. These trends are being reversed with the help of Machair LIFE+ Project (see below). The use of contractors has increased.
- Common grazing land has become under-used and under-grazed, with fewer crofters and less stock on this type of land.
- Hill grazing has experienced a reduction in stock numbers and stocking density. Influencing factors include less traditional breed stock being available, disease (louping ill, from ticks, affecting sheep), insufficient labour for gathering, lack of fencing and limited financial support.
- The machair has experienced an increase in summer grazing; this may be caused in part by a reduction in common and hill grazing.
- There has been some separation of enterprises between those focused on the machair and low lying land – typically more productive breeds - and those focused on the hill ground.
- SRDP agreements have helped reduce grazing pressure and, with Machair Life+, supported conservation based management practices related to the machair.

CONDITION OF DESIGNATED SITES IN THE UISTS: As indicated previously, there is a range of internationally and nationally designated sites on the Uists. The majority of these are now in favourable maintained or favourable recovering condition. However some features on some sites are in unfavourable condition; these include some freshwater habitats, and some bird species such as ringed plover, little tern and redshank. These do not appear to relate directly to grazing pressure or patterns. The impact of grazing, or lack of it, on the condition of some undesignated features, for example in the East of the Uists, may be a more of a concern however (see over).
GRAZING & IMPLICATIONS FOR BIODIVERSITY: The implications of grazing change on specific species are varied and complex. Some of the key impacts highlighted by local stakeholders include:

- Reduced stock numbers and stocking rates have led to undergrazing on common land and hill ground. Lack of sheep grazing may have reduced the palatability of heather and other species in hill areas, encouraging deer to graze lower down the slope, including on the machair.
- Fewer crofters involved with grazing common land and hill ground, and lack of family support, has led to less labour being available for shepherding and other management such as burning, leading potentially to loss of vegetation structure.
- Conservation-based management practices supported by SRDP and Machair Life+ agreements have led to an improvement in Machair habitats, with potential benefits for associated species. It has been harder to get non-designated land and common land under agreement, which may have contributed to a disconnect in the crofting system.

GRAZING INITIATIVES: There have been a number of conservation initiatives operating in the area, including:

<table>
<thead>
<tr>
<th>Machair Life+ Project – Conserving Scottish Machair</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Machair Life+ Project is a 4 year programme aiming to conserve 70% of the world’s machair habitat and its associated species. It provides support to the crofting community to implement and demonstrate sustainable land management that optimises the conservation interest of the machair. Its focus is machair within designated Natura 2000 sites which occur mainly in the Uists, but also areas of Lewis, Barra, Coll, Tiree, Islay, Colonsay and Oronsay. Machair Life+ started in 2010; it is supported by the EU Life+ scheme and managed by the RSPB in partnership with Scottish Natural Heritage, Comhairle Nan Eilean Siar and the Scottish Crofting Federation.</td>
</tr>
<tr>
<td>Machair Life+ activity on the Uists includes:</td>
</tr>
<tr>
<td>- Information and advice on sustainable land management</td>
</tr>
<tr>
<td>- Entering into management agreements directly with crofters to undertake suitable land management on machair (there are presently up to 90 individual agreements)</td>
</tr>
<tr>
<td>- Promoting and supporting for entry of machair into Scottish Rural Development Contracts (SRDC)</td>
</tr>
<tr>
<td>- Purchase and operation of specialist machinery to assist with machair management, this includes a shallow plough, seaweed lifter, seaweed spreader and a modern reaper/binder. Also sponsoring repairs to old binders.</td>
</tr>
<tr>
<td>- Running a greylag goose scheme to protect arable crops on machair from goose grazing. This involves a variety of scaring techniques.</td>
</tr>
<tr>
<td>- Monitoring biodiversity on machair.</td>
</tr>
<tr>
<td>- Encouraging a seed legacy of locally-grown seed to conserve and safeguard genetic stocks which are best suited to the specialist conditions of the Uists.</td>
</tr>
</tbody>
</table>

| Challenges: |
| - Grazing pressure from greylag geese. |
| - Interaction with common and hill grazing management (which the Machair Life+ project does not cover). |
| - Encouraging young people into machair management. |
| - Continuing traditional and beneficial land management options promoted under the project once funding and support is over |

| Successes: |
| - Increase in the area of late harvested crop and fallows on arable machair. |
| - Expansion of best practice in terms of arable crop production and in-bye grassland management. |
| - Expansion of the skills and knowledge base of machair management amongst crofters, farmers, contractors and others. |
| - Reduction in the extent of crop damage caused by geese |
| - Increase in area of machair under management agreement or Scottish Rural Development Contracts. |
DEVELOPING NEW MARKETS LINKED TO EXTENSIVE GRAZING

There is an opportunity to develop new markets linked to extensive (environmentally beneficial) grazing, which can help improve the viability of crofting and farming. A good example of this is provided by Angus and Ena MacDonald who farm in North Uist. The farm, including owned land and several crofts, comprises around 250 ha on land which includes the beautiful island of Vallay. The main enterprise is 250-strong herd of Highland cattle, including 106 suckler cows, followers and calves. Angus and Ena operate a low input – low output, organic system. Cattle are grazed on the hill during the summer and on the machair and lower lying land during the winter. This regime provides farming and conservation benefits: effective utilisation of hill ground in the summer and dry ground for winter grazing; and an undisturbed period during the nesting season for birds such as corncrake and an opportunity for plants to flower and set seed in the summer. Angus and Ena recognise the economic advantages of traditional breeds and making the most of the natural resources available. They have identified markets for a range of products from the Highland herd, including breeding stock, store cattle, meat and value added products.

<table>
<thead>
<tr>
<th>Challenges:</th>
<th>Successes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing pressure from geese</td>
<td>Long term growth of the business</td>
</tr>
<tr>
<td>Increasing costs (e.g. fuel)</td>
<td>Increase in the area farmed and number of livestock</td>
</tr>
<tr>
<td>Gaining planning permission for an eco-pod enterprise on the farm to diversify income</td>
<td>Effective utilisation of resources hand in hand with good environmental management</td>
</tr>
<tr>
<td></td>
<td>Focus on profit; identification of new markets and development of products.</td>
</tr>
<tr>
<td></td>
<td>Benefits for a range of habitats (e.g. machair and upland heathland) and species (e.g. corncrake)</td>
</tr>
</tbody>
</table>

LESSONS LEARNT: The following lessons can be drawn from the local initiatives and enterprises, and interviews with stakeholders in the case study area:

- High Nature Value (HNV) farming is ‘alive and kicking’ on the Uists.
- Machair Life+ and the RSPB is helping to conserve biodiversity on the machair in the Uists, complementing the support available through RDCs and other schemes by encouraging uptake and enhancing environmental outcomes.
- A focus on improving management within designated areas such as the machair is a priority nationally, however it is important not to overlook common and hill grazings which are physically and historically linked to machair. What happens on this other, undesignated land not only affects habitats and species there but can also adversely impact the machair.
- The Less Favoured Area Support Scheme (LFASS) has played an important role in keeping livestock on the hill. Access to agri-environment scheme funding is difficult on hill land as it is largely undesignated.
- Well-managed local goose management schemes can, when properly resourced, protect crops from goose damage, and allow wild geese and HNV agriculture to co-exist.
- Traditional breeds can be used as the basis of low input-low output enterprises which are becoming more profitable and environmentally beneficial. Markets, both local and on the mainland, need to be developed for products from traditional breeds in environmentally-friendly systems. Schemes for native cattle breeds need to be closely monitored so as to maintain high quality stock and reputation of the Uists.
- Careful planning is needed to sustain the benefits beyond the end of the Machair Life+ project. This includes initiatives adopted by the project such as the goose schemes.
FUTURE POLICY AND PRACTICE: Key policy recommendations from this case study are:

- Ensure CAP reform secures a strong package of support for HNV farming systems in recognition of the exceptional public goods they deliver for society and their economic vulnerability. This should include reforming the LFASS scheme to address the economic and environmental needs in the designated area, with payments being highest for land subject to the greatest natural constraints and eligibility criteria that do not exclude areas with grazing management good for biodiversity. Consideration should also be given to improving the existing Crofting Counties Agricultural Grant Scheme.

- Give specific consideration to supporting appropriate crofting activity in those areas of natural constraint which are designated as part of the Natura 2000 network, to prevent the decline of priority habitats and species. For example, through the introduction of a new Natura 2000 scheme or if there is scope in the LFASS or replacement scheme, through uplifts in payments.

- Continue to provide Life+ funding and similar partnership initiatives, recognising their importance in the delivery of bespoke projects that can provide innovative solutions to environmental and economic problems and can be critical to the survival of vulnerable farming communities and wildlife.

- Make agri-environment schemes more accessible and understandable, and better designed to accommodate integrated management across undesignated hill and common land and designated sites, in order to improve biodiversity outcomes and better support important farming systems as a whole, rather than just individual management practices.

- Ensure there is continued support and monitoring of schemes to encourage native stock, including assistance with marketing and locally-based processing of traditional breeds.

- Encourage and attract new entrants to crofting, particularly among local young people.

Thank you to Rebecca Cotton (RSPB Machair Life+), Julia Gallagher (RSPB Machair Life+), Donald Norman McDonald (crofter), Angus and Ena MacDonald (crofter), Ivan McDonald (crofter), Neil MacPherson (SGRIPD), Johanne Ferguson (SNH) and Jamie Boyle (RSPB) for providing time, photos and information for this case study. Where not otherwise credited, photographs are copyright of Cumulus Consultants Ltd.
The Croick Estate is a large Highland estate located in Strathcarron, near Ardgay in Sutherland. It has sporting, conservation, farming and tourism enterprises. The Estate lies within the Severely Disadvantaged Area (SDA).

**OVERVIEW OF ESTATE**

<table>
<thead>
<tr>
<th>AREA</th>
<th>5.2 sq km (5,219 ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY HABITATS &amp; FEATURES</td>
<td>Dry heath, wet heath, blanket bog (2,000ha of moorland), native Caledonian woodland (2,200ha), coniferous woodland (740ha), semi-improved grassland, floodplain grassland, river.</td>
</tr>
<tr>
<td>LAND USES</td>
<td>Sporting, extensive grazing, wildlife conservation, amenity, tourism</td>
</tr>
<tr>
<td>DESIGNATED SITES</td>
<td>None, other than SDA</td>
</tr>
<tr>
<td>LIVESTOCK</td>
<td>Beef cattle (Luing, Beef Shorthorn, Aberdeen Angus X) and sheep (North Country Cheviot)</td>
</tr>
<tr>
<td>LANDOWNER</td>
<td>Croick Partnership</td>
</tr>
</tbody>
</table>

**BIODIVERSITY OF THE CROICK ESTATE:** The Estate’s biodiversity is influenced by its location in Strath Cuileannach, a glen in the upper reaches of Strathcarron, together with recent and historic land use and management. Its habitats range from upland heathland and blanket bog on the upper reaches of the valley sides, to recently planted native Caledonian woodland (Scots pine, birch), to more established plantations of coniferous woodland (Lodgepole pine, Sitka spruce), to semi-improved and floodplain grassland by the river. Species associated with these different habitats include: birds such as black grouse, red grouse, hen harrier, golden eagle, raven, golden plover, curlew, snipe, greenshank, lapwing, skylark and twite; mammals such as red deer, sika deer, roe deer and fallow deer, pine martin, otter and water vole; and a wide variety of invertebrates and plants. The restoration of native Caledonian woodland was the largest scheme of its kind in the early-mid 1990s and was undertaken by the previous owner with the support of the Scottish Woodland Grant Scheme. It involved the planting and fencing off of 4 large parcels, located on both sides of the glen, together with subsequent maintenance to ensure establishment. There are no international or national conservation designations on land belonging to the Estate. Black grouse, hen harrier and native deer (red and roe) are however species listed for priority action in the Species Action Framework for Scotland.
FARMING ON THE CROICK ESTATE: The Estate’s management, including farming, is influenced by the owner’s objectives, which are:

1. To be a mixed sporting estate, centred around deer, in an improving environmental condition and notable for its habitat and wildlife diversity;
2. To protect and build upon previous public investment in native Caledonian forest;
3. To increase the resident population of black and red grouse;
4. To maintain the Blackwater as a fishing river and an important salmon spawning ground;
5. To support a variety of agricultural activity which delivers the objectives above and generates income for the estate;
6. To use the Scottish Rural Development Programme system where grants are available to help achieve the above objectives.

It is important to note the priority given to sporting interests, in the form of deer stalking, shooting and fishing, and the conservation of wildlife, ahead of farming. The Estate is privately funded by the owners – “no one owns a Highland Estate to make money” – although where possible income is generated from enterprises and schemes where this is in line with overall objectives. This income includes the Single Farm Payment (SFP) and Less Favoured Area Support Scheme (LFASS) payment. An application has recently been approved for a Rural Development Contract in order to support the restoration of grassland meadows and wetland, the blocking of drains on wet heath and peatland to stop erosion and allow peat regeneration, and undertake a small amount of additional woodland creation. Income is also generated from sporting use of the estate and holiday cottage lettings. The ratio of income from schemes and sporting/tourism enterprises is around 65:35%.

GRAZING LIVESTOCK ON THE CROICK ESTATE: Historically, the Estate was rather different. It was one of the largest sheep farms in the county, with sheep numbers increasing to over 3,500 breeding ewes at its peak in the late 1980s; this was part of a wider enterprise totalling 8,000 ewes over 30,000ha. Sheep farming was the predominant enterprise on the Estate and five shepherds were employed to manage the flock. Large areas of hill ground were drained, reseeded and fertilised in an attempt to maximise production, in keeping with other parts of Sutherland. When the previous owner took the decision to create native Caledonian woodland on the Estate, sheep numbers were reduced down to 400 ewes, with sheep excluded from the newly planted areas. Following the purchase of the Estate by the current owner in 2003, there was a further reduction in sheep numbers to around 320 ewes (600 sheep in total) managed by a grazier. All agricultural activity has now been brought back in hand and the owners run a flock of 100 North Country Cheviot Ewes. To eliminate sheep grazing pressure in most of the strath, the flock is grazed in in-bye fields and is now kept off the main strath; they are wintered on low ground elsewhere.

The Estate also has a small herd of around 20 cattle, including Luing, Beef Shorthorn and Aberdeen Angus crosses; these are purchased as stores in the spring and sold in the autumn, not overwintered. The sheep tend to be grazed on the open moorland habitats but have access to some (now unfenced) planted areas. The cattle are grazed in the fenced planted areas diversifying the age and structure of the ground vegetation in amongst the trees.

Alongside the grazing provided by cattle and sheep, there is also grazing by deer. There are healthy populations of red, sika, roe and fallow deer. These are wild populations, but managed by the Estate for stalking; annual cull returns show an above average weight for the region, an indication of good health supported by plenty of feed and shelter. In total, there are in excess of 300 hinds and calves. The deer are free to access and graze all the habitats on the Estate, including some of the native Caledonian woodland which is now over 20 years old. Overall the deer now provide more grazing/browsing pressure on the Estate than the cattle and sheep.
It is worth placing the Estate in context of grazing livestock trends in the local area. Farm survey data is available for the parish of Kincardine, within which Croick Estate is located, see below. There has been a 32% reduction in cattle numbers and 27% reduction in sheep numbers between 1995 and 2011. Beef cow numbers and breeding ewe numbers have both decreased by 39%. Contributing factors are likely to include low profitability, labour availability, the decoupling of payments and destocking to promote sporting and conservation objectives. Total livestock units have decreased by 30% and stocking density has decreased from 0.04 LU/ha to 0.03 LU/ha.

<table>
<thead>
<tr>
<th>Year</th>
<th>Beef cows</th>
<th>Total cattle</th>
<th>Breeding ewes</th>
<th>Total sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>438</td>
<td>963</td>
<td>8,174</td>
<td>18,344</td>
</tr>
<tr>
<td>2000</td>
<td>503</td>
<td>1,194</td>
<td>8,423</td>
<td>19,610</td>
</tr>
<tr>
<td>2005</td>
<td>366</td>
<td>929</td>
<td>5,830</td>
<td>14,484</td>
</tr>
<tr>
<td>2010</td>
<td>250</td>
<td>642</td>
<td>4,906</td>
<td>13,236</td>
</tr>
<tr>
<td>2011</td>
<td>266</td>
<td>656</td>
<td>4,989</td>
<td>13,301</td>
</tr>
<tr>
<td>Change</td>
<td>-39%</td>
<td>-32%</td>
<td>-39%</td>
<td>-27%</td>
</tr>
</tbody>
</table>

LFA cattle and sheep data for Kincardine, Sutherland (SG, 2011)

A summary of the main grazing regime changes on the Croick Estate and in the local area, taking into account discussions with local stakeholders and relevant reports, include:

- A reduction in cattle and sheep numbers, particularly on estates (such as the Croick Estate) which are being managed for sporting and wildlife interests.
- A simplification of cattle and sheep management, including the use of store cattle as opposed to suckler cows, on such estates.
- A reduction in the number of holdings with cattle and sheep; average herd size has remained the same but average flock size has increased slightly (over 1995-2011).
- An increase in deer numbers and deer grazing, particularly on estates managed for sporting and wildlife.
- A reduction in labour involved with grazing; with Estate labour now focused on sporting, forestry and wildlife conservation.

**SITE CONDITION:** There are no designated sites on the Croick Estate, however moorland bird and habitat surveys by the RSPB suggests that biodiversity on the Croick Estate and surrounding estates is in reasonable condition and improving. Recent results from 2010 and 2011 include:

- A total of 786 birds observed from 50 different species
- The two survey sites on the Estate indicated up to 25 bird species including up to 6 priority species (black grouse, golden plover, greenshank, curlew, snipe, and hen harrier). Golden plover was the most abundant wader.
- Black grouse, including 21 males in a number of different leks (2010). Strathcarron, and more specifically Croick Estate, remains the core area for black grouse in Sutherland.
- A broad diversity of habitat types which are generally in good condition; this includes dry heath, wet heath and blanket bog.
GRAZING & IMPLICATIONS FOR BIODIVERSITY: The implications of grazing change on specific species are varied and complex. Some of the key impacts as highlighted by local stakeholders include:

- A reduction in grazing pressure, from previously high sheep numbers, will have benefited a range of habitats on the Estate including dry heath, wet heath, blanket bog and grassland.
- In the native Caledonian woodland, initially the planted blocks were fenced off and not grazed; this led to too much rank vegetation of homogenous age and structure. The current owner has therefore introduced a variety of grazing regimes to the four blocks of woodland including:
  - Removal of fencing with open access for cattle, sheep and deer. This is resulting in deer lawns and network of tracks although some of the poorest trees have suffered.
  - Cattle and sheep grazing within a fenced compartment, and some burning. The grazing is breaking up the age and structure of the vegetation creating an integrated habitat mosaic that includes open areas and tracks. This is the best place to find black grouse which appear to like this form of transitional habitat.
  - A small amount of deer let into a fenced compartment. This deer grazing is resulting in some small scale opening up of habitat.
  - Maintenance of fenced compartment, although deer have made their own way in. This has produced similar results to the block where deer were let in on purpose.
- Bird species which benefit from the developing native Caledonian woodland include black grouse, willow warbler, grass-warbler, cuckoo, tree pipit, lesser redpoll and whinchat.
- Extensive grazing of floodplain grassland by cattle, sheep and deer is benefiting bird species such as mallard, teal, common sandpiper, sand martin, reed bunting and oystercatcher.
- Extensive grazing of heath and blanket bog is benefiting bird species such as golden plover, greenshank, red grouse, meadow pipit, skylark and wheatear.
- In addition to benefiting biodiversity, the extensive grazing regime and woodland creation is helping to reduce erosion and run-off, thereby improving water quality and reducing flooding.

LESSONS LEARNT: The following lessons can be drawn from the Croick Estate and local area:

- Large-scale restoration of native Caledonian woodland can benefit a range of species. These benefits are apparently enhanced by extensive grazing with cattle, sheep and deer. Cattle grazing, in particular, appears to open up woodland beneficially, creating a structure which is valuable for black grouse.
- The change in grazing regime, from high sheep numbers and intensive management to much more extensive grazing by cattle, sheep and deer, together with the introduction of new native woodland has seen the existing biodiversity associated with open ground habitats retained whilst other important species associated with woodland have become established resulting in a net increase in species abundance.
- Woodland creation and more extensive grazing can also result in reduced erosion, less flooding and improved water quality.
- Employment is being created in sporting, forestry and wildlife conservation, replacing to some extent that lost from sheep farming.
- Landscape scale change requires the commitment and determination of the landowner and estate staff. This can be enhanced by specialist advice, such as that provided by the RSPB which provides guidance and monitors progress.
- Scheme payments such as the SFP and LFASS payments are important and valued, but limited in their influence on Estate strategy and management. Agri-environment scheme payments, however, have the potential to provide additional support for habitat restoration and management, enhancing the existing work being undertaken by the owner.
**FUTURE POLICY AND PRACTICE:** Key policy recommendations from this case study are:

- **Continue to support large-scale woodland creation and restoration, in appropriate locations, for biodiversity and wider environmental benefits but recognise the importance of follow-up management, in particular cattle grazing.**

- **Ensure that the CAP fully recognises the delivery of public goods as a valuable product of farming systems and does not make inappropriate restrictions of payments to ‘active farmers’ in a way that prevents the environmental benefits of sustainable land management from being rewarded. Delivery should be considered at a landscape scale to meet the needs of biodiversity by considering agriculture, forestry and other land use in an integrated way.**

- **Improve agri-environment scheme support to enhance the biodiversity benefits delivered by making schemes better targeted, locally responsive, adequately funded and accessible. As part of this, review the woodland expansion National Target in the Rural Priorities scheme, given that it can drive planting in already heavily afforested areas where it might not be appropriate; what’s needed instead, is a strategic approach to woodland creation as per the recommendations of the Woodland Expansion and Advisory Group.**

- **While SFP and LFASS can provide important income for land managers, their lack of environmental conditionality means they have little positive influence on land management. Better outcomes and value could be achieved by targeting of these funds to public goods delivery.**

“We believe that ownership means stewardship”

For more information on the Croick Estate, please see [www.croick.com](http://www.croick.com)

Thank you to James Hall, Alasdair Sutherland, Robert Moffat and Kenny Graham (RSPB) for providing time, photos and information for this case study. Where not otherwise credited, photographs are copyright of Cumulus Consultants Ltd.
The Antrim Hills is a significant upland area in Northern Ireland, formed from volcanic basalt overlaying older limestones and sandstones, intersected with a series of glens formed during the last ice age. The Antrim Hills comprise part of the Antrim Coast and Glens Area of Outstanding Natural Beauty (AONB), over half of which is designated for nature conservation. The case study is focused on the Southern part of the AONB, known as the Central Ballymena Glens and Garron Plateau.

**OVERVIEW OF STUDY AREA**

<table>
<thead>
<tr>
<th>AREA</th>
<th>725sq km (72,489ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY HABITATS &amp; FEATURES</td>
<td>Heather moorland, blanket bog, rough moorland grazing, unimproved grassland, whin, bracken, upland oak woodland.</td>
</tr>
<tr>
<td>LAND USES</td>
<td>Extensive grazing, forestry, water, tourism &amp; recreation.</td>
</tr>
<tr>
<td>DESIGNATED SITES</td>
<td>AONB, SAC/ SPA covering 35,091ha, ASSI covering 8,535ha, SLNCIs.</td>
</tr>
<tr>
<td>LIVESTOCK</td>
<td>Sheep (Scottish Blackface, improved breeds), and beef cattle (Beef Shorthorn, Aberdeen Angus, Limousin)</td>
</tr>
<tr>
<td>LANDOWNERS</td>
<td>Department of Agriculture and Rural Development, Forest Service, Northern Ireland Water, Private.</td>
</tr>
</tbody>
</table>

**Biodiversity of Antrim Hills:** The varied geology of the Antrim Hills gives rise to a range of soil types which combined with topographical variation supports a great diversity of habitats and wildlife. These include extensive areas of heather moorland and grassland used mostly for rough grazing, and large areas of blanket bog. Conifer plantations also cover a significant area. The Antrim Hills are internationally important for nature conservation. The Antrim Hills Special Protection Area (SPA) is designated for its nationally important populations of hen harrier and merlin and covers 40% of the AONB area. The Garron Plateau Special Area of Conservation (SAC) is designated for its blanket bog and alkaline fen habitats, and wetland species such as the yellow marsh saxifrage. The Antrim Hills is also one of the last strongholds in Northern Ireland for breeding waders including curlew, snipe and lapwing. Other species of interest include birds such as whinchat, spotted flycatcher and reed bunting. The moorland areas link to lower lying land in the glens, which has features including species rich grassland, copses and old field boundaries.
**Farming Systems on the Antrim Hills:** Farming has shaped the landscape and habitats of the Antrim Hills for thousands of years. The predominant farming system is extensive sheep and cattle grazing over rough grassland and heather. The farms typically include both areas of moorland and lower lying land, often separated from one another. Sheep and some cattle graze the higher areas during the summer. Most stock are overwintered in the glens; some ewes are outwintered. The number of agricultural holdings has decreased by 10% from 863 to 778 over the period 2000-2007, with farms increasing slightly in size and employing fewer people. Over 80% of holdings are categorised as ‘small’ (1-2 person businesses) or very small (too small to provide full-time employment for one person). Most of the land is categorised as SDA, being poor or very poor in terms of agricultural quality.

**Grazing Livestock on the Antrim Hills:** Farm survey data (DARD, 2007) suggests that there has been a 16% drop in the number of cattle in the AONB between 2000 and 2007 and a 14% drop in the number of sheep. More detailed data for the AONB is not available however data is available by rural district. Data for the five districts - Antrim, Ballycastle, Ballymena, Ballymoney and Larne - within which the AONB sits, suggest that there has been a 4% decrease in dairy cow and beef cow numbers over the period 1995-2011 and a 19% decrease in breeding ewes, see below. There has been a slight increase in sheep numbers in the past year or two.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dairy cows</th>
<th>Beef cows</th>
<th>Total cattle</th>
<th>Breeding ewes</th>
<th>Total sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>60,976</td>
<td>47,078</td>
<td>293,975</td>
<td>310,410</td>
<td>664,037</td>
</tr>
<tr>
<td>2000</td>
<td>60,859</td>
<td>54,340</td>
<td>311,458</td>
<td>340,214</td>
<td>710,112</td>
</tr>
<tr>
<td>2005</td>
<td>62,590</td>
<td>49,922</td>
<td>307,802</td>
<td>278,865</td>
<td>587,374</td>
</tr>
<tr>
<td>2010</td>
<td>60,713</td>
<td>43,327</td>
<td>300,842</td>
<td>248,191</td>
<td>528,719</td>
</tr>
<tr>
<td>2011</td>
<td>58,415</td>
<td>45,114</td>
<td>295,904</td>
<td>252,326</td>
<td>539,224</td>
</tr>
<tr>
<td>Change</td>
<td>-4%</td>
<td>-4%</td>
<td>1%</td>
<td>-19%</td>
<td>-19%</td>
</tr>
</tbody>
</table>

Changing livestock numbers only tell part of the picture. The way farmers manage their land and stock has changed over the decades. The main grazing regime changes in the Antrim Hills suggested by local stakeholders include:

- Reduction in stock numbers and lower stocking density. A shift to more low input low output systems, with a reduction in costly inputs (fertiliser and feeds).
- A move away from cattle and sheep grazing on the hills during the winter due to ESA and other agri-environment scheme prescriptions. Livestock is housed or off-wintered. An associated increase in summer grazing on the hills.
- Cows and calves have tended to be kept on better land in the glen/valley. There is currently a growing interest in grazing cattle on the hill but shortage of the right type of cattle.
- Improved breeds of sheep being kept, with higher lambing percentage and more lambs. This tended to result in fewer sheep being kept on the hill. Research is underway to develop productive, hill sheep - Highlander composites – through cross breeding.
- Rush cutting and weed-wiping being undertaken to improve usability of hill ground for cattle and sheep, as well as benefiting wildlife.
- Burning becoming less common and less frequent.
CONDITION OF DESIGNATED SITES ON THE ANTRIM HILLS: The wildlife value of the Antrim Coast and Glens AONB is recognised by the extensive areas afforded special protection as designated sites. The Antrim Hills SPA covers 27,093ha and the Garron Plateau SAC covers around 4,650ha. There are also four NNRs and 18 ASSIs covering 8,535ha. Designated land including Natura 2000 sites, NNRs and ASSIs cover over 50% of the AONB although this has not necessarily resulted in these habitats being in favourable condition. For example, the Garron Plateau SAC/ASSI has some features in favourable condition, but others including blanket bog, dry heath, wet heath and higher plant assemblages and yellow marsh saxifrage are in unfavourable condition due to overgrazing. The AONB Management Plan states that NIEA estimates that less than half of the ASSIs are in favourable condition. NIEA also estimates that at least 50% of SLNCIs are in poor condition.

GRAZING & IMPLICATIONS FOR BIODIVERSITY: Farming on the Antrim Hills has been influenced by the designation of the area as an Environmentally Sensitive Area (ESA) in 1993. The ESA scheme encouraged farmers to safeguard the traditional farmed landscape. Reducing stocking densities was a key requirement of the ESA. The current agri-environment scheme is the Northern Ireland Countryside Management Scheme (NICMS) which has similar requirements of restoring and maintaining moorland habitats.

The implications of grazing change on specific species are varied and complex. Some of the key impacts as highlighted by local stakeholders include:

- Historically high stocking levels have had a significant impact on blanket bog and heathland vegetation, including overgrazing.
- There has been a gradual improvement in habitat quality for bog and heath. However there is still a mix of over and undergrazing. Undergrazing sometimes occurs where older farmers have not passed land on.
- Reduced grazing by cattle has led to an increase in the area of ‘sprit’ (rush) and bracken.
- Grazing levels have generally been quite good for breeding waders, although some areas still suffer from over or undergrazing making them unsuitable for waders.
- Inappropriate grazing regimes, lack of rush management and muddy areas lead to increased predation which adversely affect breeding waders such as curlew.
- Commercial forestry has also affected the landscape and provided habitat for predators including foxes and magpies; this has impacted on breeding wader eggs and chicks.
- Inappropriate burning had damaged some habitats such as blanket bog.
- Peat cutting has had a significant visual and wildlife impact; current peat cutting activity is localized and impact likely to be small.
- Water quality benefits can also arise through improved management of blanket bog and other upland habitats. This approach is being taken forward by RSPB and Northern Ireland Water via the Garron Plateau Sustainable Catchment Management Plan (SCaMP) Project.
- The ESA has helped increase the species diversity of heather moorland and led to a slight increase in heather cover. Some overgrazed sites are however taking time to recover.

GRAZING/ENVIRONMENTAL INITIATIVES: There have been a number of initiatives that have helped address the negative environmental impacts of grazing regimes and farm intensification in the area, including:
The RSPB is the lead partner in the Halting Environmental Loss Project (HELP) which operates in Northern Ireland, Scotland and the Republic of Ireland. It is funded by the European Regional Development Fund’s INTERREG IVA Programme, administered locally by the Special EU Programmes Body. Glenwherry, in the Antrim Hills is one of HELP’s operational areas in Northern Ireland. The focus in the Antrim Hills is to increase populations of breeding waders including curlew, lapwing and snipe, although habitat management for these species will benefit other wildlife such as the marsh fritillary butterfly, red grouse, hen harrier and Irish hare.

HELP in the Antrim Hills works with over 60 farmers on 2,300ha around Glenwherry. The aim is to encourage farmers to undertake management which will support breeding waders. This includes restricted grazing during the nesting period in the Spring, rush cutting or weed wiping from mid July onwards, and the creation of scrapes and/or the clearing/reprofiling of drains to create muddy areas for chick feeding. Farmers are encouraged to participate in NICMS, specifically the options for breeding waders, heather moorland and rough moorland grazing. Farmers are also encouraged to manage improved (‘green’) land or cultivated (‘red’) land adjacent to semi-natural habitat, as feeding areas, or for breeding lapwing.

The RSPB HELP project officer provides both 1:1 advice to farmers and group training. At individual farm level, information on the number and location of breeding pairs is provided, so that farmers can adapt their management accordingly, as well as guidance on enhancement measures such as scrapes. The training covers management for specific habitats and species.

**Challenges:**
- Agri-environment scheme budget limits access to funding for new agreements and works, long waiting list to get in, in meantime extensions to agreements are offered.
- Most of the area lies outside the SPA (and is not designated SAC or ASSI)
- Cattle grazing could help with habitat management, but no incentive to stock cattle
- Rush growth impacts curlew breeding, and rush management is limited by poor access
- Forestry plantations harbour predators

**Successes:**
- Uptake of land management for breeding waders
- Increase in breeding numbers of snipe and lapwing
- Curlew numbers are currently stable
- Increased delivery of public goods
- Farmers doing work on a voluntary basis such as scrape creation.
- Rush management improves agricultural value of upland areas
- Cross compliance, agri-environment and farm quality assurance links well together
- Improving farmer knowledge

**GLENWHERRY HILL REGENERATION PROJECT - UPLAND HABITAT RESTORATION**

Greenmount Hill Farm in the Antrim Hills is owned by the Department of Agricultural and Rural Development (DARD). It covers around 1,000ha and comprises 100 suckler cows and 1,000 ewes (including a flock of 250 pure bred Scottish Blackface ewes). It aims to provide a unique resource to educate and train CAFRE (College of Agriculture, Food and Rural Enterprise) students; encourage farmers to adopt findings from environmental management and livestock production knowledge transfer projects which seek to demonstrate sustainable upland management; and facilitate stakeholders to undertake work programmes to support evidence-based policy developments. The Glenwherry Hill Regeneration Project is a key project which is involved in restoring a wide range of habitats for red grouse, raptors and breeding waders. It includes regenerating heather through burning on a sustainable rotation, managing rough grassland and moorland for breeding waders, and undertaking management for red grouse. Other important work at Glenwherry includes a breeding programme to improve the productivity and profitability of upland cattle and sheep, whilst sustaining their value for environmental management.
Challenges:
- Heather moorland historically overgrazed and blanket bog burned
- Improving the productivity and profitability of hill sheep and cattle.
- The land is partly designated SPA, but not ASSI; this potentially limits funding

Successes:
- Substantial increases in red grouse numbers
- 550ha heather being regenerated for red grouse, hen harrier and other species
- Rush management and scrape creation leading to increase in numbers of breeding snipe
- Partnership working between DARD, CAFRE, RSPB and Irish Grouse Conservation Trust.
- Opportunity to disseminate best practice to farmers in the area

LESSONS LEARNT: The following lessons can be drawn from the local initiatives and interviews with stakeholders in the case study area:

- Working with farmers, providing information, advice and guidance on a 1:1 basis and training through group events, has proved successful in delivering improved land management and environmental outcomes.
- This facilitation has complemented the financial support provided through NICMS. It has enhanced the outcomes achieved on land under agreement and extended benefits to non-agreement land.
- Better management of upland habitats has agricultural benefits in terms of forage availability and improved compliance (reduced risk of non-compliance).
- Improving farmer knowledge has potentially long-lasting benefits for the farmers and the upland environment.
- Ensuring suitable grazing regimes is only part of the picture; rush management, ditch management, scrape creation and rotational burning also contribute to improving habitats, species diversity and greater populations.
- Forming partnerships with other organisations works, it also extends the reach of solo initiatives.

FUTURE POLICY AND PRACTICE: Key policy recommendations from this case study are:

- Continue projects such as HELP which provide advice and support to farmers, on both an individual and group basis, to achieve long lasting environmental outcomes. Without this project, there would be no other advisory service for farmers in these key areas.
- Address difficulties in accessing agri-environment schemes in order to provide certainty for farmers seeking to farm in an environmentally friendly way, through better funded budgets, reduced waiting times and well-planned transitional arrangements between agreements or schemes.
- Ensure the new Less Favoured Area (LFA)/Area of Natural Constraints (ANC) scheme incentivises farmers to significantly deliver public goods and rewards those who are already doing so.
- Areas used by breeding waders in the Antrim Hills currently have no designations and should be given more protection, given the National and wider importance of these populations. Consideration could be given to reviewing the boundaries/criteria of the Antrim Hills SPA currently designated for hen harrier, or creating a new ASSI for breeding waders.

Thank you to Neal Warnock (RSPB), Alan Morrow (DARD), Jim McAdam (AFBI), Colin Alexander (DARD/Glenwherry Hill Farm), Willie Warwick (DARD/Glenwherry Hill Farm), Alastair Cameron (DARD/Glenwherry Hill Farm), John Davison, (farmer) and David Bonnar (farmer) for providing time, information and photographs for this case study. Where not otherwise credited, photographs are copyright of Cumulus Consultants Ltd.
Chasing livestock numbers in the UK LFA
Case Study: Fermanagh (Northern Ireland)

Fermanagh, the most westerly county in Northern Ireland, is renowned for its beautiful lakeland landscape and mountain scenery. The county is bisected by the River Erne, Upper Lough Erne and Lower Lough Erne. These open expanses of water are fringed with wetland vegetation and framed by spectacular mountain ranges; Slieve Beagh to the east, Cuilcagh and Marlbank to the southwest, and Belmore Mountain and the Lough Navar uplands to the west. 20% of Fermanagh lies under water and 97% is designated as a Less Favoured Area.

OVERVIEW OF STUDY AREA

<table>
<thead>
<tr>
<th>AREA</th>
<th>1,875 sq km (187,500ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY HABITATS &amp; FEATURES</td>
<td>Blanket bog, upland heath, montane heath, limestone pavement, calcareous grassland, lowland meadow, purple moor grass and rush pasture, floodplain grazing marsh, fen, reedbed, lakes, wet woodland, species-rich hedgerows.</td>
</tr>
<tr>
<td>LAND USES</td>
<td>Extensive grazing, forestry, water, tourism &amp; recreation.</td>
</tr>
<tr>
<td>DESIGNATED SITES</td>
<td>SAC, SPA, Ramsar, Global Geopark, ASSI</td>
</tr>
<tr>
<td>LIVESTOCK</td>
<td>Sheep (Scottish Blackface, Glengavin, Cheviot), and beef cattle (Beef Shorthorn, Aberdeen Angus)</td>
</tr>
<tr>
<td>LANDOWNERS</td>
<td>Fermanagh District Council, Forest Service, Private.</td>
</tr>
</tbody>
</table>

Biodiversity of Fermanagh: Fermanagh’s varied geology and landscape combines to provide an important and unique biodiversity resource which supports approximately 50% of the Northern Ireland Priority Habitats and approximately 23% of Northern Ireland Priority Species. The priority habitats include bog and heath (blanket bog, upland heath, montane heath), calcareous habitats (limestone pavements, calcareous grassland, marl lakes and turloughs), grassland (lowland meadow, purple moor grass and rush pasture, floodplain grazing marsh), wetlands (reedbeds, fens, eutrophic and mesotrophic lakes, rivers and streams) and woodland (wet woodland and species-rich hedgerows). The priority species include mammals (otter, red squirrel and bats), birds (lapwing, curlew and hen harrier), aquatic species, (white-clawed crayfish and freshwater pearl mussel), butterflies (dingy skipper, marsh fritillary) and higher plants (blue-eyed grass, Tunbridge filmy-fern). Key areas for biodiversity include: Cuilcagh Mountain which has bog, heath and calcareous habitats, due to underlying carboniferous limestone; and Upper Lough Erne which has lake, reedbed, fen, floodplain grazing marsh and parkland habitats. Both areas rely on grazing management and have national and international designations for nature conservation.
FARMING SYSTEMS IN FERMANAGH: Fermanagh’s landscape and habitats have been shaped by livestock farming for thousands of years. Traditional farming systems include extensive cattle and sheep grazing on moorland, rough grassland and calcareous grassland in the upland areas, and more intensive cattle and sheep rearing and finishing systems, supported by hay cutting, in lowland areas. In the upland areas, ‘ladder’ farms typically stretch from lower lying ‘in bye’ land right through to the top of the mountain. These farms often include access to common land on the mountain. Historically, cattle tended to be grazed on the better, lower land with sheep grazing higher up. Elsewhere, farms are often small, fragmented and part-time. The number of agricultural holdings in Fermanagh has decreased by 17% from 3,525 to 2,910 over the period 2000-2011, with farms increasing slightly in size and employing fewer people. Around 95% of holdings are categorised as ‘small’ (1-2 person businesses) or very small (too small to provide full-time employment for one person). 87% of holdings are categorised as LFA cattle and sheep farms. Most of the land is categorised as SDA, being poor or very poor in terms of agricultural quality.

GRAZING LIVESTOCK IN FERMANAGH: Farm survey data (DARD) suggests that there has been a 12% drop in the total number of cattle in the area between 1995 and 2011 and a 17% drop in the number of sheep, see below. This includes a 19% decrease in dairy cow numbers, a 16% decrease in beef cow numbers and a 21% decrease in breeding ewes. There has been a slight increase in both cattle and sheep numbers in the past year or so, influenced by higher market prices.

<table>
<thead>
<tr>
<th></th>
<th>Dairy cows</th>
<th>Beef cows</th>
<th>Total cattle</th>
<th>Breeding ewes</th>
<th>Total sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>23,201</td>
<td>52,467</td>
<td>173,870</td>
<td>55,684</td>
<td>112,524</td>
</tr>
<tr>
<td>2000</td>
<td>21,535</td>
<td>55,906</td>
<td>179,184</td>
<td>57,866</td>
<td>118,853</td>
</tr>
<tr>
<td>2005</td>
<td>20,939</td>
<td>51,344</td>
<td>171,793</td>
<td>44,798</td>
<td>93,599</td>
</tr>
<tr>
<td>2010</td>
<td>18,709</td>
<td>41,710</td>
<td>151,660</td>
<td>41,756</td>
<td>88,378</td>
</tr>
<tr>
<td>2011</td>
<td>18,868</td>
<td>43,971</td>
<td>153,392</td>
<td>43,730</td>
<td>93,539</td>
</tr>
<tr>
<td>Change</td>
<td>-19%</td>
<td>-16%</td>
<td>-12%</td>
<td>-21%</td>
<td>-17%</td>
</tr>
</tbody>
</table>

Changing livestock numbers only tell part of the picture. The way farmers manage their land and stock has changed over the decades. The main grazing regime changes in Fermanagh suggested by local stakeholders include:

- Historically, there were no set systems of farming; farming was very much linked to production of milk, meat and wool for own consumption.
- In the 1970s and 80s, stock numbers and farming systems were heavily influenced by subsidies, headage payments driving increased numbers of cattle and sheep, and capital grants driving investment in livestock buildings and agricultural improvement through drainage and reseeding. This led to a focus of grazing on more productive land. Silage also replaced the traditional hay crop.
- The introduction of the West Fermanagh & Erne Lakeland Environmentally Sensitive Area (ESA) in 1993 encouraged a reduction in stock numbers and stocking density, particularly with sheep.
- The introduction of the decoupled Single Farm Payment in 2005 resulted in further decreases in cattle and sheep numbers. The Less Favoured Area Compensatory Allowance (LFACA) minimum stocking rate has helped to sustain grazing on the hill and elsewhere in the LFA.
- The reduction in stock numbers and a lower stocking density has led to a shift to more low input low output systems, with a reduction in costly inputs (fertiliser and feeds).
• The quality of stock is improving; the focus has switched from quantity to quality.
• Farmers are breeding their own stock to help avoid diseases such as redwater and looping ill
• There is a trend for some farmers moving from being full time to part time with less intensive systems, and concern over succession.
• More recently, farmers have felt pressured to remove scrub and fence off woodland in order to retain SFP eligibility. It is also thought that unauthorised burning has taken place to remove heather which has got too long.

CONDITION OF DESIGNATED SITES IN FERMANAGH: The rich natural heritage of Fermanagh is recognised by the extensive areas afforded special protection as designated sites. There are 12 SACs, 3 SPAs, 5 Ramsar sites, 1 Global Geopark, 61 ASSIs and 9 NNRs in Fermanagh. These designations have not necessarily led to these sites and the features for which they have been designated, being in favourable condition. For example, Cuilcagh Mountain SAC/ASSI has some features in favourable condition, but others including blanket bog, dry heath, wet heath and higher plant assemblages are in unfavourable condition due to overgrazing. These assessments were made in 2006 (due to be re-assessed in 2012) and are potentially subject to change with reductions in grazing pressure following decoupling. Elsewhere, some ASSIs designated for their fen, purple moor grass and rush pasture and high plant assemblages are in unfavourable condition due to undergrazing.

GRAZING & IMPLICATIONS FOR BIODIVERSITY: The implications of grazing change on specific species are varied and complex. Some of the key impacts as highlighted by local stakeholders include:

• Historically high stocking levels have had a significant impact on blanket bog and upland heath. These habitats were overgrazed; particularly in more sensitive, wetter areas and on common land, where no one took responsibility and no restrictions were in place.
• Reductions in grazing pressure following the introduction of the ESA, fencing and decoupling have generally led to improvements in upland habitats.
• However the reduction in variation of vegetation structure, following a reduction in grazing has adversely impacted species such as golden plover.
• Inappropriate burning and other management (such as the removal of scrub and field boundaries) linked to maintaining SFP eligibility has damaged upland habitats, such as blanket bog and heath, and adversely impacted species such as golden plover.
• Undergrazing in lowland areas has led to some grassland habitats becoming rushier and scrubbing up. This includes areas which are difficult to access such as islands and land fringing lakes and rivers.
• Elsewhere in lowland areas, agricultural operations including reseeding, fertilising and drainage have damaged or destroyed grassland habitats.
• Concern over SFP eligibility and cross compliance rules relating to scrub and hedgerows has contributed to clearance and over-zealous cutting leading to loss of habitat.

GRAZING INITIATIVES: There have been a number of initiatives that have helped address the negative environmental impacts of grazing regimes and farm intensification in the area, including:
CUILCAGH MOUNTAIN – PARTNERSHIP WORKING

Cuilcagh Mountain, located on the border with the Republic of Ireland, has been the focus of partnership working between Fermanagh District Council (FDC), RSPB, DARD, Forest Service NI, NIEA and six private farmers. It has been historically overgrazed, but since the 1980s has been subject to local authority management agreements, ESA agreements and more recently NICMS agreements. The aim of these agreements has been to reduce grazing pressure for the benefit of upland habitats and species, and reduce erosion of peatland which was adversely affecting the internationally important Marble Arches limestone caves (part of Cuilcagh Mountain Global Geopark).

FDC and ESA agreements applied broad brush stocking limits at around 0.5 LU/ha which led to a significant reduction in sheep numbers and maintained relatively low levels of cattle grazing. Farmers also received permission to fence their land, from lower lying land to mountain top, enabling better control of grazing and a reduction in unauthorised grazing. This has been generally beneficial for priority habitats including blanket bog, upland heath, montane heath, calcareous grassland and limestone pavement and for the farmers themselves who have adopted a low input, more sustainable systems using native breeds and native breed crosses.

The RSPB has been working at its Aghatirourke Nature Reserve to benefit a range of species including Irish hare, hen harrier, merlin, peregrine falcon, Irish red grouse, golden plover, meadow pipit, skylark and wheatear. Cuilcagh Mountain is one of the last refuges for golden plover however this species has declined in recent years due to increased sward length and loss of vegetation structure. The RSPB action includes mowing to create a short sward for the benefit of nesting Golden Plover.

**Challenges:**
- Potential conflict between management for priority habitats and priority species.
- Loss of vegetation structure leading to reduction in species such as golden plover and red grouse.
- Fencing downsides including landscape impact and increased predation.
- Maintaining eligibility for SFP.
- Lack of successors for the farms.

**Successes:**
- Reduction in grazing pressure leading to improvement in upland habitats and water quality.
- More sustainable farming systems with better utilisation of upland areas and improved quality of stock.
- Positive partnership between public sector, NGO and farmers.

UPPER LOUGH ERNE – CROM ESTATE

The National Trust’s Crom Estate is located on the southern shore of Upper Lough Erne and comprises 810ha of islands, meanders, fresh water channels, small fields and woodlands. It has SAC, SPA, Ramsar ASSI, NNR and LNR designations. Its priority habitats include parkland, floodplain grazing marsh, purple moor grass and rush pasture, fen and reedbed. The area is known for its lichens and fungi, butterflies (including the silver-washed fritillary) and moths, birds (waterfowl and other species) and mammals (including eight species of bat). The Trust works with graziers to restore or continue grazing on parkland, islands and other difficult to reach areas.

**Challenges:**
- Access for stock and machinery to islands.
- Seasonal flooding, which can make grazing and rush cutting impossible, even in summer.
- Getting the right graziers and right type of stock.
- Managing cross compliance, agri-environment and nature conservation demands.
- Mapping.

**Successes:**
- Continuation of grazing on parkland and other habitats.
- Restoration of grazing to islands.
- Sustaining key species.
LESSONS LEARNT: The following lessons can be drawn from the local initiatives and interviews with stakeholders in the case study area:

- Partnership working over many years together with financial support through agri-environment and other schemes has resulted in positive grazing regimes.
- Reducing stock numbers and grazing pressure has benefited upland habitats but not necessarily all species; other management including cutting is required to produce the right vegetation structure.
- Fencing helps control grazing but has disadvantages including landscape impact, increased predation and bird strikes.
- More sustainable farming systems have resulted from lower stocking rates, a switch to native breeds and a focus on improving quality, alongside scheme payments (these remain very important, accounting for 85-90% of farm income on one farm visited).
- Focused effort has helped sustain grazing and hay meadow management on valuable but inaccessible lowland sites.
- Concern over SFP eligibility rules relating to heather height, and encroachment by woodland, scrub and hedges, have contributed to inappropriate burning, clearance and cutting leading to loss of habitat and unnecessary work and expense.
- Cross compliance, agri-environment and nature conservation requirements do not always mesh well together.
- Lack of suitable successors for farmers and graziers threatens long term sustainability

FUTURE POLICY AND PRACTICE: Key policy recommendations from this case study are:

- Review SFP eligibility rules and/or associated guidance to ensure unintended damage to habitats and species and unnecessary management does not occur.
- Continue partnership working for the benefit of farmers, wildlife and the environment through INTERREG programmes such as the Halting Environmental Loss Project (HELP), and to find solutions which fit within the wider farming systems and meet the sometimes conflicting requirements of different habitats and species.
- Secure CAP mechanisms which support farmers to deliver sustainable farming systems and develop associated marketing opportunities. Ensure a strong package of support which rewards public goods delivery and Pillar 1 greening policies which compliment any new LFA/ANC and targeted agri-environment schemes.
- Consider how suitable successors can be encouraged to take on the management of environmentally valuable sites – “the hills need the people who understand them”.

Thank you to Brad Robson (RSPB), Patrick McGurn (EFNCP), Malachy Martin (NT), John Sheridan (farmer) and John Thomas McGovern (farmer) for providing time, information and photographs for this case study. Where not otherwise credited, photographs are copyright of Cumulus Consultants Ltd.