



Grassland Habitat Action Plan

*Including lowland dry acid grassland,
lowland calcareous grassland
and lowland hay meadows*

1. Introduction

Worcestershire contains four main semi-natural grassland types, each of which has developed over hundreds and in many cases thousands of years as a result of differing land management, soil and hydrological factors. These grassland types are:

- **Lowland Neutral Hay Meadows and Pastures**, which includes **Lowland Flood Meadows**.
- **Lowland Dry Acid Grassland**, which includes some upland communities.
- **Lowland Calcareous Grassland**.
- **Wet Grassland**, which has its own Action Plan in the Worcestershire BAP and is therefore not included here.

This Action Plan also contains an additional locally determined Priority Habitat Type: **Old Grassland**.

Road verges and traditional orchards both also hold a considerable semi-natural grassland resource and have their own Action Plans in the Worcestershire BAP.

The data used to inform this HAP are from the Local Wildlife Site Review undertaken between 2002 and 2006 inclusive. Areas covered by this review were largely the more rural parts of the county and factors affecting grasslands in the less rural, suburban and urban areas of the county may differ.

2. Current Status

The 20th century witnessed dramatic losses and degradation of all semi-natural grassland types, including the near eradication of traditional wildflower-rich hay meadows. Just 2% of the meadows that existed in the 1930's remain today, a loss of around 7.5 million acres across the UK (Plantlife).

Initially, many hay meadows fell to the plough as motor vehicles replaced draft animals. However the Second World War "Dig for Victory" campaign followed by the unprecedented agricultural change and intensification of the post-war drive for food security and the effects of the Common Agricultural Policy saw the majority of our traditional grasslands disappear. Haymaking, massively vulnerable to the vagaries of the weather, was replaced by silage technologies and our traditional pastures were largely ploughed and converted to arable, re-seeded with agricultural grass mixes or their ecological value was reduced by application of agrochemicals and overseeding to improve grazing and silage production.

Losses continued unabated throughout the 1980s and 1990s. In Worcestershire an estimated 45% of remaining semi-natural grasslands were damaged and 30% completely destroyed between 1975 and 2000, leaving only 25% of remaining unimproved grasslands intact (Stephen 1997, King 2004).

In 2004 England's remaining unimproved grassland resource was estimated at approximately 85,000 hectares (ha) (King 2004). For Worcestershire, the total area of **all** unimproved grassland types was estimated in 2018 to be 2,500-3,000 ha (Worcestershire Habitat Inventory cross-referenced with Worcestershire Grassland Inventory, Local Wildlife Sites and Site of Special Scientific Interest combined data), meaning that the county may hold 3.5% of the total resource.

2.1 Description of habitat, with distribution and extent of each

Celebrated in science, art, music and literature, wildflower and wildlife rich grasslands have long been regarded as timeless features of the English countryside. Our hay meadows in particular were the lifeblood of British agriculture and commercial activity; providing vital winter food for livestock and draft animals alike.

Semi-natural or traditionally managed grasslands provide a sustainable method of forage production, which although lower yielding than modern short-term sown grasslands are rich in trace elements, can be lower in gut parasites, are more drought tolerant and are therefore likely to be considerably more climate change resilient than modern agricultural grasslands. Traditional grasslands are important wildlife habitats, not just for their diversity of plants but also for their invertebrate, fungal and microbial diversity. They have considerable cultural importance and are more aesthetically pleasing than modern agricultural leys, adding colour and visual diversity to the landscape and the unique character of our countryside.

2.1.1 Lowland Neutral Hay Meadows and Pastures

The total England resource of unimproved lowland neutral grassland is estimated to be around 7282 ha (Rodwell *et al* 2007). The total extent of the Worcestershire resource is believed to be between 1500 and 2000 ha. From these figures it is possible that the county supports c.25% of England's remaining resource. Worcestershire is particularly significant for its lowland hay meadows and lowland flood meadows.

Lowland Hay Meadows

Sites with the classic National Vegetation Classification (NVC) MG5 community (*Cynosurus cristatus-Centaurea nigra*: Crested dog's-tail with knapweed swards) are widespread throughout the county with important concentrations in Malvern Chase, the Teme Valley, the southern Wyre Forest, parts of the Clent Hills, the Dodford area, the historic Forest of Feckenham (encompassing most of central and northern Wychavon), and on the Lias Group clays between Pershore and Inkberrow, the Lenches and the fringes of Worcester City. The Worcestershire Habitat Inventory (WHI) has 933 ha of habitat mapped that definitely conforms to the MG5 hay meadow species composition. Though the resource is widespread and can locally aggregate into distinct corridors it is mostly fragmented and some sites are ecologically isolated. Contiguous blocks exceeding 10 ha are unusual, with most sites being less than 5 ha in extent.

Lowland Flood Meadows

This term refers specifically to a rare type of grassland known as NVC MG4 (*Alopecurus pratensis-Sanguisorba officinalis*: Meadow foxtail with great burnet) grasslands, which are often referred to as 'Lammas' meadows due to the old management tradition of allowing commoners stock onto the site between Lammas (1st August) and Candlemas (1st February) for aftermath grazing.

The EU Habitats Directive identifies Lowland Flood Plain Meadows as a habitat that is important in a European context. Whilst none of the Worcestershire sites have been chosen as a Special Area for Conservation (SAC) under the Directive, Upton Ham Site of Special Scientific Interest (SSSI) is a very good example of this habitat. Other sites are very thinly scattered throughout the floodplains of the lower Severn and Avon Vales in the southern half of the county including in discrete areas around Evesham, Pershore, Tewkesbury, Kempsey and Upton-upon-Severn. The WHI, completed in 2008, has 26.3 ha of MG4 habitat mapped: in addition to this around 45 ha of previously little known MG4-type grassland was discovered between 2011 and 2013 around Eldersfield and Longdon.

Table 1. Neutral grassland NVC communities in Worcestershire (Button and Day).

NVC community	Distribution
MG3	<i>Anthoxanthum odoratum</i> – <i>Geranium sylvaticum</i>: Sweet Vernal-grass – Wood Crane's-bill grassland. A rare species-rich grassland type, occurring sparingly on the county's carboniferous deposits.
MG4	<i>Alopecurus pratensis</i> – <i>Sanguisorba officinalis</i>: Meadow foxtail – Great burnet grassland. Rare. Mainly large traditional flood meadows situated along the Avon and lower Severn floodplain. Traditionally called ham meadows such land was largely managed as common land in Worcestershire.
MG5	<i>Cynosurus cristatus</i> – <i>Centaurea nigra</i>: Crested Dog's-tail – Black knapweed grassland. Widespread. The naturally occurring grassland type over much of the county and most frequent in the grassland regions on the Triassic Mercia Mudstones and Lias Groups. It is now much reduced by agricultural improvement.
MG8	<i>Cynosurus cristatus</i> – <i>Caltha palustris</i>: Crested Dog's-tail – Marsh marigold grassland. Very rare. Only small fragments within other unimproved marsh grassland communities. Principally on the alluvial fenlands.

2.1.2 Lowland Calcareous Grassland

The total England resource of unimproved lowland calcareous grassland is estimated to be about 32,000 ha (Jefferson 1996). The WHI has 367 ha of this habitat type mapped. Calcareous grasslands are found on suitable geological strata throughout Worcestershire, although agricultural improvement has meant they are now limited in number and area. Whilst the Worcestershire resource is not a significant amount in a national context, it has great importance because it encompasses a range of scarce community types.

Table 2. Calcareous grassland NVC communities in Worcestershire (Button and Day)

NVC community	Distribution
CG1	<i>Festuca ovina</i> - <i>Carlina vulgaris</i>: Sheep's fescue and Carlina thistle grassland. Very rare within the Limestone districts. Mainly on steep slopes with thin infertile soils.
CG3	<i>Bromus erectus</i>: Upright brome grassland. Scarce but widespread. Occurs on suitable calcareous soils throughout Worcestershire.
CG4	<i>Brachypodium pinnatum</i>: Tor grass grassland. Rare.

	Apparently confined to Triassic and Jurassic limestones.
CG5	<i>Bromus erectus</i> - <i>Brachipodium pinnatum</i>: Upright brome and Tor Grass grassland. Rare. Similar sites to CG4.
CG7	<i>Festuca ovina</i> - <i>Hieracium pilosella</i> - <i>Thymus polytrichus/pulegioides</i>: Sheep's fescue, Mouse-ear hawkweed and Wild thyme / Large thyme grassland. Rare. Present on the Silurian, Triassic and Jurassic limestones. Often on the steepest slopes.

Calcareous grasslands are found in Wychavon District on the Jurassic Oolitic limestones of Bredon Hill and the Cotswold escarpment around Broadway, and on the limestones of the Blue Lias Formation (of the Lias Group) at Wood Norton and Windmill Hill. They are generally found on steep slopes with dry, thin soils and in association with rock exposures. They are characterised by CG3, CG4 and CG5 NVC communities.

Classic Worcestershire calcareous grassland sites also occur in scattered locations along the Silurian limestone ridges that run north from the Malvern Hills via Ankerdine Hill to Abberley Hill, and along the Teme valley. These grasslands occur as traditional meadows and pastures, under old orchards, alongside ancient woodlands and on old quarry sites and spoil heaps. Many have become rank in recent years and are in danger of reversion to woodland. These grasslands are generally CG3. Characteristic species include upright brome (*Bromus erectus*), ploughman's spikenard (*Inula conyza*), common rock-rose (*Helianthemum nummularium*), dyer's greenweed (*Genista tinctoria*), salad burnet (*Sanguisorba minor*), pyramidal orchid (*Anacamptis pyramidalis*) and wild thyme (*Thymus polytrichus*). Sites are generally small; however they tend to be very high quality in a national context, for example Penny Hill Bank and Quarry Farm Meadow SSSIs.

Calcareous grassland areas of no lesser importance include:

- A series of pre-historic earthworks, known as "tumps", in the south and west of the county. The calcareous grassland associated with these tumps supports scarce species such as wild liquorice (*Astragalus glycyphyllos*), fern grass (*Catapodium rigidum*), cut-leaved selfheal (*Prunella laciniata*), bee orchid (*Ophrys apifera*), wild clary (*Salvia verbenaca*) and knotted hedge-parsley (*Torilis nodosa*).
- The rhaetic (rocks formed in the late Triassic) escarpments running through the middle of the county east of Worcester mark a complex and convoluted series of steep embankments at the junction between Liassic and Mercia mudstones.
- Transitions from neutral to calcareous swards on slopes of the lias formations of the Feckenham forest.
- The rather anomalous and isolated occurrence of a calcareous flora with wild thyme, lady's bedstraw (*Galium verum*) and four uncommon species of thistle on parts of the Malvern Hills and Castlemorton Common.

2.1.3 Lowland Dry Acid Grassland

This category covers unimproved and semi-improved grasslands on free-draining and often sandy acidic soils.

Around 890 ha of dry acid grassland were surveyed in Worcestershire during the 1990s (Stephen 1997) and 912 ha are currently mapped on the WHI, however new sites continue to be discovered and the full extent of the resource remains unknown. Acid grasslands are found in the Wyre Forest and Bromsgrove Districts of north Worcestershire and in association with the Malvern Hills. The total lowland dry acid grassland resource for England is currently unknown.

It should be noted that acid grassland and heathland habitat can grade in and out of each other over time and at some point would reach a stage of needing to be reclassified. This would generate a loss in area of one habitat but of course a gain to the other and therefore should not necessarily be seen as a negative in the BAP process. On the Malvern Hills large areas are seeing an increase in Bilberry within stands of acid grassland; in contrast, at Burlish Top, a change in heath to acid grassland is currently being recorded. Details of any large reclassifications should be provided to the BAP.

Table 3. Acid grassland NVC communities present in Worcestershire (Button and Day)

NVC community	Distribution
U1	<i>Festuca ovina - Agrostis capillaris - Rumex acetosella</i>: Sheep's fescue, Common bent and Sheeps sorrel grassland. Rare. Generally confined to the acid soils of the Malvern Hills and Triassic sandstones of north Worcestershire. Often rather tussocky and frequently in a mosaic with other communities dominated by heathland, shrubs or bracken.
U2	<i>Deschampsia flexuosa</i>: Wavy hair grass grassland. Rare. The most common grassland community amongst heathland, usually where there is no grazing. Occurs on the Malvern Hills, around Kidderminster in places such as Hartlebury Common and Devils Spittleful, on the Clent Hills and Lickey Hills and in and around the Wyre Forest.
U4	<i>Festuca ovina - Agrostis capillaris - Galium saxatile</i>: Sheep's fescue, Common bent and Heath bedstraw grassland. Rare. A community of wetter, higher ground more associated with the west of Britain. One sub community U4b with <i>Holcus lanatus</i> Yorkshire-fog and White clover occurs on acid to neutral ground in the Malvern Hills and north Worcestershire around the Wyre Forest and Clent Hills area.
U5	<i>Nardus stricta - Galium saxatile</i>: Mat-grass - Heath bedstraw grassland. Very rare. Tiny fragments on hills.
U6	<i>Juncus squarrosus - Festuca ovina</i>: Heath rush - Sheep's-fescue grassland. Very rare. Occasional in the Lickey and Malvern Hills.
U16	<i>Luzula sylvatica - Vaccinium myrtillus</i>: Great wood-rush - Bilberry grassland. Very rare. Rock outcrops in the north and west of the county.
U20	<i>Pteridium aquilinum - Galium saxatile</i>: Bracken and Heath bedstraw grassland. Uncommon but widespread on acid soils, often on steep slopes on sites in the north and west of the county. Bracken cover is more than 25%.

Worcestershire contains only a small number of acid grassland SSSIs; however the existing SSSIs are generally large in extent, for example the Malvern Hills and Commons and Shadybank, Hollybed and Coombe Green Commons near Welland. Most of the acid grasslands associated with the Malvern Hills are owned and managed by the Malvern Hills Trust as public open space.

The Triassic sandstones around Kidderminster are of considerable interest, containing significant grassland elements within large heathland sites, for example the Devils Spittleful and Rifle Range SSSI, Hartlebury Common SSSI (which is on post glacial blown sand deposits) and Burlish Top Local Nature Reserve (identified in 2005 as being of SSSI quality (Stephen 2005)), as well as many small, dispersed and generally isolated blocks of old pasture. 19 such sites were surveyed in 2005 and recorded as being of Local Wildlife Site (LWS) quality; however the majority of sites remain unsurveyed.

Other important sites in North Worcestershire include Penorchard and Spinneyfields nature reserves (Worcestershire Wildlife Trust), Habberley Valley Local Nature Reserve (LNR) (Wyre Forest District Council), Waseley Hills Country Park (Worcestershire County Council) and the Clent Hills (National Trust) all of which contain areas of acid grassland.

2.1.4 Old Grassland

Worcestershire also contains a considerable, but as yet unquantified, 'old grassland' resource. Old grasslands are defined in this HAP as grassland that has suffered varying degrees of agricultural 'improvement' but are largely unploughed and are restorable as they still, on the whole, contain important remnant native plant assemblages, intact soil profiles and soil macro and micro-organism communities. They can also provide important and increasingly scarce refuges for waxcap and other grassland fungi assemblages. These grasslands, along with orchard grasslands and road verges, are vitally important elements of our natural heritage that must be recognized as an essential component of our countryside.

The completion of the WHI in 2008 enabled the amount of old grassland in the county to be estimated for the first time, with 230 ha mapped. This figure includes the communities MG1 and MG6 (see table 4 below) but also MG9 and MG10, which are the tussocky neutral grassland communities of poorly drained soils (grazing marsh), which develop when drainage has become impeded on sites with MG6 and MG7. The MG9 and MG10 communities are considered within the Worcestershire Wet Grassland BAP and so readers of this BAP are advised to consult both plans.

Table 4. 'Old grassland' NVC communities present in Worcestershire (Button and Day)

NVC community	Distribution
MG1	<p><i>Arrhenatherum elatius</i>: False oat-grass grassland. Widespread and frequent. Can include more species-rich sub-communities and their variants, such as the common knapweed sub-community and field scabious and meadow crane's-bill variants of the red fescue sub-community. MG1 is often restorable to MG4 and MG5, given appropriate changes to management regimes. MG1 is currently the dominant grassland community on road verges.</p>

MG6	<i>Lolium perenne</i> - <i>Cynosurus cristatus</i>: Rye grass and Crested Dog's-tail grassland. Widespread and frequent. Generally species-poor and characteristic of agricultural improvement but they tend to retain significant interest. MG6 can exhibit some more species-rich sub-communities such as the sweet vernal grass and yellow oat-grass communities (MG6b) in which meadow herbs such as common knapweed, ladies bedstraw and ox-eye daisy have local abundance, especially on ridge and furrow ridge-tops, steep banks or where there is a return to less intensive practices (Rodwell, 1992).
Other NVC communities	Worcestershire's 'old grasslands' contain remnant patches of many of the other NVC acid, neutral and calcareous grassland communities mentioned in this HAP.

2.2 Protection of the habitat

2.2.1 Legal protection

Lowland calcareous grassland (CG1, CG3, CG4, CG5, CG7) falls under the Habitats Directive Annex I description of 'semi-natural dry grasslands and scrubland facies on calcareous substrates'. Lowland flood meadow (MG4) falls under the Annex I description of 'lowland hay meadows'. Species-rich sub-communities of U4 and U5 acid grasslands are included within the Annex 1 description of 'species-rich *Nardus* grassland'.

Legal protection can be granted through the designation of a SSSI under the Wildlife and Countryside Act 1981 (as amended).

Lowland calcareous grassland, lowland dry acid grassland and lowland meadows are listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

Environmental Impact Assessment (EIA) Regulations: The various EIA Regulations are the transposition of the EU *Environmental Impact Assessment Directive* (2017) into UK law. The Key EIA Regulations that offer varying degrees of protection to grasslands are:

- **The Town and Country Planning and Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2018**
- **EIA (Agriculture) (England) (No.2) Regulations 2006**
- **Town & Country Planning (EIA) (England & Wales) Regulations 1999**
- **EIA (Forestry) (England and Wales) Regulations 1999**

and potentially:

- **EIA (Land Drainage Improvement Works) Regulations 1999**

2.2.2 Policy protection

Sites not meriting SSSI status can be listed as a LWS. Although not a statutory designation this status does confer some protection through the planning system. Traditional orchards and road verges, which can both contain species-rich grassland, can also be listed as LWS.

Biodiversity 2020 sets out the UK Government's strategic direction for biodiversity policy for 2010-2020, which centres around the recommendations made within Making Space for Nature (Lawton, 2010) of 'More, Bigger, Better, Joined'.

The 25-Year Environment Plan for the UK was published by the Government in 2018. It sets out the Government's approach to protecting and enhancing natural landscapes and habitats.

3. Current factors affecting the habitat

During the 20th century the primary mechanisms for loss of traditional lowland grasslands were related to agricultural intensification and production subsidy; the principal causes being ploughing and conversion to arable or re-seeded grass leys, application of agricultural chemicals and neglect of uneconomic and difficult to manage 'marginal' land. Whilst the pace of outright destruction has reduced considerably since the introduction and subsequent strengthening of the EIA Regulations losses continue to be occasionally reported.

Gradual deterioration of habitat quality remains a critical concern. Lowland neutral meadows and pastures in particular still remain vulnerable to agricultural intensification, especially where they occur on more fertile and better-drained soils where agricultural improvement is more cost-effective and its effects more immediate (Rodwell *et al* 2007). Conversely, the neglect and abandonment of areas that are uneconomical or difficult to farm in a modern agricultural context is also an important factor in grassland loss. During the 2002 to 2009 Local Wildlife Sites Review, 36% (170 ha) of the 464.5 ha assessed in the largely rural districts of Wychavon and Malvern Hills were found to have been damaged or destroyed due to extremes of management; i.e. either over-intensive management or neglect.

Semi-natural grasslands are increasingly used for non-agricultural purposes, chiefly horse grazing, which if properly managed can maintain grassland quality, but frequently leads to loss of biodiversity value and in some cases severe damage to or outright destruction of biodiversity interest. Garden extension and incorporation of grassland into the curtilage of converted agricultural buildings are regularly reported. These activities should be prevented, or minimised, by the planning process, however on occasion grassland surveys are still failing to be requested and appropriate planning enforcement is inconsistent. Other damaging factors include off-road vehicle impact, unauthorised/illegal tipping of waste and soils and the inappropriate granting of permissions for dumping of waste and soils.

In summary, inappropriately intensive management or its opposite, the neglect of management, are the key drivers of change in grassland quality. The following is a full list of the causes and factors affecting grasslands in Worcestershire:

- **Decline in the economic viability of traditional grasslands.** As low intensity livestock farming becomes increasingly unviable and unappealing this has become the precursor to many of the factors listed below.
- **Change in ownership/tenancy.** Research conducted by the Ministry of Agriculture, Fisheries and Food (ADAS, 1992) into neutral grassland ownership nationally showed that 46.5% of grassland was owned by

people aged 60 years or over. This proportion is likely to have increased significantly since the early 1990s. Whilst the research was based on neutral grassland, trends for acid and calcareous grassland are likely to be similar. Experience shows that grasslands are at the greatest threat of damage or destruction by the factors indicated below during change of ownership. The situation is exacerbated by the trend for younger generations to move away from farming and grasslands to be purchased by people who do not possess the knowledge and skills to manage them appropriately.

- **Ploughing: Conversion to temporary ley grasslands or arable.** Historically ploughing has accounted for a significant proportion of the destruction of grassland sites, both nationally and in Worcestershire (Stephen, 1997). Whilst it remains a problem, available evidence suggests that ploughing of grasslands has occurred significantly less since the enacting of the EIA Regulations as awareness amongst the farming community continues to rise. Nevertheless three sites, two Local Wildlife Sites and one Grassland Inventory site, are known to have been badly damaged or destroyed since 2000. Many meadows and smaller paddocks fall outside of the 2 ha threshold of the EIA regulations.
- **Agricultural 'improvement'.** Application of fertilisers, herbicides / pesticides, lime and re-seeding continue to cause deterioration of habitat quality and remain a grave concern. The gradual damage and destruction of biological interest that is caused by these activities is difficult to detect and, where suspected, difficult to prove to the satisfaction of the EIA regulations. As a consequence, the regulations are unlikely to be effective in discouraging this activity.
- **The widespread use of silaging as a means of feeding cattle,** in particular within the dairy industry, in preference to growing a species-rich hay sward.
- **Intensive grazing / over-grazing and inappropriate seasonal grazing.** Over-grazing leads to removal of species from the sward over time and the permanent loss of species that do not have a persistent seed bank. Grazing a hay meadow in spring and summer can result in loss of species diversity through suppression of vegetative growth, flowering and seed setting. The problem is particularly severe in areas of the county that have experienced considerable expansion of horse ownership, specifically where stocking density is too high and or continuous, and additional appropriate management such as topping and dung clearance is absent, habitat quality tends to be drastically diminished over time (King 2007). In other parts of the county over-stocking with sheep can have very deleterious effects, suppressing sward diversity and encouraging problems with invasive species such as creeping thistle (*Cirsium arvense*).
- **Development and change of use.** Often associated with change of ownership, the loss of sites through conversion to domestic gardens, development and for horse stabling/manège construction continues to be a problem. Exact losses to developments granted planning permission are currently unknown but examples do exist.

- **Abandonment, neglect and under-grazing.** General neglect, i.e. lack of management or insufficient management intensity, is a damaging factor that can lead to considerable loss of species and habitat diversity. Invasion by scrub and bracken has caused loss and damage to a substantial number of sites.
- **Unauthorised tipping/importation of waste and soils.** Sites are regularly damaged and destroyed by unauthorized tipping and through ill considered permissive tipping of soils and other waste derived from development and landscaping schemes. The lack of financial support available for the removal of fly-tipped waste on agricultural land is a significant issue.
- **Afforestation.** This continues to cause loss and degradation of sites.
- **Quarrying.** Sites continue to be lost, although these are generally associated with older permissions granted for sand and gravel extraction on the river terraces. Worcestershire County Council, aggregate extractors and landowners must ensure that losses are minimized as far as possible, and that where losses are unavoidable appropriate restoration is undertaken, taking full advantage of turf translocation, topsoil storage and seed harvesting opportunities. Enhancement opportunities should also be a condition of future permissions.
- **Scarcity of appropriate expertise, livestock and machinery.** The widespread disintegration of the cultural and social fabric associated with traditional farming (Rodwell *et al* 2007) has the knock-on effect of reducing availability of people with appropriate expertise, as well as machinery and livestock that is suited to traditional grassland systems.
- **Loss, lack of availability and low rates of grants.** The reduction or removal of grant schemes applicable to owners of small meadows, paddocks and horse pastures who are outside of the farming community. Narrow targeting and low rates of grants restricts the uptake of agri-environment schemes.
- **Fragmentation/isolation and small site size.** The county grassland resource comprises predominantly small and isolated sites. As a consequence sites tend to be vulnerable to external factors, remain at high risk of species extinction and have poor climate change resilience. Fragmentation of the resource largely prevents increase in species distribution and recolonisation of locally extinct species. It is hoped that the move away from site focused conservation effort toward landscape scale conservation and enhancement will begin the process of reversing this trend. The importance of 'old grassland' habitat must be recognized in this context of restoration and improving connectivity between sites.
- **Recreational pressure.** Deleterious impacts include trial/quad-biking, mini-moped and 4WD vehicle usage, dog walking, horse riding, mountain biking and general visitor pressure.

- **Atmospheric pollution.** The impact of eutrophication caused by atmospheric nitrogen deposition has not been assessed in Worcestershire; however at a national level it is believed that this is likely to be a significant factor in grassland deterioration (King 2007).
- **Riverine eutrophication.** Where grasslands are dependant on groundwater or are periodically inundated by floodwater eutrophication caused by agro-chemicals such as phosphorus is likely to be a detrimental factor (Rodwell, 2007).
- **Anoxia** as a result of prolonged flooding and poor surface drainage may increase if flooding frequency and duration continues to increase. Increased frequency of summer flooding events is likely to be particularly damaging, especially during the flowering season.
- **Climate change.** The likely impacts of and resilience of traditional grasslands to climate change remain largely unexplored and unknown. Worcestershire's nationally important lowland neutral meadow and pasture resource provides a valuable opportunity to identify, monitor and better understand changes that may be the result of climate change.
- **World markets.** The effects of climate change, coupled with increasing population, mean that some areas of the world will be increasingly unable to produce and supply raw food products at required rates and affordable prices. This in turn will dictate the global availability and prices of commodities such as grain, which the British farming industry will be put under pressure to respond to.

4. Current Action

4.1 Local protection

Around 950 ha of grassland (**all** types) has been designated as SSSI to date (2018) in Worcestershire and a similar figure listed as LWS. Whilst the SSSI series incorporates many of the best grasslands, there are still a number of SSSI quality sites that remain outside of the system. LWS quality grasslands continue to be discovered and assessed as resources allow. Whilst LWS have no statutory status, they are identified in Local Plans and are protected, to a degree, by planning policy and by the various EIA Regulations.

The discovery of additional possible LWS or SSSI-quality grasslands should be reported to Worcestershire Biological Records Centre.

4.2 Habitat management and programmes of action

Agri-environment funding scheme options have included those for the creation, restoration and management of semi-natural grassland. Management of many of Worcestershire's high value grassland sites is supported by Environmental Stewardship or Countryside Stewardship payments.

Financial support is generally unavailable and management advice difficult to obtain for the considerable number of important grasslands within the county that are not eligible for agri-environment funding. Occasional one-off grant funding becomes available for project delivery, for example:

- Funding from SITA Trust enabled Worcestershire Wildlife Trust to run the 'Restoring Worcestershire's Grasslands' project between 2012-2014. This brought 110 ha of grassland sites (many listed as LWS) back into good management through works such as fencing and scrub clearance.

4.3 Survey, research and monitoring

Worcestershire Wildlife Trust undertook a complete review of LWS between 2002 and 2009. Tables 5 to 8 below show trends derived from the 2002-2006 period of that review for the grassland sites and sites that contain a grassland component.

Table 5. A snapshot of key factors affecting grassland sites and mixed habitat sites containing grassland that were re-listed during the Local Wildlife Sites review. Data extracted from the period 2002-2006 and supplied by Worcestershire Wildlife Trust.

Grassland Type	No. of sites	Total area assessed (ha)	Total area damaged or destroyed: (ha)	Total intact area (ha) (optimal or sub-optimal/declining) (ha)	Sites in Fair to Good condition	Sites showing Neglect/scrub impact	Sites showing intensive management (agri-chemicals overgrazing etc.)	Estimated area of BAP quality grassland (ha)
Neutral	132	464.42	170.62 (36%)	293.80	49	24	31	280+
Calcareous	14	70.93	14.73 (20%)	56.20	6	3 ?	3?	34+
Acid	9	125.00	-	125.00	9	3	-	125
TOTALS		660.35	185.35 (28%)	475.00 (72%)	64 [50%]	30 [23%]	34 [27%]	439

Table 6. Categories of damage / deterioration / destruction that led to the de-listing of grassland sites during the 2002-2006 grassland Local Wildlife Sites review.

Cause of damage / deterioration / destruction to de-listed sites	No. of sites affected
Management intensification (agri-chemical and/or overgrazing)	13
Neglect / dereliction	6
Ploughing / conversion to arable	1
Total number of grassland sites de-listed as a result of damage / deterioration / destruction.	20

Table 7. Factors affecting 130 grassland Local Wildlife Sites reviewed between 2002 and 2006.

Proportion of the 155 re-listed grassland sites that are in near-optimal condition	50%
Proportion of sub-optimal sites affected by over-intensive management (agri-chemicals and/or overgrazing)	27%
Proportion of sub-optimal sites affected by neglect / dereliction	23%
Proportion of sites where damage / destruction is linked with change of owner / tenant / grazier	5%
Proportion of sites destroyed by ploughing	4%

Table 8. Additional data derived from the 2002-2006 Local Wildlife Sites Review.

Number of re-listed Local Wildlife Sites that contain grassland	75
Sites where deterioration of grassland has led to de-listing (removal of LWS status)	20
Newly listed (but previously recognised) sites that contain grassland.	27
Newly listed sites (not previously recognised) that contain grassland	7

In 2009 an investigation by Worcestershire Wildlife Trust (commissioned by Worcestershire County Council) into the condition of 76 grassland sites found that 31 of the surveyed field units (41%) passed the positive indicator species test and were in good condition. 45 of the surveyed units (59%) failed and were in sub-optimal or declining condition. The main causative factors were over management and intensive grazing rather than under-management and neglect. Over-management included switches from hay to pasturing (spring grazing). For much of the sample, this was attributable to spring grazing by horses.

Worcestershire Wildlife Trust produced a report in 2014 on the status of the county's LWS grasslands for the period 2005-2013. From a figure of 1080 ha of all unimproved semi-natural grassland types within the LWS system during this period it was estimated that 230 ha had been lost, damaged, impaired or reduced to a sub-optimal condition, representing a 22% depletion rate in 8 years. In addition, 7.3 ha of grassland LWS was known to have been destroyed by ploughing during this period.

At Croome Park National Trust plan to instigate a project in 2019 to monitor and compare botanical and invertebrate diversity in grasslands managed under different regimes, including holistic (low-intensity) grazing areas, conventional grazed areas and areas cut for hay.

5. Associated Plans

Wet Grassland, Traditional Orchards, Road Verges, Lowland Heathland, Slow-Worm, Hornet Robberfly, Grizzled Skipper.

6. Aim

The county's reputation as a national stronghold for biodiverse grassland habitat, in particular lowland neutral and floodplain grasslands, has been further enhanced through a focus on the protection, restoration and sustainable management of Worcestershire's existing grassland resource

7. Objectives

- Use Environmental Character Area profiling to geographically target defined corridors and clusters of grasslands, as delineated by the county Grassland Inventory, SSSI and LWS networks, to focus efforts to protect, restore and maintain current known good quality or restorable grasslands
- Re-establish a county Grasslands Forum that both actively involves and engages grassland owners and managers
- Consolidate and communicate a suite of clear interventions representing different landowner and site requirements to be available to those seeking advice on grassland management or on obtaining financial support
- Demonstrate to different audiences the multifunctional uses of grasslands, linking this to delivery of ecosystem services and 'public goods', through events and publicity focused on flagship sites

- Encourage the maintenance and improvement of floristic diversity on existing permanent pasture through good grazing management and the use of species-rich hay as supplementary feed
- Engage proactively with horse owners from the planning (change of use) stage onwards to give information and advice on best practice grassland management
- Maintain an active programme of surveying, monitoring and data collection and ensure records and maps remain up to date, specifically the Worcestershire Habitat Inventory, the Local Sites inventory and the MAGIC Geographical Information System.
- Focus on securing grassland habitat connectivity in Green Infrastructure delivery to reduce levels of fragmentation
- Develop the methodology and concept of working with groups of landowners to promote landscape-scale change and logistical efficiency, especially within target grassland corridors and cluster areas

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