Upland mixed ash woodland. Crathes Castle, Aberdeenshire

4. Upland mixed ash woodland

Climate change vulnerability: **Low**

Introduction

Ash *Fraxinus excelsior* is a very widespread native tree species, and forms the major component of most upland mixed ash woods.. The fungal pathogen *Chalara fraxinea* (ash dieback) is likely to become a major cause of ecological change in upland ash woodland and this is likely to significantly exceed the impacts of climate change. However, climate change may well play an important role in determining what species replace ash. Significant changes to the species composition of upland mixed ash woodlands are possible and potentially an increase in their susceptibility to other climate-driven impacts, such as wind throw, and colonisation by non-native invasive species and other pests and pathogens.

Habitat Description

Upland mixed ash woodland is generally found on base-rich soils in the north and west of England. Besides ash, other trees including small-leaved lime, aspen, alder, sycamore, rowan, bird cherry, and birch may also be present. The shrub layer consists of a range of species including hazel, wych elm, spindle, wild rose, hawthorn and elder. The ground flora can be very diverse, particularly under the light shade of the ash canopy.

The most extensive examples of mixed ash woodland occur in well drained limestone areas, but the type is also found where there is flushing of nutrients within more acid, poorly drained sites. Often, these latter stands are just small fragments of woodland with irregular margins or narrow strips along flushes, river banks, rock outcrops and steep banks. Many upland mixed ash woods are probably ancient in origin , but ash is a vigorous coloniser of open ground, and some very bio-diverse ash woods, such as in the Derbyshire Dales, are mosaics of ancient and recent ash woodland. Many woods have been managed as coppice in the past and others have been wood-pasture, but most now have a high forest structure.

Upland mixed ash woods are among the richest habitats for wildlife in the uplands, notable for bright displays of flowers such as bluebell *Hyacinthoides non-scripta*, primrose *Primula vulgaris*, wood cranesbill *Geranium sylvaticum* and wild garlic *Allium ursinum*. They can contain rare woodland flowers, such as dark red helleborine *Epipactis atrorubens*, Jacob`s ladder *Polemonium caeruleum*, autumn crocus *Colchicum autumnale*, and whorled Solomon's seal *Polygonatum verticillatum*. Some rare native trees are found in these woods, notably large-leaved lime *Tilia platyphyllos* and various whitebeams (*Sorbus* spp.).

Upland mixed ash woods also harbour a rich invertebrate fauna, which may include uncommon or declining species. Standing and fallen dead wood provides habitat for rare beetles, flies and other invertebrates. The dense and varied shrub layer found in many ash woods can, in the southern part of their range, provide suitable habitat conditions for dormice *Muscardinus avellanarius*, and is important for woodland birds. The alkaline bark of old ash (and elm where it still survives) supports important lichen species, particularly the *Lobarion* community.

Upland mixed ash woodland is found throughout upland England. The boundaries between this type and lowland mixed deciduous woodland may be unclear in places, for example in The Quantocks, because the two types form an ecological continuum determined by climate and soils. There are no precise data on the total extent of upland ash woods in England, but in the late 1980s the Nature Conservancy Council estimated the total extent of ancient semi-natural woodland of this type to be 40,000 - 50,000 ha in the UK. It has declined in area by about 30-40% over the last 50 years as a result of clearance, overgrazing and replanting with non-native species.

Potential climate change impacts

Cause	Consequence	Potential impacts
Increased mean temperatures		■ Decline of boreal and sub-boreal bryophyte and moss species at their range margins in the UK, especially in southern-most sites (Ellis 2012). ■ Potential breakdown in synchrony between species due to changes in the time of flushing, for example within food webs (Broadmeadow & Ray 2005, Ray, Morison & Broadmeadow 2010) and food availability (Masters et al 2005, Read et al 2009).
Drier summers	Drought Fire	■ Drought will lead to stress in drought sensitive tree species particularly birch and sycamore in the southern margins of the habitat's range, eventually changing tree species composition, with knock-on impacts on ground flora. ■ A decline and potential loss of sensitive ground flora and epiphytes, particularly ferns, bryophytes and lichens with oceanic distribution patterns (Ray, Morison & Broadmeadow 2010; Ellis 2012). ■ Increased tree stress, leading to greater susceptibility of trees to pests and diseases (Broadmeadow & Ray 2005). ■ There is potential for increased vulnerability of ground flora to drought in woodland where ash dieback has opened the canopy. This may be moderated by other tree species replacing ash in the canopy. ■ Broadleaved trees are relatively resistant to fire, but fires could result in localised changes in ground flora and understorey composition (Ray, Morison & Broadmeadow 2010), and could lead to localised loss of seedling regeneration and established saplings (Ray, Morison & Broadmeadow 2010).
Warmer winters	Fewer frosts	■ Improved winter survival of mammal pests such as deer and grey squirrel could lead to reduced regeneration and loss of ground flora. ■ Fewer frosts could lead to insufficient chilling to break Ash seed dormancy.
In combination		■ The creation of gaps in the canopy and a general reduction in competitive interactions in woodland impacted by ash dieback could exacerbate the threat from invasive native and non-native species.

Adaptation responses

Ash dieback has the potential to significantly change the structure and composition of upland mixed ash woodland. Adaptation to climate change should be built into and aligned with responses to the disease.

Many actions that aim to improve the resilience of ash woodland, for instance actions to reduce non-climatic pressures such as pests and invasive species, and improving the structural heterogeneity and species diversity of woodland, will promote adaptation to climate change and improve the resilience of woodland.

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

- Reduce the impacts of non-climatic pressures through active management. These may include damage from deer browsing, pollution from agricultural spray drift, soil compaction and erosion, and the spread of invasive species such as Himalayan balsam.
- Avoid changes that impact on the hydrological functioning of the site.
- Allow natural woodland processes and/or woodland management to promote a diversity of age structure within woodlands. This may include retaining some undisturbed old growth stands, encouraging natural regeneration, allowing pockets of wind throw trees and deadwood, and creating a 'graduated' woodland edge (as opposed to a sharp boundary with neighbouring land uses).
- Promote through both natural regeneration and/or planting, a diversity of native tree species in the canopy, such as aspen, alder, rowan and small leaved lime. Take opportunities to include species or provenances with a more southerly distribution; for example small leaved lime. Ecological Site Classification can be used to assess site suitability and indicative future impacts of climate change.
- Identify any resistance to Chalara in the ash population and take measures to protect these trees and allow them to grow.
- Aim to maintain large, old trees and the quantity of dead wood.
- Retain sycamore if its presence is not impacting on other aspects of the native flora and/or fauna.
- Aim to buffer smaller sites by extending the woodland edge and taking opportunities for new woodland creation nearby.
- Identify potential refugia where the direct impacts of climate change may be less than in the surrounding area. These could include north facing slopes and areas with more secure water supply (eg near spring lines or low lying areas closer to the water table) and places with relatively high rainfall These areas should be protected from other pressures where possible.
- Develop contingency plans to deal with outbreaks of pests, diseases and the increased risk of major new disturbance events such as wildfires.
- Take positive steps in all woodland situations to increase the proportion and diversity of decaying wood throughout sites so as to ensure both, resilience of dependant species, and the replenishment of woodland soils' organic content and hence capacity for moisture retention and provision of other essential ecological functions needed by trees and other species.

Mixed ash/alder woodland. Forest of Ae, Scotland

Relevant Environmental Stewardship options

Maintenance of woodland (HC07)

Restoration of woodland (HC08)

The aim of these options is to maintain or restore farm woodlands to benefit wildlife and protect and strengthen the local landscape character. It is only appropriate where the woodlands are part of the farmed landscape.

Priority is given to woodlands with ancient semi-natural characteristics and sites with remnants of ancient semi-natural woodland such as planted ancient woodland sites (PAWS) and grazed woodland.

Relevant English woodland grant options

The majority of woodland grants available under the English Woodland Grant Scheme closed to new applicants before April 2014. The grants outlined below, as set out in England's next Rural Development Programme document, will be available when the new scheme opens in 2015 and, in some cases during the 2014 transition period. Up to date information is available from the Forestry Commission's **Grants and Regulations** web-pages.

Woodland Infrastructure Grant (replacing the **Woodfuel Woodland Improvement Grant**).
This grant supports the sustainable production of wood by improving access to woodland for management and harvesting purposes. The grant will cover a proportion of the cost of work, and will not take account of the timber income that results.

Woodland Improvement Grants
Grants to fund the improvement in the quality of woodlands to achieve specific objectives, through either capital investments or five-year revenue payments. Current priorities are: bringing priority habitats into target condition; supporting priority species (particularly birds and red squirrels); PAWS restoration through gradual conversion; improving climate resilience through conversion to continuous cover approaches to management.

Woodland Regeneration Grant
Woodland Regeneration Grant (WRG) contributes to the costs of making changes to the composition of woodland within the normal cycle of felling and regeneration, under specific circumstances: following premature felling as a result of a pest or disease pest outbreak on the site; PAWS restoration following clear-fell. The objective is to support an increase in the capacity for sustainable management through this process.

Woodland creation grant
This grant provides funding for woodland creation to expand and join up existing woodland.

Woodland planning grant
Support for the drafting of a UKFS-compliant woodland management plan to promote appropriate management interventions and resilience planning.

Further information and advice

Buglife. Advice on managing BAP habitats for invertebrates. **Upland mixed ashwoods**.

Forestry Commission (2003). **The Management of Semi-natural Woodlands: 4. Upland Mixed Ashwoods**.

Forestry Commission England (2010). **Managing Ancient and Native Woodland in England. Practice Guide**.

Scottish Wildlife Trust. **Living with Ash dieback**.

JNCC (2008) UK BAP habitat description **Upland Mixed Ashwoods**.

Key evidence documents

Broadmeadow, M & Ray, D (2005) **Climate Change and British Woodland**. Research Note. Forestry Commission. 16pp.

Ellis (2012) Implications of climate change for UK bryophytes and lichens. Terrestrial Biodiversity Climate Change Impacts report card technical paper 8. Living with Environmental Change, Swindon, UK. **http://www.lwec.org.uk/sites/default/files/Bryophytes%20%26%20lichens.pdf**.

Masters GJ, Berry PM, Hossell JE, Ward NL, Freeman SN, Banks AN, Butt N, Crick HQP, Harrison PA & Morrison (2005) A. Impacts for the Snowdonia case study area. pp 189-236. In: Modelling natural resource responses to climate change (MONARCH): a local approach.

Pautasso, M., Aas, G., Queloz, V. & Holdenrieder, O. (2013) European ash (Fraxinus excelsior) dieback–A conservation biology challenge. Biological Conservation, 158, 37-49.

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. and Snowdon, P. (eds). 2009. **Combating climate change – a role for UK forests. An assessment of the potential of the UK's trees and woodlands to mitigate and adapt to climate change**. The Stationery Office, Edinburgh.