Beech and Yew – Wealden Edge Hangers SSSI, Hampshire

2. Beech and yew woodland

Climate change sensitivity: **Medium**

Introduction

Beech is sensitive to drought and is likely to be particularly vulnerable to the projected changes in rainfall and temperature in the south-east of England due to the large area planted on thin, freely-draining soils. However, widespread losses are unlikely, although on less suitable soils with a southern aspect the species is likely to decline. The climate is projected to become more suitable for beech in the north and west.

Being thin barked, beech is particularly vulnerable to climate change driven increases in mammal pest species such as grey squirrels. More generally, stressed trees are more susceptible to insect pests and diseases. The majority of insect pests that currently affect UK forestry are likely to benefit from climate change as a result of increased activity and reduced winter mortality. These impacts are likely to affect the commercial value of beech and lead to changes in the composition of both the canopy and ground flora of beech and yew woodland.

Habitat Description

The composition of lowland beech and yew woodland varies according to soil and topographical conditions. Beech *Fagus sylvatica* can grow on both acidic and calcareous soils, although its association with yew *Taxus baccata* is most common on calcareous sites. They are often found as part of a mosaic with other mixed deciduous woodland communities.

Calcareous beech and yew woodland commonly occurs on the limestone and chalk outcrops of southern Britain and forms perhaps 40% of the total lowland beech and yew habitat. The majority of stands have a high forest structure. The canopy can include a mix of beech, ash, sycamore, yew and whitebeam. Oak is less common than in the other beech woods, and pure stands of yew occur in places. Promotion of high quality beech for silviculture has often led to an artificial dominance of beech. Characteristic uncommon or rare plants associated with beech and yew woodland include box *Buxus sempervirens*, red helleborine *Cephalanthera rubra*, coralroot bitter-cress *Cardamine bulbifera*, and bird's nest orchid *Neottia nidus-avis*.

Beech woodland on neutral to slightly acidic soils comprises about 45% of the total habitat. It is usually found on heavier soils and often where the drainage is poor or impeded. The boundary with the other beech types is often defined by pH (in the range 7 to 4), drainage and soil texture; thus it is common to find this type grading into one of the others. Again, stands tend to be dominated by beech, but commonly contain English Oak *Quercus robur* and sometimes Sessile Oak *Q. petrea*. Bramble *Rubus fruticosus* forms a characteristic ground layer. Often there is no shrub layer, although holly *Ilex aquifolium* can form a second tier of trees, occasionally with yew. Violet helleborine *Epipactis purpurata* is a rare plant found in these communities. Mosaics with oak/bracken/bramble woodland are common, and in some areas beech can be found colonising western oak woods. This woodland type tends to occur as high forest or relict wood-pasture (with pollards), and less often as abandoned coppice.

Acidic beech woodland forms the remaining 15% of the habitat type. This usually occurs as high forest, but also makes up a large percentage of lowland wood pasture sites. Acidic beech stands are usually found on light, sandy or sometimes gravelly soils that are well-drained (pH 3.5 to 4.5). Holly, and sometimes yew, is the main understorey species, with oak being the most commonly associated canopy species. Mosaics with oak/birch/wavy-hair grass communities are common. The western edge of its range is ill-defined, and beech clearance from, and spread into, western oak woods occur in almost equal measure.

There are no precise data on the total extent of native lowland beech and yew woodland in the UK. In the late 1980s the Nature Conservancy Council estimated the total extent of ancient semi-natural woodland of this type at between 15,000 and 25,000 ha, which, with recent beech woodland planting, brings the total area to about 30,000 ha.

Potential climate change impacts

Cause	Consequence	Potential impacts
Drier summers	Drought	■ Mature beech trees are sensitive to drought and seasonally fluctuating water tables on less suitable soil types. This can lead to reduced growth, die-back and death (Hearn & Gilbert 1977; Geßler *et al* 2007). ■ Reduced abundance of beech specialists (e.g. epiphytes, fungi, invertebrates). ■ Changed ground flora composition.
Wetter winters	Spring water-logging	■ Reduced nutrient uptake and reduced vigour of beech (Carey 2013; Geßler *et al* 2007). ■ Increased susceptibility to summer drought.
Warmer summers	Prolonged periods of heat	■ Increased sun-scorch, leading to bark-death in beech.
Warmer winters	Fewer frost events	■ Reduced winter cold periods leading to reduced bud initiation and a possible reduction of beech in parts of Britain. ■ Increased fecundity and survival of mammal pests, resulting in more damage to thin barked trees and reduced regeneration. ■ More generations of insect 'pests' per year (Read *et al* 2009).
Increased frequency of extreme events	High winds	■ Increased loss of trees to wind blow. Most damage to woodlands is caused by extreme events and the frequency of these is very difficult to predict.
In combination		■ Increased prevalence of fungal pathogens, including *Biscogniauxia* species, which cause damaging strip cankers on beech (Hendry *et al* 1998).

Adaptation responses

As with other woodland habitats, there are likely to be changes in both the abundance of the habitat and the composition of species within it. In the south and east, reduced water availability will drive succession to other woodland types such as oak (especially English oak on heavier soils) or to scrub habitat, depending on soil depth, soil water holding capacity and the change in rainfall seasonality. Conversely, the vigour of beech in the north of its existing range will increase and it will become increasingly viable outside its current range.

The acceptance of change will therefore be a key response, with management to increase the resilience of beech woodland focusing on the reduction of non-climatic pressures and reducing the impact of drought.

Some of the potential adaptation options for this habitat are outlined below:

- Reduce the impacts of other pressures, such as pests and diseases, pollutants, over-grazing and development pressures. Reducing deer grazing pressure, for example, allows more flowering and seed setting of ground flora, such as primroses, therefore increasing the potential for populations to survive drought years.

- In the southern and eastern parts of its range, and in locations prone to drought, increase the patch size of very small sites and ensure new planting is designed to reduce edge effects by avoiding linear planting. This would help reduce water loss and spray drift from adjacent farmland.
- Consider soil type, aspect and topography carefully when evaluating woodland expansion options, including assessment using Ecological Site Classification, and use these features to maintain/enhance future suitability of the species.
- Where new planting is being considered, potential refugia need to be identified where the direct impacts of climate change may be less than in the surrounding region. These could include north facing or more sheltered slopes and areas with a more secure water supply (e.g. spring lines or low lying areas closer to the water table).
- Increase the age structure of high forest to reduce the susceptibility of beech populations to damage from droughts and storms.
- Accept a greater mix of native trees within the canopy of beech woods, including oak on non-calcareous soils, and smaller trees such as holly, whitebeam and birch.
- Where the climate is projected to become suitable, accept beech as component of semi-natural woodland in areas beyond its current native range.
- Take positive steps in all woodland situations to increase the proportion of decaying wood to ensure resilience of dependent species, the replenishment of soil organic content and the capacity for moisture retention.

Mature beech in Buckholt Wood, Gloucestershire

Relevant Countryside Stewardship options

WD1 Woodland Creation - maintenance payments

This option aims to support the successful establishment of newly created woodland that provides environmental and/or social benefits including:

- Supporting wildlife, particularly where new woodland links habitats or provides a protective buffer.
- Helping to reduce flood risk, improve water quality and prevent soil erosion.
- Creating woodland that is resilient and can adapt to climate change.
- Landscape enhancement.

WD2 Woodland improvement

This option aims to change the woodland structure or management regime to improve biodiversity or enhance resilience to climate change. Dependent on the operation, multi-annual agreements will show a gradual restructuring or improvement in the condition of the woodland.

Further information and advice

Buglife. Advice on managing BAP habitats **Lowland Beech and Yew Woodland**.

Forestry Commission **The management of semi-natural woodlands: Lowland beech–ash**.

Forestry Commission England 2010, Practice Guide **Managing ancient and native woodland in England**.

JNCC (2008) UK BAP habitat description **Lowland Beech and Yew Woodland**.

Forestry Commission (2003) **Restoration of Native Woodlands on Ancient Woodland Sites**.

Relevant case study examples

Chiltern Woodlands Project

The aim of the Chiltern Woodlands Project is to promote and encourage the sensitive and sustainable management of Chiltern woods in order to protect the landscape of the Chilterns and maintain and enhance its biodiversity.

Key evidence documents

Broadmeadow, M. & Ray, D. 2005. **Climate Change and British Woodland**. Research Note. Forestry Commission.

Geßler, A., Keitel, C., Kreuzwieser, J., Matyssek, R., Seiler, W. & Rennenberg, H. 2007. Potential risks for European beech (Fagus sylvatica L.) in a changing climate. Trees 21, 1–11.

Hearn, K.A. & Gilbert, M.G. 1977. The effects of the 1976 drought on sites of nature conservation interest in England and Wales, Nature Conservancy Council.

Hendry, S.J., Lonsdale, D. & Boddy, L. 1998. Strip-cankering of beech (Fagus sylvatica): pathology and distribution of symptomatic trees. New Phytologist 140, 549–565.

Ray, D., Morison, J. & Broadmeadow, M. 2010. **Climate change: impacts and adaptation in England's woodlands** Research Note. Forestry Commission. 16pp.

Read, D.J., Freer-Smith, P.H., Morison, J.I.L., Hanley, N., West, C.C. & Snowdon, P. (eds). 2009. **Combating climate change, a role for UK forests. An assessment of trees and woodlands to mitigate and adapt to climate change**. The Stationery Office, Edinburgh.