Risby Warren SSSI, Lincolnshire

19. Lowland dry acid grassland

Climate Change Sensitivity: **Low**

Introduction

Lowland dry acid grassland is expected to be relatively robust to the direct threats posed by climate change, although the climate space of some of its component species is projected to change. A greater threat in the short to medium term will be climate change driven changes to the economics of grazing in relation to other land uses. This may lead to a decline in the availability of grazing animals, or increased pressure to intensify grazing systems or convert land to arable production.

Habitat Description

Lowland dry acid grassland typically occurs on nutrient-poor, generally free-draining soils with a pH ranging from 4 to 5.5, overlying acid rocks or superficial deposits such as sands and gravels, at heights below about 300m. It covers all acid grassland managed in functional enclosures. Swards in old and non-functional enclosures in the upland fringes, which are managed as free-range rough grazing in association with unenclosed tracts of upland, are excluded from the definition. It often occurs as an integral part of lowland heath landscapes, in parklands, and locally on coastal cliffs and shingle. It is normally managed as pasture.

Acid grassland is characterised by a range of plant species such as heath bedstraw *Galium saxatile*, sheep's-fescue *Festuca ovina*, common bent *Agrostis capillaris*, sheep's sorrel *Rumex acetosella*, sand sedge *Carex arenaria*, wavy hair-grass *Deschampsia flexuosa*, bristle bent *Agrostis curtisii*, and tormentil *Potentilla erecta*, with presence and abundance depending on community type and locality. Dwarf shrubs such as heather *Calluna vulgaris* and bilberry *Vaccinium myrtillus* can also occur but at low abundance.

Acid grasslands can have a high cover of bryophytes, and parched acid grassland can be rich in lichens. Parched acid grassland in particular contains a significant number of rare and scarce vascular plant species, many of which are annuals.

The bird fauna of acid grassland is very similar to that of other lowland dry grasslands, which collectively are considered to be a priority habitat for conservation action. Bird species of conservation concern which utilise acid grassland for breeding or wintering include woodlark *Lullula arborea*, stone-curlew *Burhinus oedicnemus*, nightjar *Caprimulgus europaeus*, lapwing *Vanellus vanellus*, skylark *Alauda arvensis*, chough *Pyrrhocorax pyrrhocorax*, green woodpecker *Picus viridis*, hen harrier *Circus cyaneus*, and merlin *Falco columbarius*.

Many of the invertebrates that occur in acid grassland are specialist species which do not occur in other types of grassland. The open parched acid grasslands on sandy soils in particular, can support a considerable number of ground-dwelling and burrowing invertebrates such as solitary bees and wasps. A number of rare and scarce species are associated with the habitat, some of which are included on the UK Biodiversity Action Plan list of species of conservation concern, such as the field-cricket *Gryllus campestris*.

Lowland dry acid grassland has undergone substantial decline in the 20th Century, mostly due to agricultural intensification, although locally, afforestation has been significant. Important concentrations occur in Breckland, the New Forest, Dorset, the Suffolk Sandlings, the Weald, Dungeness, the coasts of south west England, and the border hills of Shropshire. Stands remote from the upland fringe are now rare and it is estimated that less than 30,000 ha now remain in UK.

Potential climate change impacts

Cause	Consequence	Implications
Hotter summers	Longer growing season	■ Phenology may change significantly, with flowering and seed setting occurring earlier in season. ■ Community composition may shift to favour southern temperate and Mediterranean continental plant species (Preston et al. 2002). ■ Bracken Pteridium aquilinum may spread and dominate some areas (Stewart et al 2008).
Warmer winters	Fewer frost days	■ Milder winters may reduce frost heaving, which will reduce the amount of bare ground for the regeneration/recruitment of annual plants from the seed bank.
Drier summers	Drought	■ Drier conditions will favour stress-tolerant (eg deep rooted) and ruderal species due to the increased gaps/bare ground in swards. However, species which are intermediate between stress tolerant and competitive will be retarded by drier summers. ■ Summer drought may favour annual species over perennials, leading to community change. ■ Oceanic/sub-oceanic[19] species such as bird's foot Ornithopus perpusillus, heath bedstraw Galium saxatile and sand spurrey Spergularia rubra may decline. ■ Drier summers may favour the spread of dry heath into acid grassland (Berry et al 2007).
	Wildfire	■ Increased incidence of fire, especially in sites that form part of a mosaic with heathland or bracken, could lead to changes in community composition, bare ground, and increased vulnerability to invasive species.

Adaptation responses

The direct impacts of climate change may be less important than changes in land management, including the ongoing impacts of fragmentation and agricultural intensification, and the impact of atmospheric nitrogen deposition. Adaptation is therefore likely to focus on increasing the resilience of grassland by ensuring that other sources of harm are minimised. However, an adaptive approach is needed to deal with issues like changing seasonal patterns in growth and flowering.

Expanding the area of the habitat through targeted habitat restoration and creation will also be a key adaptive response, with the priority given to measures to increase the size, heterogeneity and connectivity of existing patches.

19 These are species that are restricted to the Atlantic zone (Oceanic) or sub-oceanic species that also extend beyond the Atlantic zone into the western Mediterranean and western central Europe.

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

- Ensure best practice management of existing stands by maintaining suitable grazing regimes and avoiding over or under-grazing, or agrochemical and fertilizer inputs.
- Ensure remaining sites are protected and buffered from agricultural intensification.
- Increase the flexibility in site management to respond to the increased variance in seasonal growing conditions. For example, increase the capacity for changing the timing and intensity of grazing through the use of layback land or housing for animals when ground conditions prevent on-site grazing.
- Adjust grazing dates to align with longer term climatic driven changes to flowering dates.
- Increase the area of dry acid grassland by restoring semi-improved grasslands and re-creating habitat on improved grassland and arable land to ensure the expansion and buffering of existing sites and improve the coherence of existing networks. Consideration should be given to increasing topographic and hydrological heterogeneity when identifying potential sites.
- Within sites, identify areas that might act as potential refugia from climate change, such as areas with north facing slopes, complex micro-topography, low nitrogen levels and high species diversity, and ensure that these are under optimal management.
- Permit the growth of scattered scrub, especially on drought prone sites, as this can provide a wider range of microclimates and soil conditions.
- Monitor and control the spread of potential native and non-native invasive species.
- Some changes in species complements on sites may be inevitable or even desirable (for example, an otherwise threatened species colonising a new site). Site objectives and management should be flexible enough to recognise this.

Nightjar

Relevant Environmental Stewardship options

Maintenance of species-rich, semi-natural grassland (HK06)

This option is targeted at maintain and protecting of areas of species-rich grassland.

Restoration of species-rich, semi-natural grassland (HK07)

This option is targeted at maintaining and protecting of areas of species-rich grassland. They are often on difficult ground and may have suffered from management neglect or may have been selected for agricultural improvement. The botanical diversity of such grassland may be enhanced by simply amending existing management practices. However, on many sites pro-active restoration management will be required, involving the introduction of seeds and the creation of gaps for their establishment. Substantial changes of livestock type, timing of grazing, or control of dominant species may also be required. This option can also contribute to protecting valued landscapes and archaeology, and the promotion of good soil conditions.

Creation of species-rich, semi natural grassland (HK08)

This option is aimed at creating species-rich grassland on former arable land, ley grassland or set-aside land.

Supplementary options

Grazing supplement for cattle (HR1)

This supplement promotes grazing by cattle where this is likely to be beneficial in meeting environmental objectives.

Further information and advice

JNCC (2008) UK BAP habitat description **Lowland Dry Acid Grassland**.

Rodwell JS, Morgan V, Jefferson RG & Moss D. (2007) **The European context of British Lowland Grasslands**) JNCC Report, No. 394.

English Nature. Monitoring the condition of lowland grassland SSSIs: **Pt 1 English Nature's rapid assessment method (ENRR315)**.

Natural England (2008) **State of the Natural Environment**. This provides an overview of the state of England's grasslands – their extent, trends, key drivers of change, and actions to achieve favourable condition of the resource.

Plantlife Information about grassland habitats and their management.

Relevant case study examples

Creation of lowland dry acid grassland at Minsmere, Suffolk : RSPB
Sheep grazing was introduced on former arable land at Minsmere RSPB Reserve in Suffolk, with the objective of creating acid grassland. Seven years after the introduction of a grazing regime, the grassland is well established but is still some way off approaching the cover and species richness of existing semi-natural acid grassland.

Key evidence documents

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Crofts, A. & Jefferson, R.G. 1999 *The Lowland Grassland Management Handbook*. English Nature & The Wildlife Trusts, Peterborough.

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Preston, C.D., Telfer, M.G., Arnold, H.R., Carey, P.D., Cooper, J.M., Dines, T.D., Hill, M.O., Pearman, D.A., Roy, D.B., Smart, S.M. (2002). **The Changing Flora of the UK**. London Defra.

Sanderson, N. A. 1998 A review of the extent, conservation interest and management of lowland acid grassland in England. *English Nature Research Report* No. 259. English Nature, Peterborough.

Stevens CJ, Dupre C, Gaudnik C, Dorland E, Dise NB, Gowing DJ, Bleeker A, Alard D, Bobbink R, Fowler D, Corcket E, Vandvik V, Mountford JO, Aarrestad PA, Muller S, Diekmann M (2011) Changes in species composition of European acid grasslands observed along a gradient of nitrogen deposition. *Journal of Vegetation Science* **22**, 207–215.

Stewart, G., Cox, E., Le Duc,M., Pakeman, R., Pullin, A. & Marrs, R. (2008) Control of Pteridium aquilinum: meta-analysis of a multi-site study in the UK. *Annals of Botany*, 101, 957–970.