Heather and gorse. Dunkery and Horner Woods NNR

18. Upland heathland

Climate Change Sensitivity: **Medium**

Introduction

Projected changes in temperature are likely to drive changes in community structure and species composition, with upland heaths progressively becoming more like present lowland heaths. This will however be moderated by the greater wetness of the uplands (Carey 2013), particularly in the North West. Wet upland heaths will, however, be susceptible to changes in precipitation, especially during the summer.

The large size of upland heath patches within the uplands, together with the high variability in topography and mosaic of habitats will provide some resilience to climate change. Fragmentation and isolation of upland heathlands is less of an issue than for lowland heath, but less mobile species will still be restricted to their original sites. These may become less suitable for many species, particularly those at lower altitudes and in the south. The rate of colonisation by distinctive lowland heath species will depend on the proximity of seed sources, and may be slow given the fragmented distribution of much lowland heath.

Upland heathland is a component of management systems created as part of extensive livestock farming or grouse moor management, and changes in approach within these systems (including subsidy payments) are likely to have a greater impact than climate change will directly. Nonetheless, the importance of management by extensive grazing and burning means that upland heaths will be sensitive to indirect impacts of climate change, through changes in policy and the economics of upland grazing systems and carbon management. Certain sites may also be vulnerable to potential increases in visitor numbers, although this is likely to be limited to popular and accessible sites.

Habitat Description

Upland Heathland is found on impoverished, acidic mineral and shallow peat soil, and is characterised by the presence of dwarf shrubs such as heather and gorse (at a cover of at least 25%). Upland heathland is defined as lying below the alpine or montane zone (at about 600-750 m) and above the upper edge of enclosed agricultural land (generally at around 250-400 m). Blanket bog and other mires, grassland, bracken, scrub, trees and woodland, freshwater and rock habitats frequently form intimate mosaics with heathland vegetation in upland situations.

Upland heath is typically dominated by a range of dwarf shrubs such as heather *Calluna vulgaris*, bilberry *Vaccinium myrtillus*, crowberry *Empetrum nigrum*, bell heather *Erica cinerea*, and, in the south and west, western gorse *Ulex gallii*. In northern areas, juniper Juniperus communis is occasionally seen above a heath understorey. Wet heath is most commonly found in the wetter north and west and is dominated by mixtures of cross-leaved heath *Erica tetralix*, deer grass *Scirpus cespitosus*, heather and purple moor-grass *Molinia caerulea*, over an understorey of mosses, often including carpets of *Sphagnum* species. Blanket bog vegetation may also contain substantial amounts of dwarf shrubs, but in a healthy state it is waterlogged much of the time and peat-forming, with frequent hare's-tail cotton-grass *Eriophorum vaginatum* and characteristic moss species, particularly Sphagnum species. However, in much of the UK it is degraded as a result of drainage, burning and over-grazing and is not actively peat forming. In these circumstances, where there is little or no *Sphagnum* and peat formation has stopped, the vegetation grades into heathland. Underlying peat, typically more than 0.4m deep, indicates that a site was formerly blanket bog. High quality heaths are generally structurally diverse, containing stands of vegetation with heather at different stages of growth. Upland heath in 'favourable condition' also usually includes areas of mature heather.

Upland heath is associated with important bird species, including red grouse *Lagopus lagopus*, black grouse *Tetrao tetrix*, merlin *Falco columbarius* and hen harrier *Circus cyaneus*. Some forms of heath also have a significant lower plant interest, including rare and local mosses and liverworts that are particularly associated with the wetter western heaths. The invertebrate fauna is especially diverse.

Upland heathland is found throughout the uplands of England, along the Pennine Chain, the Lake District, Yorkshire Dales, Peak District, Bowland Fells, Northumberland, North York Moors, and on Exmoor, Dartmoor and Bodmin moor in the south west. There is an estimated 226,609 ha of upland heath in England.

Potential climate change impacts

Cause	Consequence	Potential Impacts
Increased mean temperatures	Longer growing season (Burt & Holden 2010)	■ Increased growth of grasses and other heath species and a gradual change towards a lowland heathland structure (Carey 2013). ■ Temperature is often a limiting factor for insect and microbial performance. Warmer temperatures are likely to result in increased herbivory and faster nutrient cycling, leading to changes in vegetation.
Hotter summers	Potential for increased visitor numbers Increased risk of wildfire	■ An increase in unmanaged access could lead to more erosion on access routes, an increased risk of wildfires (Albertson et al 2010), and increased disturbance of ground nesting birds (eg Underhill-Day 2005). ■ Changes to community composition and increased erosion and loss of peat.
Warmer winters		■ Increased threat from pest species such as heather beetle.
Drier summers	Drought	■ Altered community composition. ■ Increased susceptibility to wildfire, and risk of resulting peat/ soil damage under wild or managed burns. ■ Increased risk from using managed burns as a management option.
	Drier ground conditions	■ Lower summer water tables could lead to a reduction in wet heath components of the heathland ecosystem. ■ Improved accessibility for visitors could potentially lead to increased erosion and risk of wildfire (Albertson et al. 2010). ■ Marginal land could become suitable for more intensive agriculture.
Wetter winters	Increased surface runoff	■ Spring burning as a management option may become increasingly difficult.
Storm events	Increased rainfall intensity	■ Greater erosion, particularly affecting footpaths.
In combination		■ Loss of suitable climate for key species (Holman et al 2002, Berry et al 2005). ■ Changed food web interactions leading to reduced habitat suitability for some bird species (Pearce-Higgins 2011). ■ Expansion of bracken into higher altitudes at the expense of Heather (Fraser et al 2009, Pakeman et al. 2000, Carey 2013). ■ Increased productivity leading to an intensification of grazing and increased nutrient loading (Wessel et al. 2004, Carey 2013).

Adaptation responses

Different aspects of climate change will interact and have different impacts on the various components of heathland systems. Management of existing sites will need to be flexible, and be adjusted to reflect these changes.

Heathland is threatened by many pressures that are not related to climate change, such as habitat loss and an associated increase in fragmentation and isolation, heavy access and recreation pressure, over grazing, and inappropriate or lack of management. Increasing the resilience of upland heath by reducing these pressures is likely to be a key adaptive response in many cases.

In addition to actions on existing areas of heathland, adaptation will also require targeted habitat restoration and creation to address historic habitat loss and to improve the resilience of heathland networks.

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

- Develop fire contingency plans across the whole upland habitat mosaic and ensure that the design and management of habitats reduces fire risk, such as by introducing firebreaks and fire ponds, and restricting access to some areas at times of high fire risk. Rewetting drier, degraded blanket bog and reducing heather cover will also help to reduce fire risk.
- Minimise erosion through the management of access, grazing and burning.
- Consider allowing an increase in scrub and woodland cover within the upland mosaic to improve habitat heterogeneity, in order to provide potential refugia for sensitive plants and invertebrates.
- Within upland sites, identify areas that might act as potential refugia to climate change, such as areas with complex micro-topography, robust hydrology, and high species diversity, and ensure that these are managed accordingly.
- Maintain structural diversity within the vegetation to provide a wide range of micro habitats and niches, including, where possible, bare ground, areas dominated by mosses and lichens, low herbs, dwarf shrubs of diverse age classes, wet heath and mire, and scattered trees and shrubs.
- Consider the need to adjust designated site boundaries as habitats change (eg to create larger functional sites) and review the interest features for which the site is managed.
- Upland heath grades into various other habitat types along climatic gradients, particularly lowland heath with higher temperature, montane heath with lower temperature, and blanket bog in wetter conditions. Conservation objectives need to reflect these gradients, and build in an acceptance that there will change under a changing climate, and that the location for action to conserve particular species is likely to change.

Female hen harrier in flight

Relevant Environmental Stewardship options

Maintenance of moorland (HL09)

Restoration of moorland (HL10)

These options aim to maintain or restore areas of moorland habitats to ensure they are in good condition to benefit upland wildlife.

Creation of upland heathland (HL11)

This option aims to (re-)create dwarf shrub communities (upland heath) in upland moorland areas where dwarf shrubs are rare or absent and their seed banks are depleted. It will be targeted at areas adjacent or close to existing dwarf-shrub heath. The option will help to (re-)create and strengthen the diverse vegetation mosaics characteristic of upland landscapes.

The management objectives and prescriptions will vary widely according to the nature of the site and the success of initial treatments.

Management of heather, gorse and grass by burning, cutting or swiping (HL12)

This supplement supports the establishment of an appropriate programme of rotational vegetation management. This may involve either an increase or decrease in management activity.

Moorland re-wetting (HL13)

This supplement supports the re-wetting of moorland to maintain wetland habitats and their associated wildlife and conserve the vegetation mosaics and landscape features characteristic of upland landscapes.

Seasonal livestock exclusion (HL15)

This supplement is aimed specifically at sites where major moorland restoration is necessary and achievable, or for further improving moorland in good condition. It can only be applied where additional environmental benefit will be achieved by removing more stock than is required by the standard moorland option. Examples of such benefits include: increasing the rate of heather regeneration; or allowing rare species to flower (eg spring gentian) or regenerate (eg juniper).

Further information and advice

Natural England (2001) **Upland Management Handbook**.

The upland management handbook pools the expertise of many of the country's leading wildlife, farming and land management specialists to provide a blueprint for the practical delivery of the land management that will benefit upland wildlife.

Natural England (2009) **Responding to the impacts of climate change on the natural environment: Cumbria High Fells**.

Tayside Local Biodiversity Action Plan - **Montane (habitats above the treeline)**.

Shropshire Biodiversity Action Plan **Upland Heathland**.

JNCC (2008) UK BAP habitat description **Upland Heathland**.

Key evidence documents

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