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Mountains and uplands

Scotland's uplands are uniquely wild and distinctive, and have some of our most highly rated wildlife and habitats.

Summary

Scotland's uplands have some of our most distinctive and important wildlife and habitats – embracing mountains, moorlands, blanket bog and rough grasslands. Birds such as the golden eagle, golden plover and red grouse epitomise the uplands, and heather and bog mosses help define the landscape and support much of its nature.

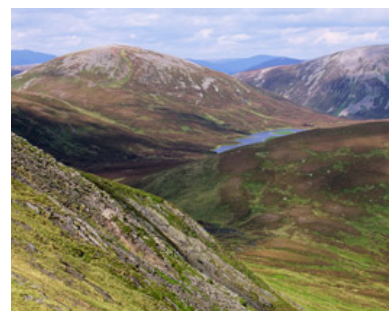
Most of the uplands have been modified through grazing, drainage, afforestation and atmospheric deposition to the extent that near-natural habitats are rare. A range of monitoring studies reveals that many of the upland habitats and associated wildlife are declining in extent or condition.

Introduction

Mountains, moorlands, peatlands and rough grasslands form the bulk of what we refer to as the uplands - some of our wildest landscapes. A high proportion of the Scottish uplands are semi-natural in character with most of the flowering plants being native. Above the former treeline, we have some of the most natural habitats in Britain, especially in the corries and on the summit plateaux in the Highlands.

Scotland's upland biodiversity is the product of geology, climate and land use. Management for hill sheep, forestry, recreation, sporting interests (notably red deer and red grouse shooting), and more recently for renewable energy developments, have moulded the distinctive landscape and nature we see today. Some of the imprints of land management, such as the quilt-work pattern caused by heather burning (muirburn) and associated shooting butts, are striking to visitors from abroad.

Covering just over half of Scotland, the uplands have the most extensive and best examples of near-natural habitats and wildlife associated with northern and remote parts of Europe. Lying at latitude close to that of the Nordic region, and having a similar geology, soils, glacial history and cool maritime climate, the plants and animals of Scotland and the Nordic countries have much in common. However, the richness of oceanic mosses and ferns in Scotland's uplands is exceptional and there is a unique mix of vegetation types associated with the different climatic influences (Atlantic, Arctic, Arctic-alpine, Boreal and even some Mediterranean elements). Indeed, many of the plants in the uplands are on the extreme edge of their world range. Although most of the species themselves are not scarce elsewhere in Europe, the assemblages of birds in Scotland's boreal-arctic peatlands, high mountain plateaux and corries are unique and some species, such as ptarmigan and dotterel, nest at higher densities than recorded anywhere else in the world.



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Description of upland wildlife

Cool, wet and windy conditions determine the prevailing nature of Scotland's uplands. The extent and character of our uplands are distinctive – from rugged landscapes in the west, rolling hills in the south, and the massive whaleback mountains in the central and eastern Highlands. Detailed background descriptions on the Scottish uplands can be found in the [UK National Ecosystem Assessment](#).

The range of habitats is unique. According to the [Country side Survey](#), the land area of Scotland is about 80,000 km² (almost 240 km at its widest and 1350 m at its highest). Around half of Scotland (55%) is upland, with a third of the uplands being bog habitat and the remainder being acidic (rough) grasslands, dwarf shrub heath (heather moorland), bracken, fen, marsh and swamp, inland rock and montane habitats (Table 1).



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Protected areas

Site-based conservation of nationally and internationally important habitats, species and geological features is undertaken through a network of protected areas (including [Special Areas of Conservation \(SACs\)](#), [Special Protection Areas \(SPAs\)](#) and [Sites of Special Scientific Interest \(SSSIs\)](#)). The European protected areas (SPAs for birds; SACs for other animals and habitats) have the best examples or largest concentrations or populations of habitats or species listed under the EC [Habitats and Birds Directives](#). These protected areas tend to be in much better condition than the wider countryside – they have been selected because of their rich wildlife interests, but also have had more support from government and the agencies to help with conservation and management activities. These areas are well monitored through the [Site Condition Monitoring Scheme](#), which provides overview reports on the state of nature every six years. The wider context for conserving nature in Scotland is detailed in the [Scottish Biodiversity Strategy](#).

Of the upland landscape in Scotland, 24% lies within SPAs, 16% in SACs, 22% in SSSIs, 11% in [National Parks](#) and 3% in [National Nature Reserves](#). That such a large extent of the uplands lies within European sites, in particular, is testament to the importance of our upland nature. The habitat types have specialised names, and include blanket bog, wet and dry heaths, species rich grasslands, scree slopes, high mountain mossy heaths, and a variety of specialist communities. Upland birds include some of our rarest raptors (golden eagle, peregrine and merlin), waders (golden plover, curlew, greenshank, dunlin and dotterel) and others widely associated with wild upland areas, notably red grouse, ptarmigan and ring ouzel.

Upland habitats

Upland habitats fall under seven broad types, Table 1 provides an overview of the estimated areas of these broad habitats across Scotland and how they have changed through time.

Table1: Estimates of land area in Scotland (in thousands of hectares)

Broad habitat type	1990	1998	2007
Bog	1922	2039	2044
Dwarf shrub heath (moorland)	1007	912	894
Acid (rough) grassland	n/c	911	983
Fen, marsh and swamp	289	261	238
Bracken	107	121	131
Inland rock	53	91	84
High mountains	n/a	38	38

Source: [Country side Survey report for Scotland](#)

n/e indicates not estimated.

Note that small extents of these habitat types occur outwith the uplands.

We can see that there has been a steady loss of heather moorland and fen, swamp and marshy habitats since 1990 and an expansion of bracken. The increase in bog extent may reflect the greater effort spent in the last twenty years to restore drained and afforested bogs.

The following sections provide some more detail on some of the habitats. A more comprehensive summary of detailed descriptions of changes is given in [Scotland's wildlife – and assessment of biodiversity in 2010](#).

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Bog

These are compost heaps in reverse. Bog mosses and other plants break down very slowly in a largely waterlogged and oxygen-starved environment and gradually form a layer of peat. A variety of plants can lay down peat in bogs, notably bog mosses (e.g. *Sphagnum*), but also bog cotton and deer grasses.

Bog is one of the most extensive semi-natural habitats in Scotland, covering just over 2 million ha, a quarter of our land area. It includes 1.1 million ha of blanket bog which is a rare habitat globally. Scotland holds a significant proportion of the European and world resource. Blanket bog is found throughout the Scottish uplands but is most extensive in areas with gentle slopes and poor drainage dominating the landscape of the gently undulating moorlands, particularly in the North Highlands and Western and Northern Isles. Bog plants are adapted to living in soil with low levels of nutrients, exemplified by the carnivorous sundew which traps insects and digests them to supplement the low levels of nutrients available from the bog. The conservation interest of peatlands is of international significance, because of their importance as a habitat, and their role in storing carbon. Birds such as golden plover and dunlin nest at some of the highest densities recorded globally, and greenshank nest in open peatlands here, whereas in other countries they nest in wooded bogs.

Dwarf shrub heath (moorland)

The one habitat which is utterly distinctive in upland Scotland is heather moorland – especially when its dominant plant, the ling (or heather), flowers in late summer to give the purple vistas we see on so many postcards. This is a fascinating habitat, with a great richness of invertebrates and birds.

Virtually all of the moorland habitat is grazed by sheep, and more locally by red deer, and much of it is managed by controlled burning on rotation by a practice called 'muirburn' to regenerate heather, and in turn to benefit livestock and wildlife - by providing nutritious young shoots while also retaining areas of older, taller heather for grouse and other birds to nest in.

More than 40 species of birds nest on moorland, including red grouse, golden plover, hen harrier and merlin. There are also large numbers of ground beetles and spiders, and other animals often seen include adders and hares. While the plant interest is not high, some such as bog myrtle, cranberry and blueberry add to the appeal of being on the hill.

Virtually all of our moorland was once woodland, but land management over thousands of years has left us with open moors without trees. This is reflected in large areas of the north-west Highlands being known as deer forest despite it consisting of heath and boggy terrain with not a tree in sight. In the few areas where we still have large areas of natural woodland, especially Scots pine, one key feature is the understorey dominated by heather and other shrubby vegetation.

Acid grassland

These are the rough grasslands we see in the uplands, often associated with hill farming country, and on the fringes of heather moorland. Occurring above the enclosed agriculture limit, these can be found down to sea level in the exposed north west. They are characterized by a diversity of species, often very herb rich, with many wildflower species and native grasses and are a haven for upland invertebrates including the rare vertigo snail. The fragrant thyme and the buzzing of insects is an indication of the richness of these grasslands, with curlew and skylarks adding distinctive sound.

Many of these rough grasslands were formerly covered by heather, but have been heavily grazed to the extent that grasses have overwhelmed and replaced the heather and other dwarf shrubs. Its extent increased by 8%, between 1998 and 2007, possibly as a consequence of increases in sheep densities – though numbers have fallen off since the early part of this decade, so national surveys in future may find a recovery of heather at the expense of rough grassland.

High mountains

Mountain wildlife is special and includes birds such as ptarmigan, dotterel and the snow bunting. These extreme habitats support species that are at the southernmost extent of their distribution. Mountain heath and willow scrub is one of the most natural habitats that we have in Scotland – it occurs above the tree line, usually above 600 metres, but lower in more exposed locations. Heaths dominated by heather and blueberry support a diverse population of plants and bryophytes. Where willow trees do grow, they are stunted. These habitats form mosaics with montane grasslands and moss dominated sedge heaths.

Scotland contains 90% of high mountain habitat in the UK. The woolly fringe moss heaths which drape mountain summits are found in few other parts of the world, and the heath on Ben Wyvis forms the largest single expanse of this habitat known to us!

Condition of upland habitats

An [assessment of Scotland's biodiversity](#) was carried out in 2010 and gave results from monitoring across protected areas.

The [Scottish Biodiversity Strategy](#) gives details on 'priority' habitats and species in Scotland. In the uplands we have eight such habitats (blanket bog; limestone pavement; upland heathland; calaminarian grasslands; inland rock outcrop and scree habitats; mountain heaths and willow scrub; upland calcareous grassland; and upland flushes, fens and swamps) and 122 species (a range of mosses, liverworts, fungi and flowering plants; bees and butterflies; mammals and birds). All of these habitats and many of the species are monitored closely. A variety of methods are used to assess if populations are increasing (i.e. favourable) or decreasing (i.e. declining), and for many of the habitats the species composition and structure of vegetation tells us a lot about their condition. All of the upland habitats were found to be declining in condition in 2005 and by 2008, seven of these were still declining though one (limestone pavement) had stabilised. For species, the situation was somewhat better; for 13 species monitored in 2008, 11 were stable and only one (the flower Shetland mouse-ear) was declining. Between 1994 and 2008, upland birds remained unchanged, though some species have declined in range or abundance (such as hen harriers).

Across protected areas, a detailed [Site Condition Monitoring](#) programme provides details on how the habitats and species for which the sites were designated are faring. Based on the 767 condition assessments carried out across sites, 66% were in 'favourable' condition (i.e. good health) or were improving on their previous condition, by October 2010.

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Pressures affecting upland wildlife

Biodiversity losses across the uplands are occurring as a result of a complex range of factors. The book [The Changing Nature of Scotland](#) outlines these in detail.

In summary, these changes include:

1. **land management changes** - notably heavy grazing pressures from sheep and deer in some areas, poorly practised muirburn and fragmentation. These lead to a loss of the dwarf shrub heaths and a proliferation of grasses – since the 1940s around a quarter of heather cover has been lost due to heavy grazing pressure;
2. **atmospheric deposition** - there has been a large increase in acid and nutrient deposition over the past 140 years, although acid deposition is beginning to decrease. South of the Highlands, the grassy summit heaths have become much grassier due to this deposition – which favours grasses and sedges at the expense of mosses;
3. **afforestation** – large swathes of blanket bog were lost to commercial forestry in the 1980s. Many of the afforested areas lost their breeding birds (such as golden plover, dunlin and greenshank), and the moss-dominated character of the vegetation was damaged as the peatlands dried out;
4. **abandonment of grouse moor interests in some parts** – which can lead to an increase in the number of predators which take eggs or chicks of nesting birds;
5. **removal of livestock** - since the 2000s, which has meant that the vegetation has grown more rank and thick, with a corresponding decline in the richness of invertebrates important for some nesting birds;
6. **illegal persecution of some raptors** – notably hen harriers, golden eagle and peregrine in some areas;
7. **windfarms** – while these are becoming much more prevalent in the uplands, there is little evidence to date of displacement or turbine-related deaths of birds;
8. **climate change** - warming is already becoming evident in the earlier timing of spring events, such as bud burst, bird migration movements and egg laying. Northward shifts in ranges in plants and animals are also becoming apparent, although the reasons for these are not straightforward. Range shifts up hillsides are anticipated, with some possibly displacing plants and animals adapted to alpine or arctic-alpine conditions on the high tops. Reduced snow cover in winter is expected and this will affect the regulation of water supply and snow-bed vegetation in the uplands.



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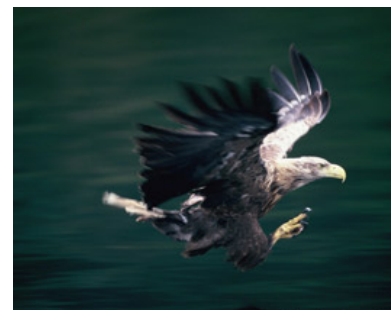
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Consequences of a change in upland wildlife

The uplands are characterised by environmental change – much of what we see has been modified by land use, and this will continue as management practices and policies change. A lot of the uplands' biodiversity is in poor condition, and whilst there are signs of some improvements, the overwhelming conclusion is that many of the habitats and associated wildlife are threatened. Across protected areas, the signs of improvement are promising, but outwith these areas losses and deterioration of many habitats are evident. These changes in upland biodiversity have many consequences for society through their effects on key ecosystem services.

- provisioning services:** good quality habitats are needed to sustain hill sheep and deer and to support grouse shooting. These also support many of the tourism related activities;
- regulating services:** these are vital. Intact and good condition blanket bogs, for example, maintain carbon stocks and support a unique community of birds and plants – where peatlands are eroded, they lose carbon which may increase greenhouse gas concentrations in the atmosphere. Good condition habitats should also contribute to cleaner water, and in the highest parts they contribute to downstream flood prevention (because some of the peatland and flush communities retain more water and release it slowly during periods of high rainfall – whereas eroded and poor condition habitats release water rapidly, contributing to flooding);
- cultural services:** the aesthetic, spiritual and cultural enjoyment derived from being in the uplands is massive – and of course underpins much of our tourism sector. Some of the conservation success stories, such as the reintroduction of sea eagles, red kites and beavers, and the return of the osprey, boost local economies. This provides a compelling reason to ensure that upland biodiversity is improved – so that many more people can enjoy being in healthy landscapes abounding in wildlife.



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Response by society

Scotland's Biodiversity: It's in Your Hands presents a 25-year vision and framework for action to protect Scotland's biodiversity. The strategy aims 'to conserve biodiversity for the health, enjoyment and well being of the people of Scotland now and in the future', through five key objectives, to:

1. halt the loss of biodiversity and continue to reverse previous losses through targeted action for species and habitats;
2. increase awareness, understanding and enjoyment of biodiversity, and engage many more people in its conservation and enhancement;
3. restore and enhance biodiversity in all our urban, rural and marine environments through better planning, design and practice;
4. develop an effective management framework that ensures biodiversity is taken into account in all decision-making;
5. ensure that the best new and existing knowledge on biodiversity is available to all policy makers and practitioners.

The Nature Conservation (Scotland) Act 2004 gave Scotland's Biodiversity Strategy statutory force and established a biodiversity duty, requiring public bodies in Scotland to take biodiversity into account in their activities. It linked the duty to a list of species and habitats considered to be of principal importance for the purpose of biodiversity conservation in Scotland – the Scottish Biodiversity List. Following a review and public consultation, in May 2004 the Indicators Working Group of the Scottish Biodiversity Forum proposed a suite of 22 biodiversity indicators for Scotland's Biodiversity Strategy. First published by the Scottish Government in November 2007, these are now maintained and updated by [Scottish Natural Heritage](#).

In the uplands, the Scottish Biodiversity Strategy has been delivered through the Upland Ecosystems Group, with ancillary work by Scotland's Moorland Forum (31 government agency and NGO members). By late 2010, achievements over just two years included:

1. identifying key biodiversity challenges for managing the uplands sustainably whilst accommodating different management objectives;
2. completing an Upland Solutions project, which pointed to some practical ways of tackling real land management challenges in two areas – Muirkirk and uplands south-west of Inverness;
3. delivering a series of good practice events to demonstrate the land use practices needed to deliver real benefits.

Some major demonstration projects have been established, notably the [Langholm Moor Project](#) which is developing new methods for restoring heather moorland – and for managing the conflict between grouse moor management and raptor conservation.

A huge amount of work is done by the NGO sector and volunteers to restore upland habitats. Many peatlands have been restored through ditch blocking and tree removal to improve the prospects for wildlife. The [IUCN Commission of Inquiry on Peatlands](#) has highlighted the exemplary nature of peatland restoration work being done in Scotland – with work in the Flow Country peatlands in Caithness and Sutherland acclaimed internationally.

A significant number of volunteers contribute to monitoring wildlife across Scotland, with organisations such as the British Trust for Ornithology, Scottish Raptor Study Groups, Scottish Wildlife Trust, RSPB Scotland, Butterfly Conservation and Plantlife contributing a huge amount of detail on how biodiversity is changing.

With the announcement on 12th October 2011 of key reforms to the Common Agricultural Policy we will see major changes in land use across the uplands as a result. These are bound to have major impacts on habitats and wildlife – especially if there is less support for low intensity grazing which contributes so much to the distinctive character of our upland wildlife.

We now have strong alliances between the Scottish Government, its agencies, estates and NGOs who are all committed to forging a better future for Scotland's nature – and all that depends on it.



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