

# How woodland managers can make woodlands more resilient to climate change



## Introduction

This briefing note summarises how we, as woodland managers, can make our woodland more resilient to the effects of climate change and the risks from pests and diseases.

We have a specialist team of foresters who can advise you or your clients, so please call me if you would like to start reviewing how to make your woods more resilient.

The Forestry Commission's view is that, due to climate change, we must make significant changes to accepted and widely practiced forest management in the UK.

Woodland managers should aim to produce woods that meet owners' objectives and are fit for present and future society, so that they grow sustainably, while adapting to environmental threats and climate change. This will include changing what we plant and how we manage it.



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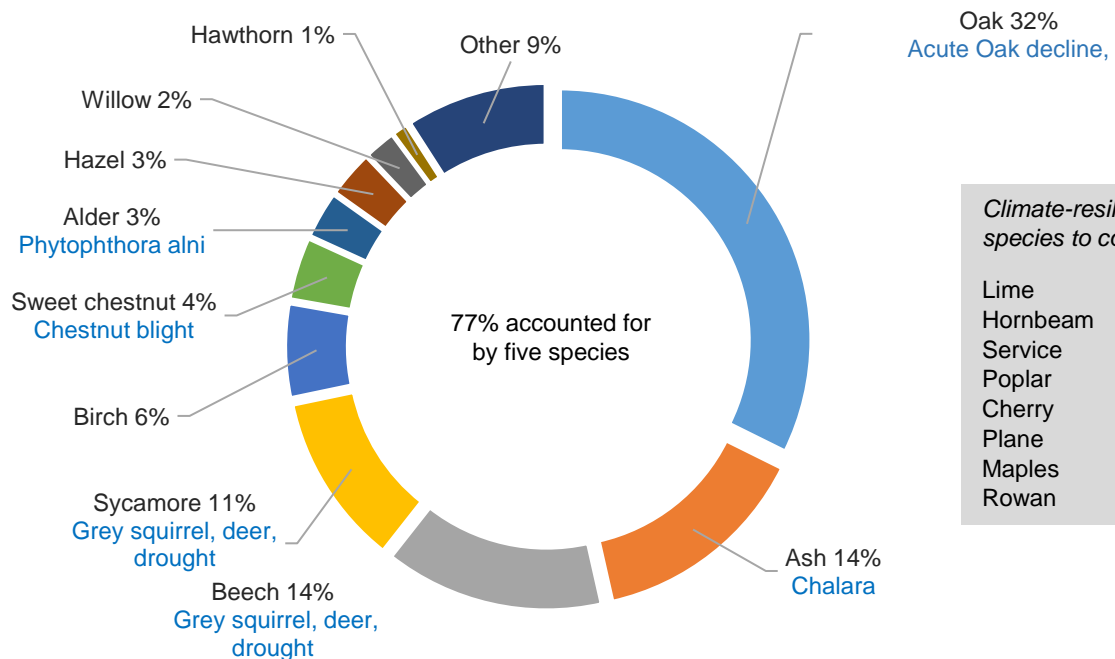


## Current reliance on a small number of species increases vulnerability

At present, both broadleaf and conifer woodlands are dominated by a small number of species, which makes them more vulnerable to pests, diseases and climate change impacts:

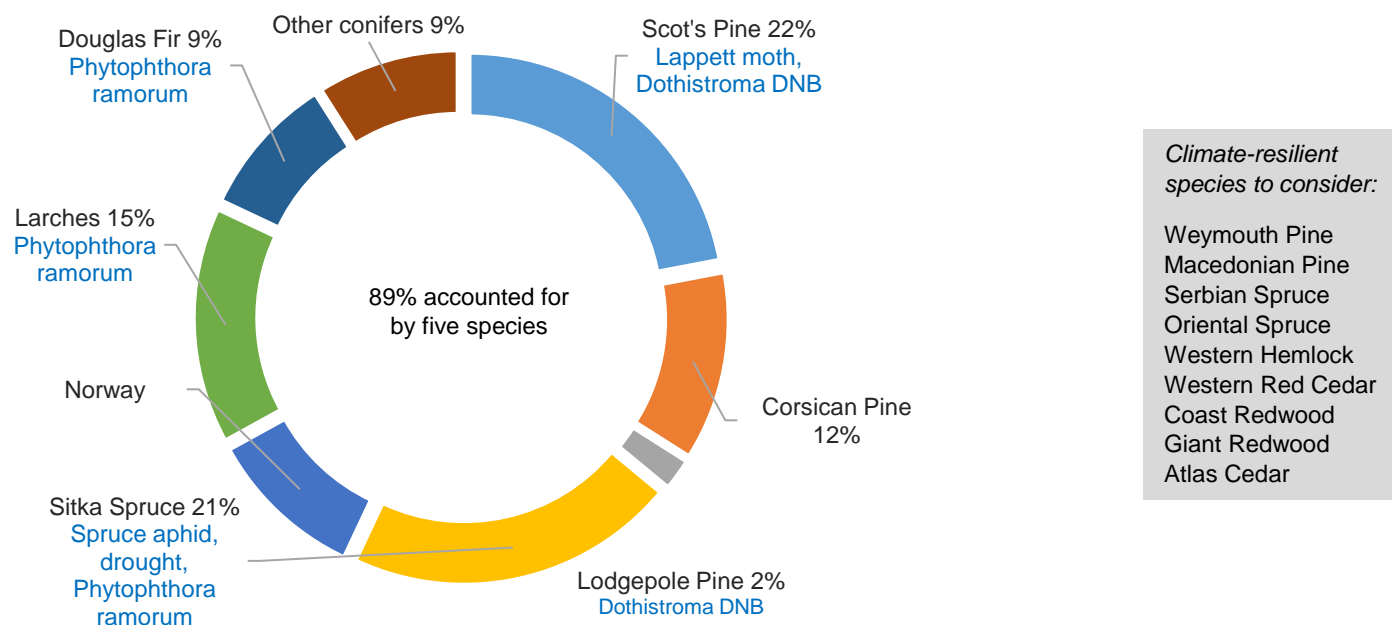
**Figure 1** Species make up of broadleaved woodland in England

Source: Forestry Statistics 2013, Broadleaves, National Forest Inventory, Preliminary estimates of quantities of broadleaved species in British woodlands, with special focus on ash (2012). (Pest and diseases to watch for in blue.)



**Figure 2** Species make up of conifer woodland in England

Source: Forestry Statistics 2012, Conifers, National Forest Inventory, Standing timber volumes for coniferous trees in Britain (2012)). (Pest and diseases to watch for in blue.)



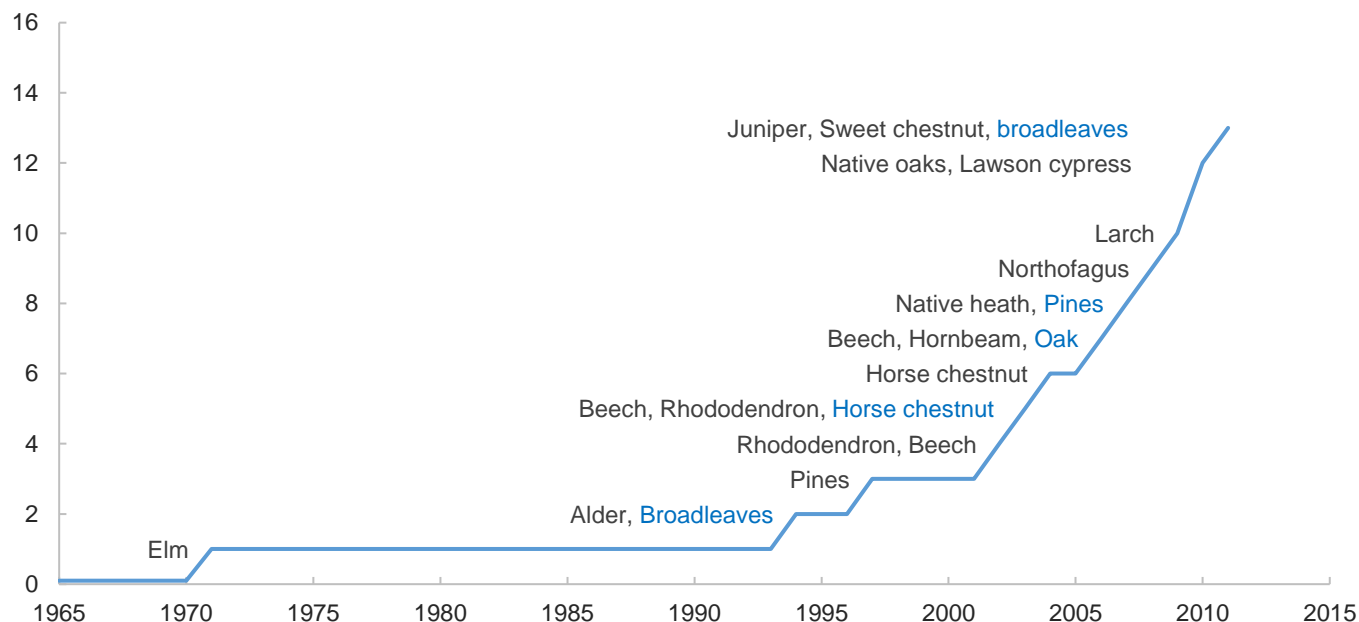


## The number of new woodland pests and diseases has increased rapidly since the early 1990s

As well as increasing, the numbers of pests and diseases have spread more widely.

**Figure 3 New disease and pest outbreaks in the UK**

Source: based on Forestry Commission data. (Species affected by disease in black, pests in blue.)



## The UK's climate is already changing, by the equivalent of 40 feet per day

This table shows some of the most significant opportunities and threats to UK woodland from climate change.

Green indicates positive impact and orange/red indicates negative impact. The darker the colour, the greater the expected consequences.

	2020s	2050s	2080s
<b>Opportunities</b>			
Increase of potential yield of Sitka Spruce in Scotland			
<b>Threats</b>			
Forest extent affected by red band needle blight			
Decline in potential yield of beech trees in England			
Wildfires due to warmer and drier conditions			
Forest extent affected by green spruce aphid			
Loss of forest productivity due to drought			

N.B. The Forestry Commission has high confidence in the predictions of these consequences.

The Forestry Commission estimates that by the 2080s, 65% of its public forestry estate will be classed as 'unsuitable' without any adaptation. Put another way, this is a 35% decline in productivity.





## How can managers start addressing the challenge?<sup>1</sup>

What it means in practice – principles and simple messages.

<b>Principles</b> Approaches to management that are flexible, reactive and anticipatory will help forests and woodlands adapt to the changing climate	<ul style="list-style-type: none"> <li>– Be confident and act now – otherwise it may be too late</li> <li>– Manage your woodland and leave a legacy for future generations</li> <li>– When planting, please speak to your nursery, buy contract grown stock – plan ahead</li> <li>– Look to source Grown in Britain</li> <li>– Use income from thinnings to fund the work</li> <li>– The plan should map out different species, length of rotation, growth rates and value of timber</li> </ul>
<b>Woodland design and contingency planning</b> Forest design, structure and composition needs to be resilient to the effects of a changing climate and extreme weather events Woodland and trees that are appropriately located can help to alleviate the impacts of climate change on society and the environment	<ul style="list-style-type: none"> <li>– Understand climate change projections</li> <li>– Create fire, windstorm and flood contingency plans</li> <li>– Monitor and review</li> <li>– Create landscape and wildlife corridors, and think about replacing mature trees that characterise the landscape</li> </ul>
<b>Bring existing woodlands into management</b>	<ul style="list-style-type: none"> <li>– Manage deer, squirrels and invasive species</li> <li>– Thin to encourage regeneration</li> <li>– Enrichment planting to diversify species</li> </ul>
<b>Adapt choice of planting material</b> Introducing diversity in tree species and origins will ensure some thrive should others decline	<ul style="list-style-type: none"> <li>– Understand your soils and the growing conditions to help choose the right species for the specific site</li> <li>– Diversity of species – including ‘minor species’</li> <li>– Genetic diversity and more southerly origins</li> <li>– Species capable of withstanding hotter, drier climate</li> </ul>
<b>Transform to ‘continuous cover forestry’</b> Woodland and trees can be used to develop ecological connectivity between habitats to enhance the ability of woodland ecological communities to adapt to climate change	<ul style="list-style-type: none"> <li>– Landscape approaches</li> <li>– Link woodlands in the landscape</li> <li>– Enlarge existing woodlands</li> <li>– Build in usable access routes for forestry machinery and haulage</li> </ul>

## What it means in practice – different approaches for different woodlands

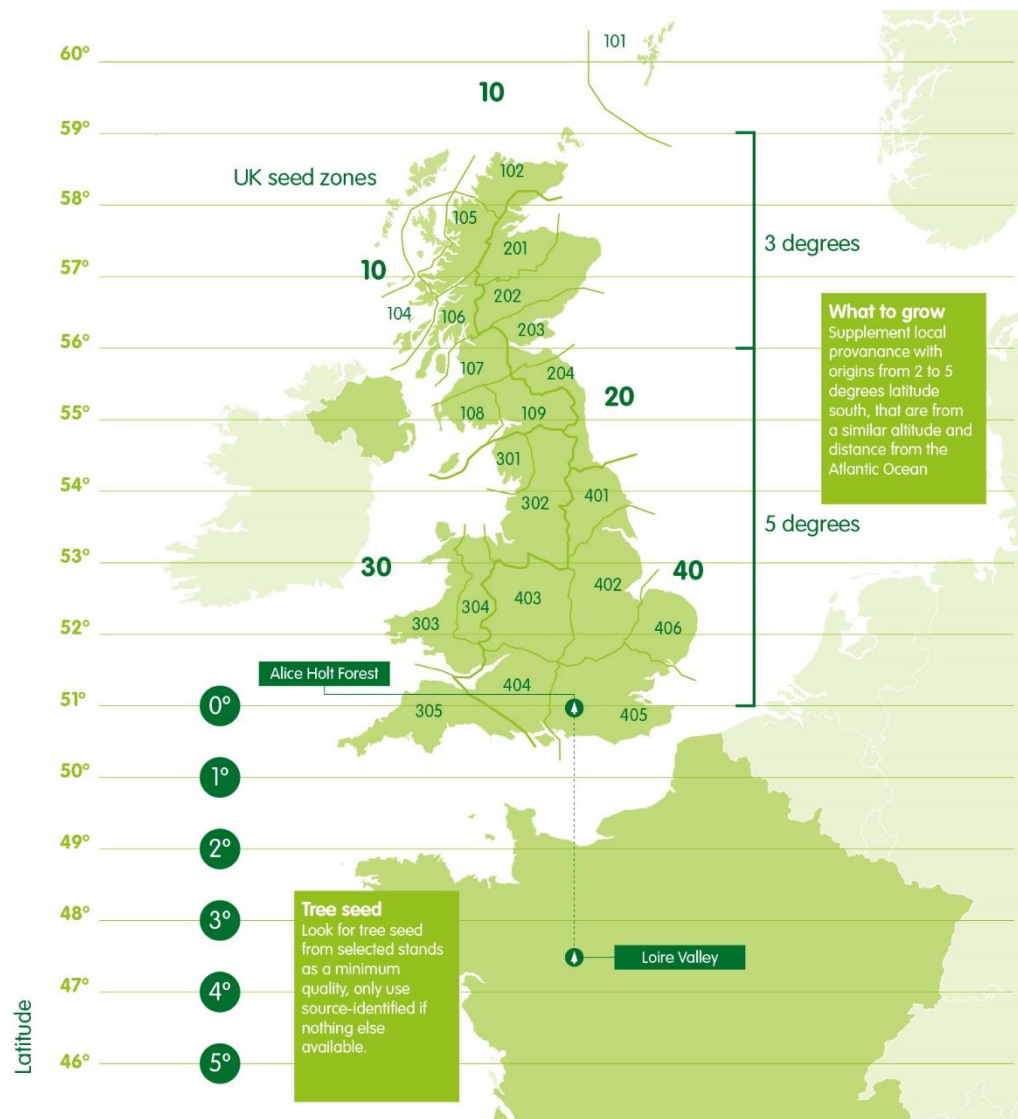
Most of this is just good woodland management practice.

<b>For all woodlands</b>	Write a management plan (and implement it!) Include climate change projections (and impacts on species present) Acknowledge change may be inevitable – and match species to variation in topography, aspect and soil type
<b>Existing semi-natural woodland</b>	Work with nature (under planting, diversify using minor native species) Reduce other pressures (deer, squirrels, invasives) Bring coppice into management (as it may be more resilient) Use management intervention to encourage natural regeneration (such as thinning and deer management) Use landscape approaches to expand habitat and reduce fragmentation
<b>New native woodland</b>	Native species, but include more provenances from more southern latitudes Primarily native species, but consider including near natives A small proportion of exotics may be appropriate
<b>Amenity woodland’</b>	Similar to new native woodland, but more scope for exotics Fast growing species may be considered to create a ‘mature feel’
<b>Commercial plantations</b>	Diverse range of species (landscape or intimate) Consider future wood products alongside species Much scope for using provenance to increase resilience

<sup>1</sup> See Forestry Commission. Forests and Climate Change. UK Forestry Standard Guidelines. *Forestry Commission*, Edinburgh. (2011). [http://www.forestry.gov.uk/pdf/FCGL002.pdf/\\$FILE/FCGL002.pdf](http://www.forestry.gov.uk/pdf/FCGL002.pdf/$FILE/FCGL002.pdf)



## Assisted migration of native trees



Supplement local provenance with origins from 2 to 5 degrees latitude south, that are from a similar altitude and distance from the Atlantic Ocean.

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## Species we might use

Lesser-used natives	Near Native – but when	Exotics
Small-leaved lime Hornbeam  Large-leaved lime Wild and true service tree Aspen Cherry Rowan	Downy birch Flowering ash Oriental beech Common walnut	Coast redwood Macedonian pine Italian alder Robinia Black Walnut

## Information to make informed decisions

- FCE's climate change resource [forestry.gov.uk/climatechangeengland](https://forestry.gov.uk/climatechangeengland)
- Forest research [forestry.gov.uk/fr/climatechange](https://forestry.gov.uk/fr/climatechange)
- SilviFuture [silvifuture.org.uk/](https://silvifuture.org.uk/)
- Ecological Site Classification [forestry.gov.uk/esc](https://forestry.gov.uk/esc)

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