Wet woodand. Ickburgh, Norfolk

5. Wet woodland

Climate change sensitivity: **Medium**

Introduction

Wet woodlands experience waterlogged conditions for at least part of the year, so are sensitive to changes in climatic conditions. Many of the tree species associated with wet woodland are expected to be relatively resilient to climate change (Gosling *et al* 2009, NEA 2010), but the nature of impacts will depend largely on how precipitation patterns change. In many instances, wet woodland is a successional habitat that will move towards dry woodland over time and reductions in summer rainfall and water tables are likely to hasten this process. Increases in the abstraction of water from catchments during dry periods will exacerbate the direct effects of climate change.

Much of our wet woodland has been lost or destroyed over recent decades due to clearances and land drainage for agricultural production, and it remains susceptible to changes in agricultural land use.

Increased river flooding may increase the value of wet woodland as a natural flood, erosion and water quality management tool, creating opportunities for habitat creation and retention.

Habitat Description

Wet woodland occurs on poorly drained or seasonally wet soils, usually with alder, birch and willow as the predominant tree species, but sometimes including ash, oak, and beech on the drier riparian areas. It is found on floodplains, as successional habitat on fens, mires and bogs, along streams and hill-side flushes, and in peaty hollows. These woodlands occur on a range of soil types, including nutrient-rich mineral soils and acid, nutrient-poor organic soils. The boundaries with dry woodland may be sharp or gradual and may change with time through succession, depending on the hydrological conditions and the treatment of the wood and its surrounding land. Therefore, wet woods frequently occur in a mosaic with other woodland habitat types such as mixed ash and oak woods and with open habitats such as fens.

Many alder woods are ancient and have a long history of coppice management which has determined their structure, and in some situations it appears that this practice has maintained alder as the dominant species and impeded succession to drier woodland communities. Other wet woodland may have developed through natural succession on open wetlands (sometimes following cessation of active management) and structurally are little influenced by direct forestry management.

Notable concentrations of wet woodland on fens occur in East Anglia, Shropshire and Cheshire, while hillside and plateau alder woods are more restricted to Wales, Cumbria and western Scotland. Fragments of ancient floodplain forest are rare, and the best examples are probably in the New Forest and northern Scotland. Bog woodlands of pine on bog are confined to Scotland, but fragments of birch bog woodland occur more widely in scattered stands across the UK.

Wet woodland combines elements of other ecosystems and as such can be important for many species groups. The high humidity favours bryophyte growth. A large number of invertebrates are associated with alder, birch and willow, including the Section 41 species, sallow guest beetle *Melanopion minimum* and jumping weevil *Rhynchaenus testaceus*. Even quite small seepages may support craneflies such as *Lipsothrix errans* and the endemic *Lipsothrix nervosa*. Dead wood within wet woodland is common, and its association with water provides specialised habitats not found in dry woodland types. The cranefly *Lipsothrix nigristigma*, for example, is associated with log jams in streams. Wet woodland provides cover and breeding sites for otters *Lutra lutra*. While few rare plant species depend on wet woodland, there may be relict species from the former open wetlands within wet woodlands, such as the marsh fern *Thelypteris palustris*.

Potential climate change impacts

Cause	Consequence	Potential impacts
Drier summers	Drought	■ Drying out of sites reliant on rainfall could lead to a change in the dominant tree species and conversion to drier woodland habitat types. The composition of ground flora is also likely to change.
Wetter winters		■ Potential colonisation of open ground habitat in the lower reaches of catchments fed by upland headwater tributaries (Ray *et al* 2010). ■ Long-term water-logging may lead to increased dominance of tree species such as alder and willow and localised changes in ground flora and understory composition.
Warmer winters	Fewer frost events	■ Increased survival of mammal pests such as deer species and grey squirrel *Sciurus carolinensis* resulting in more damage to thin barked trees and reduced regeneration, and an increased risk of colonisation by invasive non-native species. ■ A reduction in alder *Alnus glutinosa* dominance due to the impacts of *Phytophthora* spp (Ray *et al* 2010).
Increased frequency of extreme events	Summer and winter flooding	■ An increase in the frequency of extreme floods could result in the death of older trees and the development of scrubby stands. ■ Access to sites to undertake management may become increasingly difficult. ■ More frequent extreme events could create opportunities for restoring or creating wet woodland as a flood, erosion and water quality management tool.

Adaptation responses

Rainfall is likely to be the main cause of change in wet woodlands rather than temperature. At present, there is significant uncertainty in the climate projections for precipitation. Even if the current projections of drier summers and wetter winters prove to be accurate, the overall impact on wet woodlands is uncertain.

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 certain sites reduced water availability will drive succession to drier woodland types such as beech and 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.

The management of water availability and levels will become increasingly important in catchments in the south and east of the country. The resilience of wet woodland may be increased by promoting structural and species diversity and the management of invasive species. New planting can reduce the vulnerability of existing sites though increasing patch size and providing a buffer to neighbouring land.

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 pressure. Reducing deer pressure, for example, allows more natural regeneration.
- Remove sources of nutrient enrichment by increasing the area of extensively managed land around the wetland and implementing good practice throughout the site's catchment.

- Where water supply is critical for the interest feature, consider actions that enable water tables to be artificially maintained during the spring and summer, including the use of artificial structures.
- Actively manage woodland to ensure structural heterogeneity and different age classes among canopy trees, for example through rotational coppicing.
- Accept and encourage a greater mix of native trees and shrubs within the canopy and shrub layer.
- Monitor and address potentially harmful invasive native and non-native species. This might include the use of surveillance to detect the arrival of species at an early stage (while they can still be eradicated) and identifying potential sources of invasive species in the surrounding area.
- Promote wet woodland as potential new green infrastructure in new developments and as part of larger wetland creation schemes.
- Where new planting is being considered:
  - prioritise areas with more secure water supply (e.g. spring lines or low lying areas closer to the water table) as they may represent potential refugia from the direct impacts of climate change;
  - consider the proximity to sources of invasive species when identifying locations, and avoid sites that could connect invasive pathways to areas of conservation interest;
  - give priority to making existing sites larger and reducing edge effects;
  - promote resilience through planting a range of tree species; options can be assessed using Ecological Site Classification.
- Where possible, identify opportunities to restore or create wet woodland habitats as part of flood management schemes within river floodplains. Within wet woodland, the retention of in-stream woody debris can help to enhance flood alleviation.
- 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 dependent 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.

Mature wet birch, alder riparian woodland, Crathes Castle, Aberdeenshire. © Forestry Commission/Isobel Cameron

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.
- Help reduce flood risk, improve water quality and prevent soil erosion.
- To create 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

Forestry Commission (1994) Practice note **The Management of Semi-natural Woodlands 8. Wet Woodlands**.

Sussex Wildlife Trust (2013) **How to create and restore wet woodlands**.

JNCC (2008) UK BAP habitat description **Wet Woodland**.

Key evidence documents

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Gosling, P.G., McCartan, S.A. & Peace, A.J. (2009). Seed dormancy and germination characteristics of common alder (*Alnus glutinosa L.*) indicate some potential to adapt to climate change in Britain. Forestry 82: 573-582.

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

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 the potential of the UK's trees and woodlands to mitigate and adapt to climate change**. The Stationery Office, Edinburgh.

UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) (2008).

UK National Ecosystem Assessment (2011). Chapter 8 Woodland.