

## Woodlands and forests

Scotland's woodlands and forests support a wide range of important plants and animals. For wildlife, our woodlands are in a moderately good condition now and are likely to improve in the future.

### Summary

#### Key messages

- Woodlands support a large part of Scotland's terrestrial wildlife.
- Human influence and climate change had reduced forests to only 4.5% of Scotland's land area at the start of the 20th century; no woodlands in Scotland can now be considered truly natural.
- Since then, a huge woodland creation effort has increased our forest area by 1 million hectares.
- In 2013 Scotland's woodland and forest cover was 1.4 million hectares (18% of the land area).
- Rare and threatened species are more often found in and around semi-natural woodlands, but many have also colonised planted forests.
- The condition of our forests and woodlands for wildlife is moderately good, and there are indications that it will continue to improve with sustainable management.

#### State and trend

**State:** Moderate - high agreement, high evidence

**Trend:** Stable/declining - low agreement, medium evidence

There is an explanation of the diagram and further information on how we carried out the assessments on the [summary pages](#).

- Native woodland and planted forest differ in the potential they have to support wildlife, and they also differ in their state.
  - Native woodland is potentially more valuable for wildlife, but may be further from achieving this potential – moderate/poor state
  - Planted, mainly non-native forests – good/moderate state
- Planted forest area and the composition of forests are improving.
- The quality of native woodland is stable/declining (some are improving, some declining), although it is increasing in area.

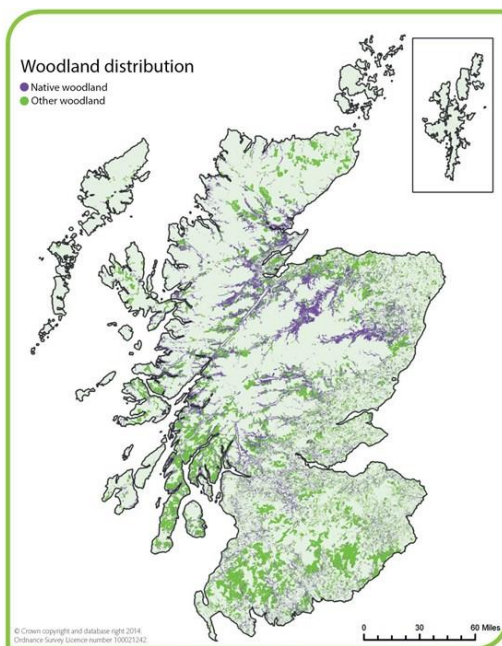


## Overview

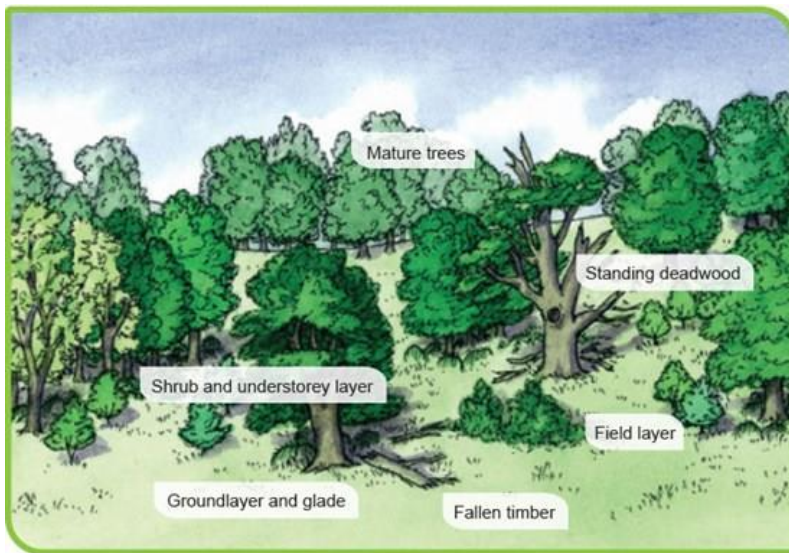
In pre-historic times most of what is now Scotland, apart from the high mountain tops, was covered in forest. As the human population increased, forest cover declined. By the start of the 20th century, only 4.5% of Scotland was covered in woodland. Reafforestation efforts since the First World War have created 1 million hectares (ha) of new forest, and by 2013 [Scotland's forests and woodlands covered 1.41 million ha](#) – 18% of the total land area. Just over one-fifth of this is currently native woodland; the rest is dominated by introduced species.

People tend to think of forests as being extensive areas dominated by trees, while woodlands are often smaller elements of a landscape where open space is dominant, or at least is equal to tree cover. Plantation is a term used to describe woodland planted to a particular design, with rather narrow management objectives. Plantations can be established using conifers or broadleaves, and the main tree species can be non-native or native. Typically, plantations have less variety of tree species, tree sizes, dead wood, ground vegetation, and open spaces than mature semi-natural woodlands.

Over the last 30 years there has been a huge change in the approach to designing new woodlands in Scotland, with a strong emphasis on providing multiple benefits. At the same time, an approach to managing existing plantations has been developed that uses the opportunities created by timber harvesting to transform plantations more quickly into forests by diversifying tree species, age structure and the proportion of open spaces. This process, known as **restructuring**, is routinely applied in Scotland to develop forests that are increasingly valuable as wildlife habitats as well as a timber resource.



**Figure 1:** Woodland cover in Scotland



**Figure 2:** Woodland structure

Much of our wildlife is associated with forests, woodlands and trees. Mature native woodlands support a rich variety of species, and some native woodland, and the plants and animals that live there, are unique to Scotland or are at the limits of their worldwide distribution. However, some conifer forests that started out as plantations provide habitats for rare animals; this can help populations recover and occasionally be used for species reintroduction.

## State

Since the 1980s many native woods have been created or put back into positive management after a period of neglect. At the same time significant native woodland loss and fragmentation has occurred in the unenclosed uplands.

The restructuring of planted forests has likely increased their overall biodiversity value although there is limited baseline information to compare with. Woodland birds have benefited significantly, but there has been a decrease in the diversity of woodland plants, probably because many young woodland areas are reaching closed canopy conditions.

### Woodland biodiversity indicators

Greater biodiversity (the variety of species, as well as the presence of rare species) tends to be associated with woodlands that have a complex structure (with mature trees, shrubs, deadwood and open ground), and with woods that have more tree species or a larger proportion of native species.

Woodland biodiversity indicators have been developed for the Scottish Biodiversity and Forestry Strategies to reflect these relationships

**Table 1:** Woodland biodiversity indicators: all woodland types (extract from [Scottish Forestry Strategy indicators](#)).

Woodland biodiversity indicators	Last assessed	Baseline value	Most recent reassessment
Scottish Woodland Bird Index	2012	100	151
Woodland structure and composition: mean understorey shrub layer cover (under a canopy of more than 15 m in height)	1995–1999	17%	Next due 2015
Woodland structure and composition: mean number of tree and shrub species within plots (sample plot size of 0.25 ha)	1995–1999	2.2	Next due 2015
Woodland structure: mean deadwood volume (standing and fallen)	1995–1999	4.4 m <sup>3</sup> /ha	Next due 2015
Woodland structure and composition: old growth as a proportion of Scotland's woodland cover ('old' growth is 95 years or older for conifers, or 135 years for broadleaves)	1995–1999	4.8%	Next due 2015

The [Scottish Woodland Birds Index](#), which is part of a wider index of abundance of terrestrial breeding birds, has shown a gradual increase in woodland bird abundance of 51% since the index started in 1994.

Baseline [indicator values for woodland structure and composition](#) across all woodland types come from national inventory data collected between 1995 and 1999 (Table 1). It will be possible to see a trend once the new [National Forest Inventory](#) has been completed in 2015/2016; this will be carried out on a five-year cycle thereafter.

- The 'understorey/shrub layer cover' indicator reflects the amount of vegetation present under the tree canopy.
- The 'number of tree/shrub species' indicator measures the presence of a wide range of plants and animals.
- Deadwood provides habitat for specialist woodland plants and animals, in particular insects and fungi.
- Old-growth woodland is a key indicator of biodiversity – old-growth woodland contains a high proportion of large and old trees, a diverse structure, and deadwood.

Other trend information comes from the [Countryside Survey](#), which has also assessed changes in the composition of woodland plant species. Between 1998 and 2007, the richness of plant species declined slightly in broadleaved and coniferous woods, which may be related to an increase in overall levels of shade as more woods mature.

## Priority species and habitats

Priority species and habitats are those identified as being the most threatened and requiring conservation action under the [UK Biodiversity Action Plan](#) (UKBAP). There are currently 169 of these species in Scotland associated with woodlands and trees including:

- 14 mosses and liverworts;
- 85 fungi and lichens;
- 37 invertebrates;
- 13 vascular plants;
- 20 vertebrates.

UKBAP reporting in 2008 indicated that 75% of woodland-related priority species and habitats were in a stable/favourable or recovering condition.

Although rare and threatened priority species are most concentrated in native woods, many have also been able to thrive in woods dominated by non-native tree species.

## Native and ancient woodlands

Native woods can be semi-natural (self-sown) or planted. They are defined as woods in which over 50% of the canopy is made up of species native to the region.

Some have been continuously present in some form for at least 250 years; these are known as ancient woodlands. Native and ancient woods generally have a high value for biodiversity.

The precise area, distribution and condition of native and ancient woodlands has been assessed and reported in the [Native Woodland Survey of Scotland](#) (NWSS).

The survey recorded 311,153 ha of native woods, and a further 7,900 ha were estimated to have been established by March 2013, making a total of 319,053 ha. Of this area, 77,924 ha were on ancient woodland sites. Another 42,381 ha on ancient woodland sites are predominantly non-native in species composition, so the total ancient woodland area is 120,305 ha.

Comparing NWSS data with earlier maps of ancient woodlands shows that up to 14% of ancient woodland has been lost over a 40-year period. Almost 90% of this loss has occurred in unenclosed upland areas

**Table 2:** Area covered by the main types of native woodland in Scotland.

Native woodland type <sup>1,2</sup>	Area covered (hectares)	Proportion of native woodland area (%)
Lowland mixed deciduous woodland <sup>3</sup>	23,189	8
Native pinewoods	87,599	28

Upland birchwoods	91,235	29
Upland mixed ashwoods	12,353	4
Upland oakwoods	19,474	6
Wet woodland	44,742	14
Blackthorn scrub	152	<0.1
Hawthorn scrub	2,138	1
Juniper scrub	1,482	1
Montane willow scrub	10	<0.1
'Other' type <sup>4</sup>	28,779	9
Total	311,153	100

1. The first six rows are native woodland types that are priority habitats under the UK Biodiversity Action Plan.
2. 30% of mapped units (polygons) of native woodland surveyed contain a single native woodland habitat type. The remaining 70% consist of two or more woodland types, where no one patch has an area of more than 0.5 ha.
3. This is sometimes referred to as lowland mixed broadleaved woodland.
4. 'Other' native woodland includes areas that could not be attributed to a particular type of native woodland.

Some of these native woodlands are also listed as European habitats of conservation concern in [Annex I](#) of the [Habitats Directive](#).

The [NWSS](#) also assessed the condition of native and ancient woods using a specially developed indicator. Just under half (46%) were found to be in satisfactory condition for biodiversity, but most of the rest could achieve this if a single threat was removed. By far, the most widespread threat is excessive browsing and grazing by herbivores, mainly deer. For ancient native woods, 40% were in satisfactory condition.

### Designated woodland features

Many areas of native woodland are legally protected as Sites of Special Scientific Interest (SSSIs) or Special Areas of Conservation (SACs) because they contain one or more features of particular wildlife importance. In March 2015, 68.2% of these woodland features were in favourable or recovering condition (an increase from 59% in 2005). Around 9% are recovering but still in unfavourable condition.

### Pressures affecting woodland and forest wildlife

Although many pressures are being dealt with, and some are declining, others – such as the effects of deer and invasive non-native species – are a threat to woodland wildlife and need more work.

### Fragmentation and loss of woodland habitat

Development leads to some loss of woodland area. This is usually on a small scale, with the exception of wind farms, which affect some extensive areas in upland conifer forests. Unauthorised and illegal clearance of woodland is rare. Conversion of woodland for agricultural use is currently a minor issue.

[Fragmentation and gradual loss of native and ancient woods](#) remains a serious problem in unenclosed uplands. More work is needed to establish the causes, but they are most likely to be a combination of excessive herbivores and poor regeneration capacity on some sites with old trees. Another factor could be muirburn, which grouse-moor managers and shepherds carry out to rejuvenate mature heather and grass. This can prevent woodland expansion by killing tree seedlings near woodland edges. However, in general, forest fires are not a significant problem for woodland wildlife in Scotland.

There are also pressures to convert some planted woodlands into open habitats where past tree-planting has damaged habitats such as peatlands, which are now recognised as important, and where there is a good prospect of restoring open habitat that supports wildlife.

### **Economic and management pressures affecting woodland biodiversity**

For most woodlands in Scotland, lack of management is likely to have a long-term negative effect on biodiversity. Management can increase structural diversity in a woodland, which provides more opportunity for a wide range of plants and animals to find a suitable living space. Even semi-natural woods need to be managed; for example, because of deer browsing pressure preventing seedling recruitment or invasive non-native species outcompeting native and natural flora.

If owners do not manage their woodlands, the biodiversity and even the survival of the woodland may be threatened in the long term.

For the conifer forests that were planted in the 20th century, factors can challenge the economic viability of timber harvesting, such as remoteness from processing facilities, fragile rural roads, or the costs of working on steep terrain. In some upland sites, practical issues like site quality and the risk of wind damage limit the speed and extent to which a more diverse forest can be developed, and reduce the incentive to manage them for timber.

### **Climate change**

Climate change is expected to make Scotland a warmer, wetter and windier place, with more extreme weather. The factors determining our climate 50 years from now are not fully understood, but there will be positive and negative effects on trees and woodland wildlife. Some species may need to migrate to new areas as their habitats change; others may be able to colonise a larger area as average temperatures rise. Woodland managers will need to plan for uncertainty and help woodland ecosystems adapt.

### **Tree pests and diseases**

A number of new threats to trees and shrubs have emerged recently, including:

- death of ash trees due to a fungus, *Chalara fraxinea*;
- various *Phytophthora* species of fungi threatening larches, some other trees, juniper and blaeberry (*Vaccinium myrtillus*), which is important for food and shelter for many wildlife species;
- dothistroma needle blight, which affects pines.

There is no common cause for new epidemics, but the trend may be related to climate change and the increasing movement of plants through international trade.

### Native deer

Red and roe deer are native to our woodlands and they can help maintain biodiversity in some circumstances. However, in many places there are too many deer and this has a severely negative effect on the ground vegetation and stops trees from regenerating. Excessive browsing or grazing was the main threat to the condition of native woodland identified in the Native Woodland Survey and Scottish Natural Heritage's assessments of the condition of designated woodland features.

### Invasive non-native species

Invasive non-native species (INNS) are a pressure in many woods. The invasive hybrid rhododendron (*Rhododendron ponticum*) is the most extensive invasive species in Scottish woodlands, and should be removed where possible to prevent it from spreading. More localised problems also come from other plants, including Himalayan balsam and Japanese knotweed.

**Table 3:** Extent of recorded invasive non-native shrub and field layer species in native woods.

Invasive species	Area covered (ha)	Proportion of total area of invasive species (%)	Proportion of native woodland area covered by invasive species (%)
Rhododendron <i>ponticum</i>	3,691	65	1.2
Other herbaceous invasive exotics	1,468	26	0.5
Himalayan balsam	240	4	0.1
Japanese knotweed	113	2	<0.1
Giant hogweed	96	2	<0.1
Snowberry	46	1	<0.1
Total	5,654	100	1.8



Grey squirrels pose a threat to native red squirrels by spreading squirrel pox virus. Grazing and bark-stripping by non-native sika and fallow deer are also a problem in some areas.

### ***Non-native trees in native woods***

Many native and ancient woods have a mixture of native and non-native species due to past management or because they were planted as mixtures. In some places this threatens woodland biodiversity; for example, remnants of ancient broadleaved woodlands can be shaded out by dense conifers. In other cases, non-native species may have little impact if they are not invasive. A site-by-site assessment is desirable. The [NWSS](#) showed that non-native trees exceeding 10% of the canopy cover is the second most common threat to native woodland condition.

### **Nutrient enrichment and deposition of pollutants**

Nitrogen deposited from the atmosphere and from agricultural run-off or stock grazing in small woods can alter the balance of plant species. The [Countryside Survey](#) showed evidence of significant increases in plant species associated with more acidic conditions between 1990 and 2007.

The acidification of streams and lochs can be made worse when leaves capture air pollutants that are then washed down into the soil by rain. This is a bigger risk in wet upland areas where the underlying rocks and soils are not good at neutralising excessive acidity in rainwater. The effects of acidified water on wildlife in rivers and lochs peaked in the 1980s, but is still a problem in some places. However, most areas are [gradually recovering](#).

### **Recreation**

Woodlands are increasingly popular for recreation, and provide benefits for woodland owners. These uses often complement biodiversity conservation, but can cause damage; for example, by disturbing breeding birds or trampling sensitive plants.

## **What is being done**

Getting multiple benefits from forests and woodlands requires sustainable forest management. Policies and legislation provide a foundation for successful sustainable forest management.

### **Policies**

The [Scottish Forestry Strategy](#) sets out the Scottish Government's ambitions for the condition of woodlands and the services that those woodlands will provide for society. Land-use decisions need to be balanced at local and national levels.

The [2020 Challenge for Scotland's Biodiversity](#), published in 2013, sets out ambitious policy proposals for restoring nature and getting more benefits from it, including improving the condition of those native woodlands identified in the Native Woodland Survey of Scotland.

As recommended by the [Woodland Expansion Advisory Group](#) in 2012, the Scottish Government's woodland creation target is to create 100,000 hectares of new woodland over by 2022. This should be carried out to modern standards of good practice and provide multiple benefits. There will be a review, initiated no later than 2020, to set targets for after 2022. Around 40% of the total is expected to be native woodland.

Under the Scottish Government's [Control of Woodland Removal Policy](#), loss of woodland should only be permitted if it results in significant public benefits. Planting in other areas to make up for any loss of woodland is often expected.

Development-planning policies also influence the location and character of woodland expansion through [Forest and Woodland Strategies](#) and encourage the development of green networks, notably the [Central Scotland Green Network](#).

Planning policy and management plays an important part in directing development away from woodlands, especially those that are important for biodiversity.

## Legislation and regulation

Woodland creation and forest management is regulated by Forestry Commission Scotland (FCS), mainly under the [Forestry Act 1967 \(revised\)](#) and [The Environmental Impact Assessment \(EIA\) \(Forestry\) \(Scotland\) Regulations \(1999\)](#).

Other environmental protection legislation that applies to woodlands includes the Wildlife and Countryside Act (1981, amended 1985), the Nature Conservation (Scotland) Act (2004), Wildlife and Natural Environment Act (2011), the Water Environment and Water Services (Scotland) Act 2003, and the Conservation Regulations (1994, amended in 2004, 2007 and 2011), which incorporate the European Union directives on habitats and species and on wild birds.

## Sustainable forest management

FCS provides good-practice standards for managing woodlands and guidance for biodiversity in the [UK Forestry Standard \(UKFS\)](#) and associated guidelines.

Financial support to create and manage woodland is available under the [Scotland Rural Development Programme \(SRDP\)](#). This includes grants for creating new woodlands that meet the requirements of the UKFS and grants for improving biodiversity, particularly in designated sites and for priority species and habitats.

Planning and managing woodlands is generally best considered over the long term and on a landscape or whole forest scale, within a regional context. [Long-term forest plans](#) are in place for all of the national forest estate, and are now required as a condition of grant aid for most management in private woodlands. These plans set out, for a period of at least 20 years, how the diversity of conifer forests will be increased as they mature. At the end of 2013 there were 215,426 ha of privately owned woodland with a long-term forest plan.

Increasing demand for public use of woodlands is being met by encouraging more planting and management of [woods in and around towns](#). These woodlands are often in locations that present a particular opportunity to enhance wildlife habitat networks.

The [NWSS](#) provides a comprehensive basis for planning the management of native and ancient woods and developing native woodland habitat networks.

Planting new native woodlands has been a major part of woodland creation over the last 20 years to help meet the UKBAP targets.

## Climate change

Measures and advice to help forest managers take action to adapt to climate change are included in the Scottish Government's Climate Change Adaptation Framework, and [more detailed advice for the UK](#) as a whole has been published by the Forestry Commission.

## Deer

Collaboration between neighbours in the management of deer, which integrates the management of woodlands as well as the deer that live there, is encouraged. [A Scottish code of practice for sustainable deer management](#) gives advice on this. [Regional deer management groups](#) in the uplands and a new [Lowland Deer Network Scotland](#) are developing a more co-ordinated approach to deer management. Deer population levels on the national forest estate are managed so as to minimise negative impacts on biodiversity while sustaining deer as part of woodland ecosystems.

## Invasive non-native species (INNS)

Under the [Wildlife and Natural Environment \(Scotland\) Act 2011](#), SNH, FCS and SEPA have new powers and responsibilities to tackle problems caused by INNS. [Grant support under SRDP](#) is available to help land managers.

## Nutrient enrichment and deposition of pollutants

As well as removing emissions at source, good river-basin planning and site management can reduce the effects of nitrogen enrichment on woodland biodiversity. Careful management of livestock grazing may also help. The [UKFS guidelines on forests and water](#) include measures to minimise the effects of acid rain.

## Social use of woodlands: impacts on biodiversity

Most disturbances to wildlife can be minimised by careful planning and communication. FCS has published [good practice guidance](#) to help woodland managers manage recreation while minimising any impact on wildlife.