



Royal  
Botanic Garden  
Edinburgh



**NatureScot**

Scotland's Nature Agency  
Buidheann Nàdair na h-Alba

# BUILDING A PLANT BIODIVERSITY STRATEGY FOR SCOTLAND







# WHY WE NEED PLANTS

Life as we know it depends on plants. Plants form the structurally dominant components of terrestrial ecosystems and constitute the majority of global biomass. Plants underpin the functioning of ecosystems and the regulation of climate; they provide a multitude of goods and services of benefit to humanity including food, medicines, construction materials, soil stabilisation and flood amelioration. Plants also have fundamental value as components of our biodiverse planet; they define the landscape, are an intrinsic component of culture, enhance health and well-being, and support tourism and recreation. We cannot live without plants: they are part of our lives.

**Above:** Oakwood at Ariundle National Nature Reserve, Ardnamurchan.  
©Lorne Gill/NatureScot.



# WHY WE NEED A PLANT BIODIVERSITY STRATEGY FOR SCOTLAND

**Below:** Machair, a habitat at risk from climate change and changes in land management.  
©Lorne Gill/NatureScot.

Given the importance of plants for climate, nature and people, it is essential that Scotland's plant biodiversity is conserved and sustainably managed. Threats to plant biodiversity in Scotland include climate change; habitat loss, damage and fragmentation; invasive alien species; pathogens and pollution. Targeted, prioritised actions are needed to ensure that the most important components of plant biodiversity in Scotland are protected.

In this document we outline the key elements that need to be included in a Plant Biodiversity Strategy for Scotland which aims to conserve and sustainably manage the nation's plant biodiversity.

## **Scope**

Our focus is on wild vascular plants and bryophytes, collectively termed 'land plants' (including flowering plants, conifers, ferns and their allies, and bryophytes) and lichens.









**Left :** Alpine-blue sowthistle  
translocation team, Glenfeshie,  
Cairngorms National Park ©RBGE.

# KEY ELEMENTS OF A PLANT BIODIVERSITY STRATEGY FOR SCOTLAND

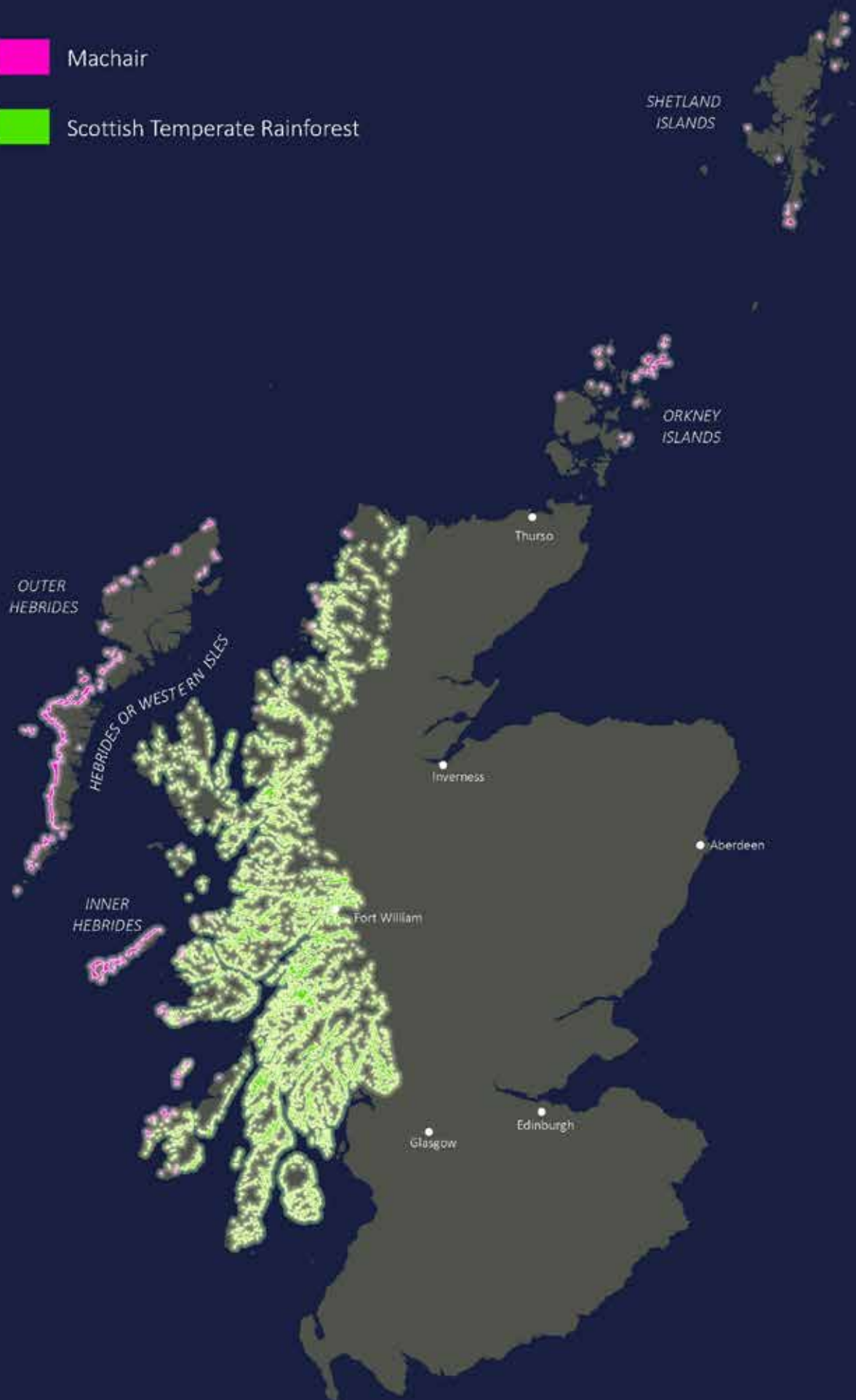
A Plant Biodiversity Strategy for Scotland should cover the following six key areas:



The Scottish Government committed to the Plant Biodiversity Strategy in December 2020. To deliver on this, strategy development is being led by the Royal Botanic Garden Edinburgh and NatureScot, working with partners from the James Hutton Institute and Plant Link Scotland. This document provides a summary of the issues that should be covered in each of the six key area and acts as a framework for the Strategy. It is being circulated for consultation as part of the Scottish Biodiversity Strategy in June 2022, providing increased visibility for the Plant Biodiversity Strategy for Scotland. Embedding plant conservation in the Scottish Biodiversity Strategy ensures a strong foundation in policy and for delivery to 2030 and beyond.

 Machair

 Scottish Temperate Rainforest







# Plants

## Including habitats, species and genes

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Scotland holds globally important plant diversity. Plants form the backbone of habitats including those for which Scotland is famous, such as temperate rainforest, oceanic heath, Caledonian pinewoods and the peatlands of the Flow Country. At a species level, we are home to internationally significant populations of British bluebells and oblong woodsia, as well as plants found nowhere else in the world, such as Scottish primrose and northern prongwort. Underpinning the diversity of species and habitats, is genetic diversity, without which plants would be unable to adapt to the changing world around them. Scotland's position at the edge of Europe means that many plants are at the farthest limits of their distribution and have unique adaptations to the environment. For example, the arctic-alpine flora of Scotland's mountains contains populations which are isolated geographically and located at the low-latitude margin of their global range. These assets of habitats, species and genes are key elements of Scotland's natural heritage and priorities for conservation and restoration, and should be included within the Strategy (see Table, page 14).



**Left :** Examples of key botanical assets for conservation in Scotland: distribution of machair and temperate rainforest ©NatureScot.

**Top left :** Oak woodland, Arriundle National Nature Reserve, Ardnamurchan ©Lorne Gill.

**Top right:** Scottish primrose, *Primula scotica* ©Lorne Gill/ NatureScot.

**Bottom right:** Common lungwort, *Lobaria pulmonaria* ©NatureScot.



# 2

## People

Botanical expertise across individuals and organisations, and the benefits people receive from plants

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Within Scotland there are high levels of expertise and capacity across multiple organisations to support plant conservation. This includes (a) expertise in plant ecology and biodiversity science in research institutes and Scotland's universities; (b) expertise in practical conservation and threat assessment in government agencies and conservation charities; (c) private sector expertise including plant nurseries supporting restoration projects, environmental land managers, companies specialising in technological innovations to support biodiversity monitoring and conservation, and industries responsible for large scale land management (farming, forestry, landscaping). Another major source of expertise and capacity exists at the individual level, including professional and amateur naturalists with detailed knowledge of groups of organisms or places. The integration of this expertise and capacity will be key to effective delivery of the Scottish Plant Biodiversity Strategy, including the strategic investment in skills development and sharing to maximise impact and to address known skills gaps such as taxonomic expertise. At the same time, plants – both urban and rural – provide all members of society with opportunities to reconnect with the natural world, which is associated with significant health and wellbeing benefits.

**Top left :** Bioblitz at Wester Moss Site of Special Scientific Interest, Stirling  
©Lorne Gill/NatureScot.

**Bottom left :** Studying Oceanic Heath  
©RBGE.

**Right:** Isle of Arran Wildlife Festival  
©Lorne Gill.







## Data

### Biological records and wider environmental data assets including national collections

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Centuries of biological recording have resulted in the availability of extensive datasets on species diversity and distributions in Scotland. Long-term projects such as the Scottish Snowbed Vegetation Monitoring Network provide authoritative insights into changes in populations of key species in sensitive habitats. Long running phenology projects allow us to understand biodiversity responses to environmental change, and large-scale citizen science projects are resulting in an increasing density of natural history observations to support biodiversity conservation. Biodiversity infrastructure such as the Scottish Biodiversity Information Forum and the Botanical Society for Britain and Ireland distribution database hold key data assets. In addition, institutes like the Royal Botanic Garden Edinburgh house important living conservation collections of threatened Scottish species alongside extensive preserved collections. Scotland's rich data resource provides a strong baseline for monitoring success, and as such is an important component of the Strategy.

# 3

**Above:** Herbarium collections at the Royal Botanic Garden Edinburgh ©RBGE.

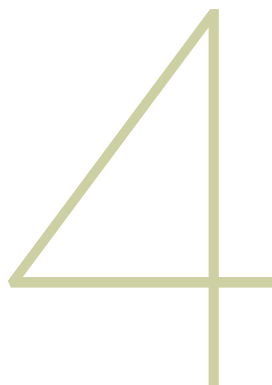








**Left :** Beinn Eighe National Nature Reserve, Wester Ross ©NatureScot.



## Addressing threats

**Actions to address the main reasons why Important Scottish plants and habitats are declining**

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The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has identified five major drivers of global biodiversity loss: land-use change, climate change, invasive species, pollution, and direct exploitation of nature, all of which impact on plant biodiversity in Scotland and need addressing in the Scottish Plant Biodiversity Strategy. Major pressures include grazing on vegetation, limiting natural regeneration and expansion of woodland and scrub; climate change threats reducing habitat availability; loss of semi-natural habitats to competing land-use demands; the spread of invasive species outcompeting native species in key habitats; and increased impacts of plant disease and pollution, such as nitrogen deposition. The Strategy should include actions to address the key threats to Scottish plants and to monitor progress and impacts.





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## Environmental economics

### Actions to maximise benefits to biodiversity via green financing

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**Top left :** Arable weeds in a field of oats ©NatureScot.  
**Bottom left :** Alpine-blue sowthistle translocation team, Cairngorms National Park ©RBGE.  
**Right:** Blanket bog, The Flows National Nature Reserve ©Lorne Gill/ NatureScot/2020Vision.

The direct benefits to humanity of nature’s goods and services are driving the development of new financing mechanisms that support the conservation and restoration of nature, and assist the transition to a net-zero economy. The development of a Scottish Plant Biodiversity Strategy should include strategic assessment of the implications of green financing mechanisms, and seek to identify opportunities to maximise the benefits to biodiversity from these investments. For example, through nature-based solutions, which are currently heavily weighted towards addressing climate change rather than biodiversity loss.



# Policy integration

## Alignment to the wider environmental policy landscape

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The Scottish Plant Biodiversity Strategy needs to be coherent and aligned to the wider environmental policy landscape, both within Scotland and at a global level. The 'parent' strategies are:

- (a) The post-2020 Global Biodiversity Framework, which is to be agreed at the forthcoming 15th Conference of the Parties (COP15); and
- (b) The Scottish Biodiversity Strategy, which will be shaped and guided by the COP15 outcomes.

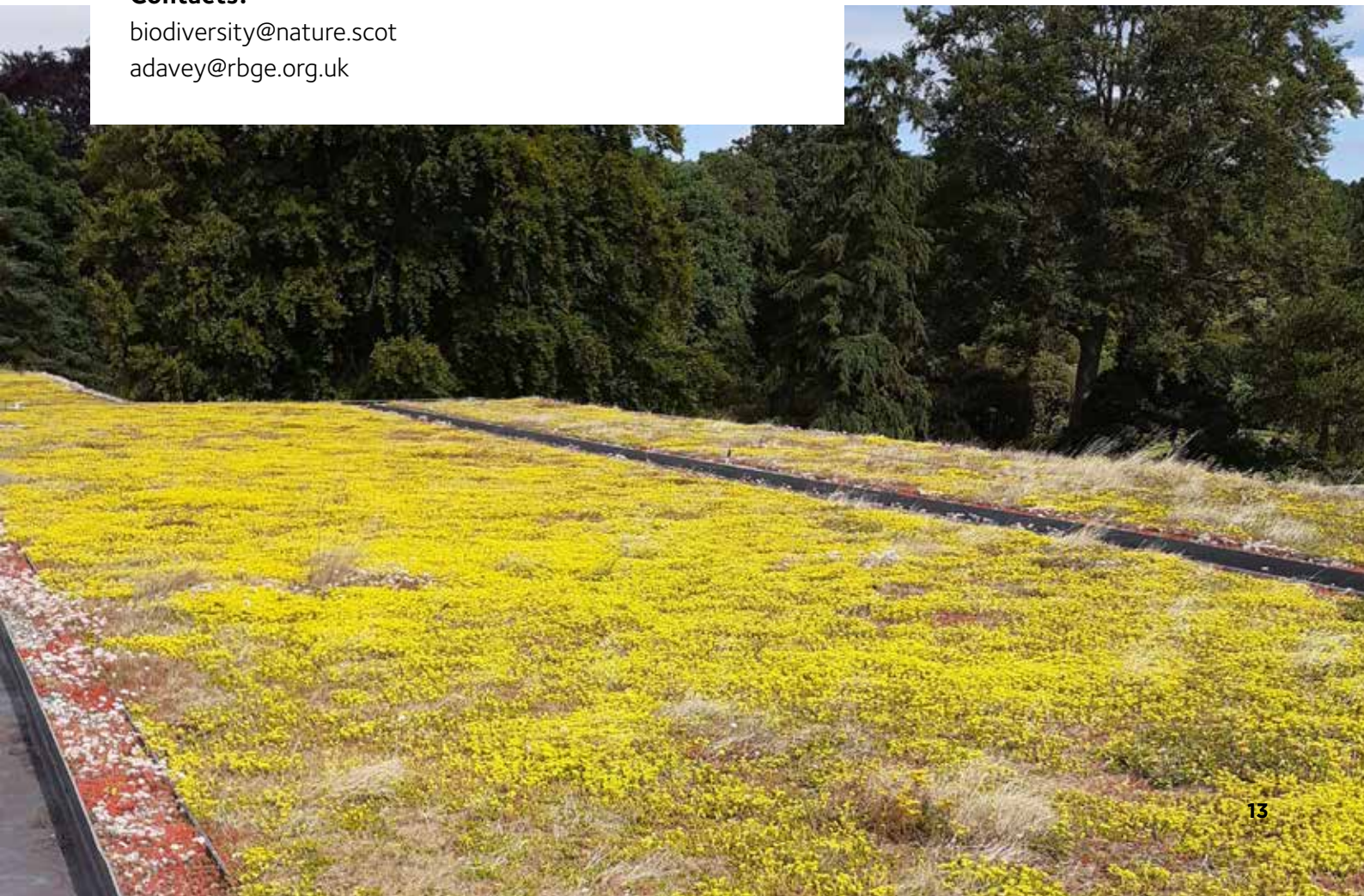
Beyond these key parent strategies there is likely to be a new Global Strategy for Plant Conservation (GSPC), itself aligned to the COP15 outcomes. Other key policies of relevance include Scotland's Environment Strategy, Scotland's Plant Health Strategy, the UN Decade on Ecosystem Restoration and ongoing commitments via Regional Land-Use Partnerships.

### Contacts:

biodiversity@nature.scot  
adavey@rbge.org.uk



**Below:** Green roof at Dawyck Botanic Garden, Scottish Borders ©RBGE.





# Examples of Key Botanical Assets for Conservation in Scotland

Habitats	
Pinewoods	A culturally distinctive Scottish landscape, important to the national sense of identity and to place-making (for example the Great Wood of Caledon).
Scottish temperate rainforest	Scotland has some of Europe's best remaining (most intact and biodiverse) examples of this habitat. Covering less than 1% of global land area, elsewhere in Europe temperate rainforests have been heavily deforested and impacted by air pollution.
Peatland	Scotland has some of the most extensive intact blanket bog in the world, although raised bog has been almost entirely destroyed. Carbon capture and storage in these peatlands are critical ecosystem functions, making protection and restoration of degraded peatlands a priority.
Liverwort heath	Oceanic montane heath is a globally rare habitat, which in Europe is confined to the UK and Norway. It is vulnerable to inappropriate management such as burning.
Montane habitats	These high mountain habitats, dependent on long-lying snow and threatened by climate change, can act as 'canaries in the coalmine', providing early warning of climate change impacts and guiding decisions on how to respond to this global threat.
Upland woodland and scrub	This is a key habitat supporting high biodiversity and a range of ecosystem services including slope stabilisation, shelter provision, nutrient retention and water regulation. Degraded and fragmented by centuries of overgrazing from sheep and deer, very little of this high altitude community remains in Scotland.
Urban plant ecosystems	Urban plants enhance people's lives: they provide shade, improve water storage and reduce flood risk, and benefit health and wellbeing in our most deprived areas. Shifting our cities from grey to green infrastructure and diversifying this with native species will increase the resilience of urban environments to climate change and provide wider societal benefits.
Grasslands	Some of our most threatened habitats, species-rich grasslands are largely semi-natural, requiring ongoing management in the form of grazing or hay-making. These habitats are vital for pollinators and hold populations of some of our rarest species.
Freshwater lochs	Scotland contains a rich array of freshwater lochs, with particularly species-rich examples on the western and northern isles, and mainland areas close to the sea. All shallow lochs are threatened by climate change, and invasive non-native species also have major impacts in this important habitat type.





Riparian woodland	Riparian woodland is important for river functioning; tree roots help to stabilise banks, their leaves are a source of nutrients, and their shade regulates water temperature as the climate changes. Scotland has very little riparian woodland, largely as a result of grazing by deer and sheep.
Machair	Machair is one of the world's rarest habitats. Almost entirely confined to Scotland, it is maintained by the traditional practice of crofting which gives rise to an incredibly diverse habitat – a typical square metre can contain 45 different species of plants.
Arable biodiversity	Arable flowers are the fastest declining group of plants in Britain. Scotland is home to endangered species such as corn marigold and red hemp nettle. Crop edges and managed field margins are essential for a range of rare and endangered arable plants and in turn support many pollinators.
<b>Species</b>	
Internationally important species	Scotland has a particular responsibility for species found nowhere else and those that have a large proportion of their global range in Scotland. Their conservation is an important priority.
Species threatened by habitat fragmentation and climate change	Species in montane habitats, such as treeline woodland and scrub, cliff-ledge refugia and snowbeds, are often restricted to small populations and threatened by habitat loss due to climate change, coupled with constraints on regeneration due to grazing. These species are particularly susceptible to local extinction.
<b>Genes</b>	
Unique adaptations at the edge of Europe	The oceanic climate and geographical position of Scotland places much of its biodiversity at the range edge. This makes it likely to house unique genetic variants, adapted to the local conditions. Conserving these variants is particularly important for species which are threatened, or whose presence is a defining feature of the Scottish landscape. This includes arctic-alpine species at the southern edge of their range, and temperate species at their north-western margins.
Genetic diversity in wild relatives of utilised species	The wild relatives of cultivated species represent a genetic resource of value to the search for useful traits or genes (e.g. for cold tolerance or disease resistance). This is particularly important in times of rapid, human-induced environmental change.





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