Farmland and lowland

Scotland's farmland hosts a diverse range of plants and animals – some of which are in decline, but others are faring well.

Summary

Arable and grassland fields, crofting land, horticultural areas and lowland heaths and unimproved grasslands all make up the farmland and lowland ecosystem. The biodiversity of this ecosystem is highly influenced by land use change and land management practices, with very recent losses of set-aside land and applications of herbicides and pesticides affecting some areas. By October 2010, around two-thirds of habitats and species assessed by SNH were found to be in a favourable or recovering condition.

©Scottish Natural Heritage

Comment on this page

Introduction

Farmland and lowland ecosystems are made up of a wide range of habitats, including arable and horticultural fields, often with hedgerows, crofting land, lowland heaths, woodlands, traditional orchards, wood pasture and a range of grasslands (including machair, neutral and species-rich grasslands) – many of which have been 'improved' through intensive agricultural management and decades of cattle and sheep grazing on pasture land. These habitats are widespread in the Central Belt and in much of southern and eastern Scotland, but also exist in the northern and western Highlands, where they are managed as crofting land, and here there are rare birds such as corncrakes and choughs. Other principal habitats occurring in the lowlands include wetlands and woodlands. The habitats described there are also influenced principally by agriculture.

Lowlands and farmlands have a rich wildlife, although much of this has changed considerably in recent decades. Birds are a particularly good indicator of biodiversity in the lowlands because they reflect changes in habitat quality and food supplies. Overall, since 1994 the trends of 26 species show a slight increase in numbers. However, there are some striking differences across species. Some once-common farmland birds have declined greatly in range and numbers, for example lapwing, corn buntings, barn owls and kestrels. Others, however, have increased considerably – such as numbers of wintering geese.

Across Scotland, 39 habitats have been identified as the most threatened, and are designated as priority habitats. There are several priority habitats in the lowland and farmland ecosystem, notably lowland heathland, neutral grasslands and fen meadows. Priority habitats are monitored to continuously assess their condition.

Description of farmland and lowland wildlife

According to the Countryside Survey Report for Scotland 2007, nearly a quarter of Scotland's land area was in arable or horticulture, improved or neutral grassland broad habitats. These habitats occur predominantly in the lowlands, where they occupy 58% of the land area. Farming on the most nutrient-rich lowland soils can be as intensive as anywhere in the UK.


©Scottish Natural Heritage

Comment on this page

The four most extensive broad habitats are:

Arable fields and horticulture

The traditional view of red poppy heads waving in the breeze, or a field of cereals with a sheen of cornflower blue, has become rare as agriculture has intensified. Arable flowers are often annuals – plants that grow, flower, produce seed and disperse within one season. All arable plants thrive on regularly disturbed ground.

Field margins and hedgerows

Hedges are an integral part of our landscape and our culture. These former field boundaries provide an essential habitat and refuge for a wealth of farmland wildlife. Mistle thrush and wood warbler, butterflies such as the peacock and meadow brown, bats and hedgehogs all use the shelter and food supplies afforded by hedges. They also act as wildlife corridors, helping animals to move through open farmland while staying under cover.

The field margins are often called 'conservation headlands', and include beetlebanks and grass margins around arable fields kept free of pesticides so that invertebrates can thrive. The insects living in these strips provide food for birds and small mammals. They may also include crop pollinators and predators of crop pests. Unsprayed field margins act as a buffer between the crop, with its chemical applications, and the adjacent unsprayed habitat.

Lowland grasslands

Lowland grasslands are rare in Scotland now, as many areas suitable for agriculture have been 'improved' to increase the grass yield. These feed cattle and sheep as well as much of our wildlife – for example, badgers foraging for worms, bumblebees collecting pollen, lapwing nesting in open fields, predatory beetles hunting smaller insects, and crane's-bill and pignut flowering on a grassy road verge.

Applying fertiliser to increase grassland productivity makes these grasslands species-poor because just a few grass species will grow rapidly – crowding out the smaller, slower-growing species. In contrast, unimproved lowland grasslands are small meadows that have not had fertiliser applied – these are full of flowers, rushes, sedges, mosses and the great variety of wildlife squeezed out of productive grasslands. Many colourful flowering plants grow here, such as purple thyme and knapweed, supporting insects that feed on their nectar and pollen. This abundance of insects, including bumblebees and butterflies, attracts birds such as yellowhammer, nesting in nearby hedges, and skylark – which nest on the ground in open fields.

Scotland also has a rare wildlife-rich form of coastal grassland, called machair, restricted to the Hebrides, the north-west coast and the Northern Isles. Machair is established on shell sand and found only in Scotland and the north-west of Ireland. Centuries of low-intensity management in these areas, using seaweed rather than chemicals as fertiliser, and with low levels of grazing, have created flower-rich grasslands. The wild flowers encouraged by patterns of cropping and fallowing can be visually stunning, and the habitat also supports a wide range of insect and bird species. Machair provides a refuge for species that were once widespread in Scottish lowland arable areas, such as the corncrake and the great yellow bumblebee.

Lowland heathland

No higher than around 300 metres above sea level, and dominated by heather, other dwarf shrubs and gorse, lowland heaths add colour and texture to the land. Traditional activities, such as grazing, kept the woodland regeneration under control, with any surviving trees collected for firewood. Lowland healthlands were once much more common across Scotland, but have since become grasslands as a result of intensive agriculture.

More than 5000 invertebrate species are found in Britain's heathlands, and there is a richness of other wildlife, ranging from juniper to nesting stonechat, in Scotland's lowland heaths.

Other principal habitats occurring in Scotland's lowland and farmland ecosystem include woodlands and wetlands.

Condition of farmland and lowland habitats and species

The Countryside Survey Report for Scotland provides a range of statistics on changes across habitats. Between 1998 and 2007, the area under arable and horticulture declined by 13%, whereas improved grassland expanded by 9%. The length of linear features (hedges, walls, fences, etc.) decreased by nearly 8%. The total length of hedges and lines of trees decreased by 5% in Scotland between 1998 and 2007; and managed hedgerows decreased by 7%. At present, Scotland has about 46,000 km of hedgerows –

roughly equivalent to the circumference of the Earth.

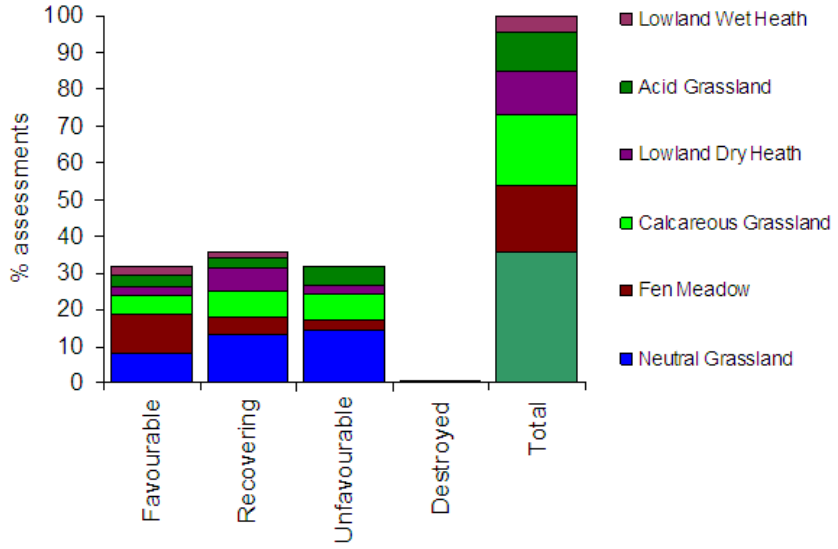
Land under arable and horticulture covered 6.6% of Scotland in 2007 – its extent decreased by almost 14% between 1998 and 2007, from 618,000 ha to 534,000 ha (equivalent to the loss of something like 110,000 football pitches). The decrease was mainly due to conversion of arable to improved grasslands (14%) and neutral (unfertilised) grasslands managed for grazing livestock (4%), and several other habitats (8%). Field margins that are not ploughed and fertilised become weedy and are important for wildlife.

Grasslands that are lightly managed (neutral grasslands) covered almost 6% of Scotland in 2007; this is unchanged since 1998. Unimproved lowland grasslands (not ploughed and fertilised) are now rare in Scotland. Here, many species of orchids and globeflowers are found in abundance. These areas reveal to us how grasslands used to look before agriculture was intensive and widespread. The species in these grasslands require a certain level of grazing – enough to ensure the meadow does not become overgrown and rank, but not so much as to prevent the flowers from seeding. Many grassland plants need small, open spaces to germinate, whereas many invertebrates need tussocks for shelter, so the best grasslands for wildlife contain both short and long patches – a variety of micro-habitats for a variety of species.

SNH has carried out habitat and species condition assessments on protected areas, notably Special Areas for Conservation (SACs) and Sites of Special Scientific Interest (SSSIs). The assessments are made for the 'notified features' of the sites – such as named species or habitat types for which the sites were designated. Of 160 of these assessments for the lowlands, 68% were in a favourable or recovering condition by October 2010. The main reasons for poor condition were over-grazing, invasive species and land management. Figure 1 shows the condition of notified features in lowland and farmland protected areas in 2010.

Figure 1: Condition of notified features in lowland and farmland protected areas in 2010 (some of these habitats are described in other parts of Scotland's Environment Website – such as fens, under Wetlands)

Source: SNH – 30 September 2010, including recovery under remedial action as in the National Indicator



Changes in a number of broad habitats and priority species across the wider countryside, as well as protected areas, of Scotland are monitored under the Biodiversity Action Reporting System (BARS). The farmland and lowland habitats include lowland meadows, arable field margins and orchards, and the 108 lowland species include butterflies, moths, birds, flowers, and mosses and lichens. BARS provides details of changes occurring over time.

Wildlife indicators are also used to determine trends. The smoothed long-term (1979-2010) butterfly population trend for all species was classed as stable. However, butterfly species that are restricted to specific and often isolated habitats (specialists) declined to 51% of their 1979 abundance, although further decline has not been even since 2000. Moth abundance among 185 of the more common species fluctuated between 1975 and 2004. There is emerging evidence from the Rothamstead Insect Survey of long-term declines among common moth species in Britain.

Between 1994 and 2008, 50 of 65 terrestrial breeding bird species in Scotland increased in abundance (by 31% overall). Farmland birds increased by 26%. These changes may be surprising, in the face of major declines in farmland bird populations across the UK since the early 1990s. However, the plight of some farmland birds is causing real concern in Scotland. For example, the once common corn bunting is now extremely rare and only exists in small populations in Fife, north-east Scotland and the Uists. The lapwing is declining due to reduced nesting opportunities related to agricultural intensification, and loss of spring cropping and mixed farming. Skylarks are declining because of loss of nesting and feeding opportunities in dense, autumn-sown crops coupled with high rates of nest losses in intensive grass silage systems.

Finally, looking at arable flowers, we find declines due to technological and chemical advances – good news for farmers wishing to maximise their crop yield but not for biodiversity. Large fields growing only one crop – a monoculture – provide a barren landscape for insects and small animals. A range of arable plants provides an alternative source of habitat to nearby crops, and a supply of seed that feeds birds, mammals and invertebrates. Many of these arable weeds are of high conservation value, and have cultivated 'varieties'. As shifts occur in climate, these rapidly growing species may become more important, especially those with varieties well adapted to a changing climate.

Updated: 1 November 2011

Pressures affecting farmland and lowland wildlife

Changes across farmland and lowland ecosystems have occurred in Scotland as a result of a number of pressures including the intensification of agriculture, spread of housing and industrialisation, acidification, eutrophication and climate change. However, these have not resulted in the sorts of adverse impacts on biodiversity recorded in other parts of the UK.

©Scottish Natural Heritage

Agriculture is the main driver of land use change, as well as the main source of inputs of nitrogen, phosphorus and other nutrients into the farmland and lowland ecosystem. Globally, according to the Millennium Ecosystem Assessment, land use change is expected to remain the largest driver of biodiversity loss. Expansion and intensification of agriculture is driven by increasing demand for food, which is, in turn, influenced by an increasing population and increasing consumption.

The potential for agriculture to produce more food than ever before can be attributed to a number of factors, including the application of fertilisers. However, in some areas, high levels of nitrogen and phosphorus in the soil are causing concern. Slow-growing species that thrive in nitrogen-poor environments cannot compete with faster-growing species that depend on high levels of nitrogen and other nutrients.

Comment on this page

Climate influences natural processes of soil formation and erosion, ecosystem functions, and the use and management of land and water resources. Longer growing seasons extend cropping opportunities. A warmer and wetter climate may render some pests and diseases more prevalent and difficult to control. Drier summers in the east of Scotland may increase the frequency and severity of wildfires over lowland heathland and woodland fringes, leading to soil erosion and habitat damage. Increased winter wetness and extreme rainfall events may lead to greater soil erosion.

Consequences of a change in farmland and lowland wildlife

Any changes in farmland and lowland biodiversity are likely to affect the goods and services provided by the lowland and farmland ecosystem. As well as playing a crucial role in provisioning services, farmland is of great cultural significance and makes a major contribution to the landscape.

©Scottish Natural Heritage

The UK National Ecosystem Assessment, published in 2011, provides an overview of a range of consequences of a change in biodiversity.

In terms of **provisioning services**, the lowland and farmland ecosystem has shifted towards intensive use for food production – for people as well as livestock. However, this has resulted in a change in biodiversity that could have major implications for food production. As farm fields have become larger, and the use of agricultural chemicals has increased, mounting evidence points to a potentially serious decline in populations of pollinators such as bees. As these are essential for crop production, a decline in pollinators could affect crop yield and food security. The pollinators themselves provide a **regulating service**.

Comment on this page

The **cultural services** provided by the farmland and lowland ecosystem are considerable – indeed these can define many visitors' perceptions of the environmental quality of places away from towns and cities. Lowland heaths, hay meadows and machair are often described as cultural landscapes – reflecting the distinctive nature of the consequences of how these area are managed. A loss of these habitats would have a detrimental impact on the cultural services provided.

Response by society

The government has targets to meet for the conservation and management of protected areas, and for the wider countryside. Further work is needed to address reasons for some conservation areas being in unfavourable status. Support for this comes mainly through the Scottish Rural Development Programme (SRDP), which is supported by the Common Agricultural Policy.


©Scottish Natural Heritage

Comment on this page

In 2006, the EU issued a Biodiversity Communication and detailed Biodiversity Action Plan to halt the loss of biodiversity by 2010. In Scotland, a consistent approach has been adopted to assessing progress through targets and indicators.

More recently, the EU has issued a biodiversity strategy up to 2020. This recognises that it is important to fully value nature's potential. It provides a framework for action over the next decade with a target to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss.

A 25-year framework for action began in 2004 with the publication of Scotland's Biodiversity Strategy. The Nature Conservation (Scotland) Act 2004 requires the government to report on progress with this strategy every three years. The most recent progress report was published in February 2011. The strategy is currently being updated and the outcome will be published in 2012; this will set out intentions for meeting new biodiversity targets by 2020.

The Scottish Government published the Strategic Environmental Assessment to ensure that the likely significant environmental effects of plans, programmes and strategies are assessed and taken into consideration during policy development. This should include an assessment of the impact on biodiversity.

The Land Use Strategy is based on the principles of sustainable land use. This includes encouraging the management of land to deliver multiple benefits, including biodiversity.

All public bodies in Scotland have a legal duty to protect wildlife, biodiversity and natural habitats. The Scottish Biodiversity Strategy co-ordinates the actions of a wide range of partners, all seeking to achieve broader action on biodiversity. Co-ordinating with this national strategy are Local Biodiversity Action Plans organised by local authorities and local partnerships. The partners also provide advice to help ensure that government provides the best possible support, for example, through the SRDP, which includes grants targeted at encouraging land management practices that support a range of important habitats and species.

The Farmland & Lowland Ecosystem Group in Scotland has been developing proposals for ecosystem health targets and how these could be met and monitored. These include enhancing the diversity of habitats and species in enclosed farmland, increasing ecosystem resilience (by developing habitat networks and improving habitat condition through adjustments to agri-environment schemes), and developing high-quality green networks to improve people's quality of life (especially in and around greenspace areas).

The Farmland & Lowland Ecosystem Group has also been taking forward some key work for biodiversity. In addition to developing work on ecosystem health targets, it has:

1. developed conservation projects for traditional orchards and open mosaic habitats within previously developed land in towns and cities;
2. developed a tool for modelling habitat networks and assessing habitat fragmentation;
3. generated habitat network maps for parts of lowland Scotland (Edinburgh and Lothian and Glasgow/Clyde Valley have been foremost in this);
4. developed guidance on the potential impacts on biodiversity from biofuel and biomass production.

As one of the most visible and visited landscapes in Scotland, the changing nature of the farmland and lowland ecosystem will be viewed by many as indicative of changes in Scotland as a whole.