

Cabinet

**Thursday, 23 November 2023, 10.00 am, Lakeview Room,
County Hall**

Membership

Councillors:

Cllr Simon Geraghty (Chairman), Cllr Marc Bayliss, Cllr Adrian Hardman, Cllr Marcus Hart (Vice Chairman), Cllr Adam Kent, Cllr Steve Mackay, Cllr Karen May, Cllr Richard Morris, Cllr Tracey Onslow and Cllr Mike Rouse

Background Documents

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2023

Worcestershire State of Nature Report



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Foreword

Emily Barker - Chair, Worcestershire Local Nature Partnership

The Worcestershire Local Nature Partnership welcomes and endorses the publication of the county's first full State of Nature Report 2023, which sets out a comprehensive picture of the successes and the challenges currently facing nature on our doorstep. The crisis facing our native habitats and species is a serious one, driven by threats such as habitat loss and fragmentation, pollution, invasive non-native species and climate change.

Worcestershire is special: the county contains around 8% of England's remaining traditional orchards, and up to 25% of England's remaining lowland meadows. Nationally or regionally important populations of species such as the brown hairstreak butterfly, the noble chafer beetle, the Deptford pink and the slow worm are found here, alongside threatened species such as the violet click beetle and the twaite shad.

The State of Nature Report celebrates some of the incredible work already being delivered across Worcestershire to restore nature, but does not shy away from highlighting the challenges that remain in our county: for example, just 49.2% of Sites of Special Scientific Interest are in Favourable condition, 27.25% of watercourses are in Bad or Poor ecological condition, and within the last decade we have lost at least a further 123ha of semi-natural grassland to development or conversion to other land uses. There is much more work to be done, locally and nationally, if nature's decline is to be halted and then restored.

The publication of this report comes at a crucial time as the county embarks on the preparation of a Local Nature Recovery Strategy. The strong partnership working ethic that exists between local communities, conservation groups, landowners, public bodies, businesses and the Local Nature Partnership within Worcestershire will be critical to delivering the step change necessary to reverse the decline in nature. I hope that in reading this report all of us will be inspired to consider how, through our work and in our personal lives, we can take action to help secure nature's recovery.

Section 1: Geology, Landscape and Protected Areas





Cherry orchard in the Teme Valley © Rebecca Lashley

Worcestershire's Geology and Soils

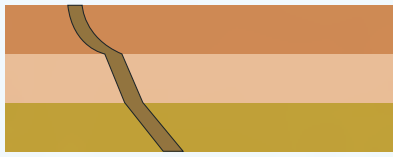
Kay Hughes, Julie Harald, and Professor Ian Fairchild
from Herefordshire and Worcestershire Earth
Heritage Trust

Our landscape and natural environment have been shaped by hundreds of millions of years of geological activity, resulting in a mosaic of different rock types that yield a rich patchwork of soil types. In fact, Worcestershire is one of the most diverse counties in England for its geology and soils, and hence its potential to support diverse wildlife habitats.

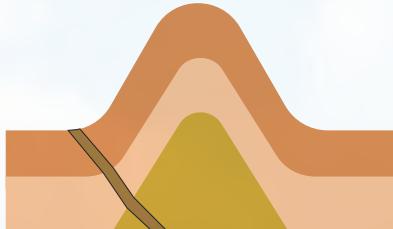
Geodiversity is defined as the variety of rocks, landforms, minerals, fossils, natural processes, superficial deposits and soils in the environment. Geodiversity is fundamental to biodiversity, affecting both water and land-based habitats. Mapping of bedrock, superficial geology and topography provides a powerful predictive tool for the location of soil types and habitats.

Rocks degrade to soil when exposed to the weather. Different rocks contribute sand, clay, lime and other minerals in various proportions. Different life forms flourish depending on soil structure and its chemical content. Life forms in turn have a major effect on soil structure and chemistry. Life in the soil takes many forms and is an integral part of soil formation, while life beyond the soil contributes energy, oxygen and organic matter.





Sedimentary rocks form in flat layers, igneous rocks intrude from depth.

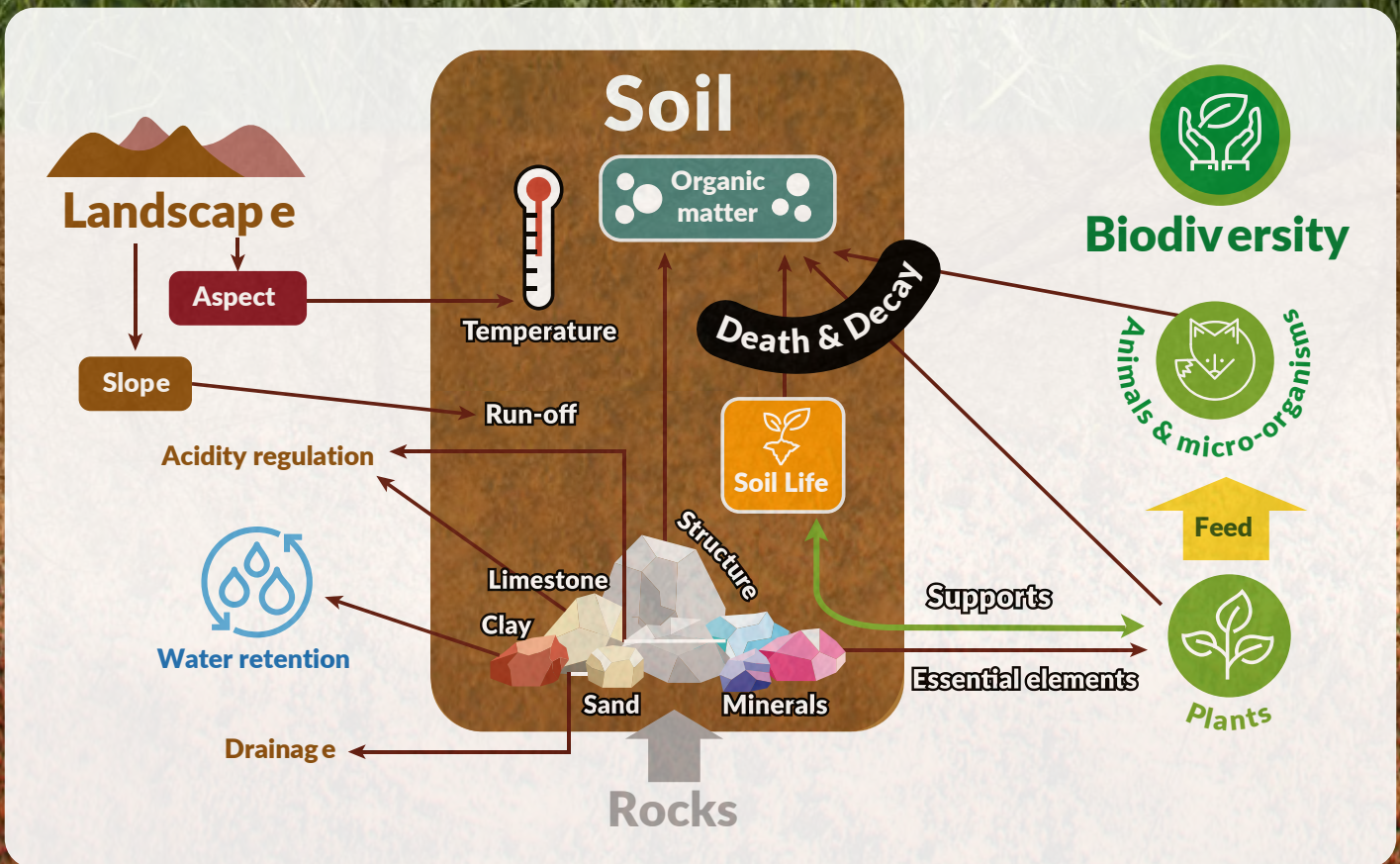


Layers are folded by mountain-building.



Erosion carves the landscape, and leaves debris from glaciers and rivers.

Complex patterns of bedrock result when layers of sediment are folded, deformed and then eroded. Intrusion of molten rock from deep in the earth adds to the complexity. New rocks form on top of old landscapes and the cycle repeats to create complex patterns. The bedrock found in Worcestershire is between 677 and 170 million years old and has been folded and eroded several times, resulting in a great variety of bedrock types near the surface. More recent action by glaciers and rivers has removed newer rocks and shaped the landscape, leaving superficial deposits on the hills and in the valleys.



Underground soil layer of cross-section earth with grass on the top © Getty Images

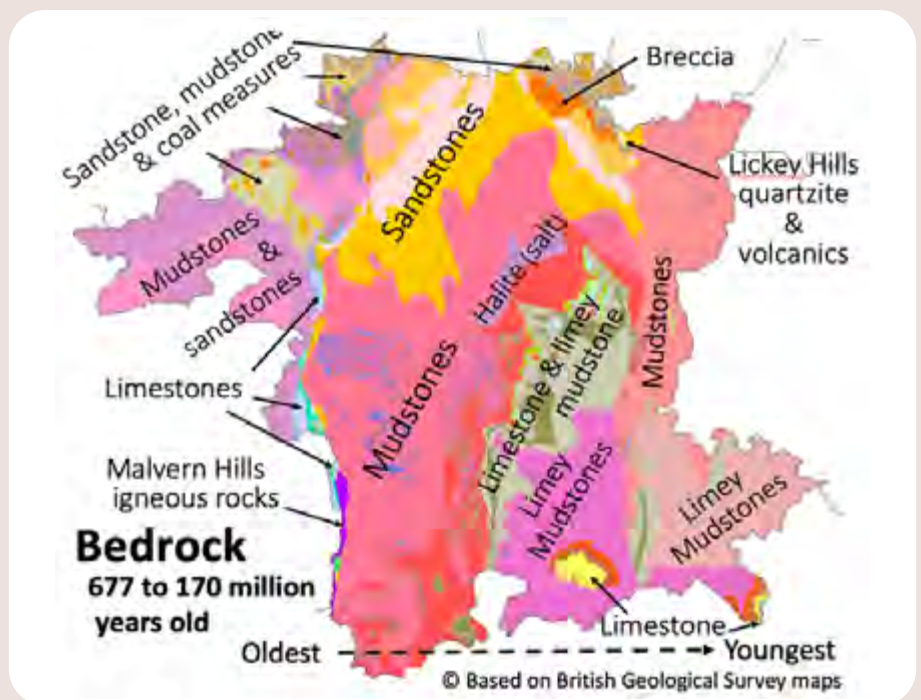
Worcestershire's Geology and Soils



Close up of hands holding soil © Getty Images

Bedrock of Worcestershire

The Precambrian, igneous rocks of the Malvern Hills are the oldest rocks in the county. The Ordovician rocks of the Lickey Hills are also very old. In both cases they were thrust up from depth by powerful earth forces, as were the Silurian limestones that formed over the igneous rocks to extend the north-south line of the Malvern Hills. The area occupied by these rocks is small, but the rocks are very distinctive, enhancing geodiversity and supporting diverse habitats and species.



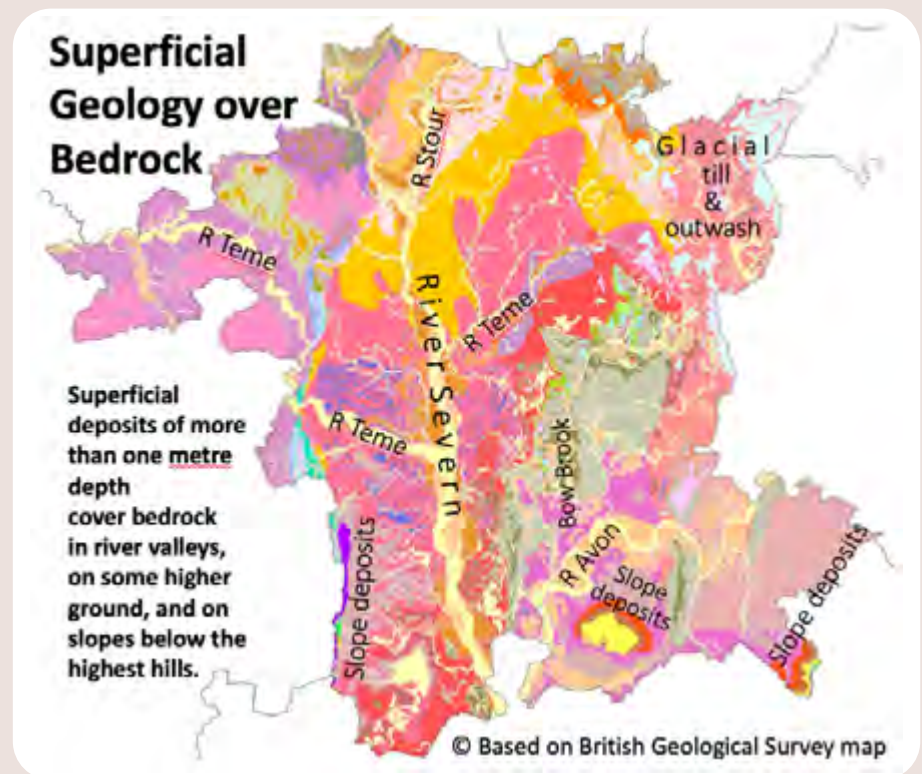
Rocks to the west of the Malvern Hills are mostly mudstones with sandstone plateaux, formed in hot, dry conditions. Later, the Carboniferous rocks in the far northwest and northeast formed near a tropical sea coast. After an episode of mountain-building, Triassic sandstones and mudstones formed in a hot desert, as a rift valley opened up down the centre of the county. Later, in the Jurassic Period, sea encroached over most of England. Limestones and limey muds settled on the seabed, forming the rocks found in the east of the county.

Landscape and Superficial geology

Much more recently, the land was tilted upwards to the northwest, rising above sea level. At the same time, the world cooled. Ice sheets advanced and retreated over Britain, removing huge volumes of younger bedrock. Glacial deposits were left by the retreating ice, and some of these remain on high ground in the northeast.

Rivers fed by ice from the north continued to deepen their valleys. The remnants of old riverbeds formed sand and gravel terraces on valley sides. Alluvium settled on modern flood plains along with occasional, rare patches of lowland peat. Copious slope deposits that formed on higher hills spread many kilometres downslope. This rich variety of rock

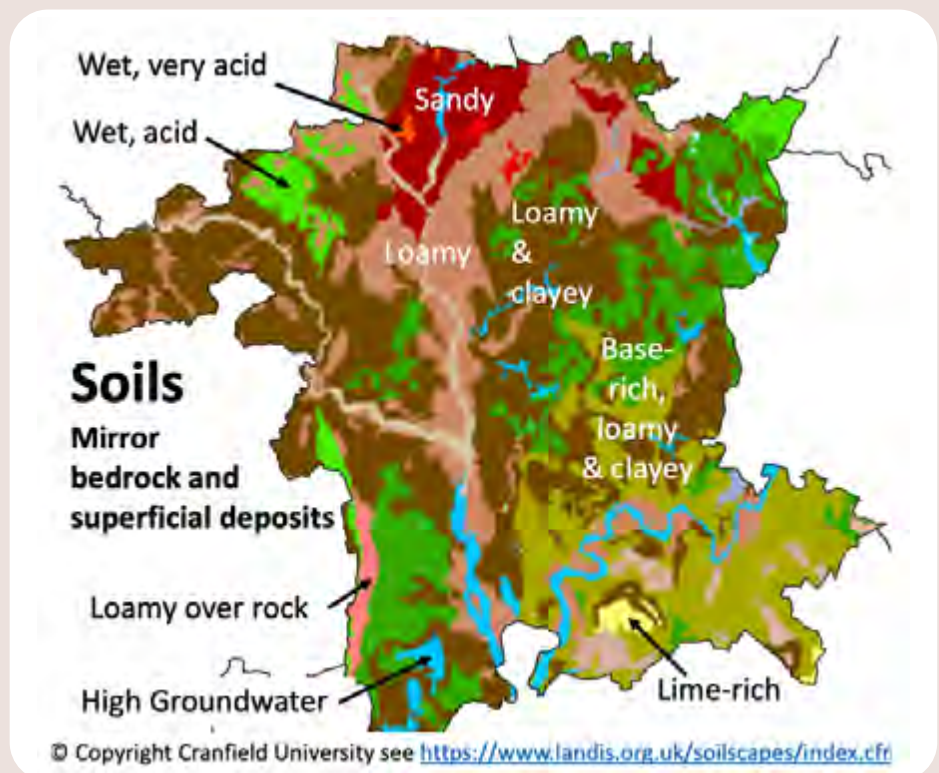
forms the basis of the county's soils and wildlife habitats.



Soils

When the ice retreated around 10,000 years ago diverse soils developed. There is a strong link between soils and the underlying geology, with soil type then modified by factors including relief, drainage, land use, tree cover and human activity. Soil type can change from one field to the next.

Land use by people can have a major impact on soils: urbanisation, pollution and intensive farming methods can all have damaging effects. Soils are a finite resource and must not be taken for granted: it can take 500 years for just 2cm depth of topsoil to form, but human activity can remove or destroy it in just a few years.



Landscape Character Areas

Adam Mindykowski from Worcestershire County Council

Landscape character describes the sum of the natural and cultural processes that shape and create unique landscapes. The differences are sometimes subtle but variations in our landscape support different habitats, species and characteristics inherited from past generations. Landscapes are not static. The process of change continues, and nature recovery can contribute towards the positive conservation of landscape character.

Landscape Character in Worcestershire

The Worcestershire Landscape Character Assessment (LCA)¹ was produced in 1997-99 by Worcestershire County Council. The LCA was enhanced between 2008-2012 to include a landscape condition and sensitivity assessment before being developed into a digital resource and made available via an interactive GIS website².

The Worcestershire LCA comprises 449 Landscape Description Units and 1,257 Land Cover Parcels. These are nested within 22 Landscape Character Types that describe the broad character of the rural landscape. Urban areas were not included in the original assessment but were mapped for the purpose of highlighting non-rural areas. A detailed Technical Handbook³ describes the process and factsheets⁴ were produced for each of the Landscape Character Types, setting out primary, secondary, and tertiary characteristics along with constraints and opportunities that are likely to be encountered within each landscape type. The LCA Supplementary Guidance⁵ was published in 2012.

1 <https://www.worcestershire.gov.uk/environmental-policy/landscape-character-assessment>

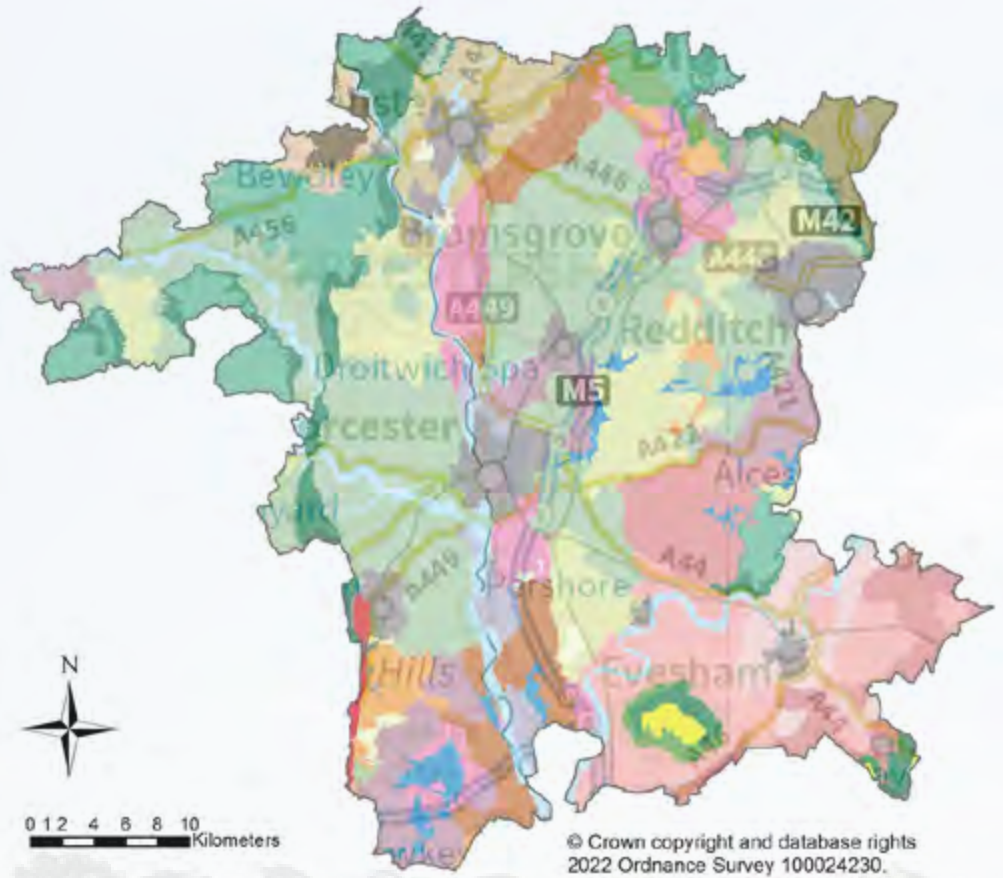
2 <https://gis.worcestershire.gov.uk/website/LandscapeCharacter/>

3 [lca th.pdf \(worcestershire.gov.uk\)](#)

4 <https://www.worcestershire.gov.uk/environmental-policy/landscape-character-assessment>

5 [Landscape assessment 31.7.12_WCS STRATEGY 22.9.08 SINGLE PAGE \(worcestershire.gov.uk\)](#)





Legend

Landscape Type

- | | | | |
|---|------------------------------------|--|--|
|  | Enclosed Commons |  | Settled Farmlands with Pastoral Land Use |
|  | Estate Farmlands |  | Timbered Pastures |
|  | Forest Smallholdings and Dwellings |  | Timbered Plateau Farmlands |
|  | High Hills and Slopes |  | Unenclosed Commons |
|  | Limestone Estatelands |  | Urban |
|  | Principal Settled Farmlands |  | Village Claylands |
|  | Principal Timbered Farmlands |  | Village Farmlands with Orchards |
|  | Principal Village Farmlands |  | Wet Pasture Meadows |
|  | Principal Wooded Hills |  | Wooded Estatelands |
|  | Riverside Meadows |  | Wooded Forest |
|  | Sandstone Estatelands |  | Wooded Hills and Farmlands |
|  | Settled Farmlands on River Terrace | | |

Landscape Character Areas



Wooded Estatelands at Ockeridge © WCC

The Nine Key Indicators of Character

The Landscape Character Types were defined by three definitive cultural indicators of landscape character and further refined by six descriptive indicators. The cultural indicators are Tree Cover Character, Settlement Pattern and Land Use. The descriptive indicators are Characteristic Features, Field Boundaries, Enclosure Pattern, Tree Cover Pattern, Indicative Ground Vegetation and Spatial Character.

The cultural indicators are:



Tree Cover Character



Settlement Pattern

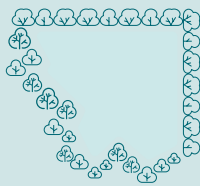


Land Use

The descriptive indicators are:



Field Boundaries



Enclosure Pattern



Tree Cover Pattern



Indicative Ground Vegetation



Characteristic Features



Spatial Character

Broad Character Trends That Define Worcestershire's Landscape

The Landscape Character Types define distinctive areas at the sub-county scale. They support the identification of opportunities for nature recovery, showing where restoration of habitat networks can also reconnect and enhance landscape features.

Case Study: Ancient countryside with hedgerow and woodland networks

The Principal Timbered Farmlands Landscape Type and the Wooded Estatelands Landscape Type both support intricate and long-established networks of hedgerows with hedgerow trees, native woodlands and mixed farming that includes fields of permanent pasture. Hedgerow networks and woodlands in the Principal Timbered Farmlands Landscape Type are distinctly more sinuous and irregular in shape compared with those within Wooded Estatelands. However, both have been affected by loss of hedgerows, hedgerow trees and grassland, thereby degrading key characteristics and condition. Restoration of hedgerow and woodland networks and new planting to support nature recovery are key opportunities in these landscapes.



Principal Timbered Farmlands at Wichenford © WCC

Case Study: Open farmland habitats with arable margin networks

The Principal Settled Farmlands and Estate Farmlands Landscape Types are comprised of larger fields with a greater emphasis on arable farming and no blocks of woodland. Tree cover is generally associated with watercourses, groups of trees planted around settlements and occasional small areas of plantation. These landscape types are unified by a more open character with more frequent long-range views. Hedgerows, hedgerow trees and other linear landscape features remain important, and have been affected by the same issues of fragmentation and loss evident across most Landscape Types in Worcestershire. However, these more open landscapes present opportunities for the creation or enhancement of habitat to support farmland birds and networks of floristically enhanced arable margins for pollinators.



Principal Settled Farmlands © WCC

National Character Areas

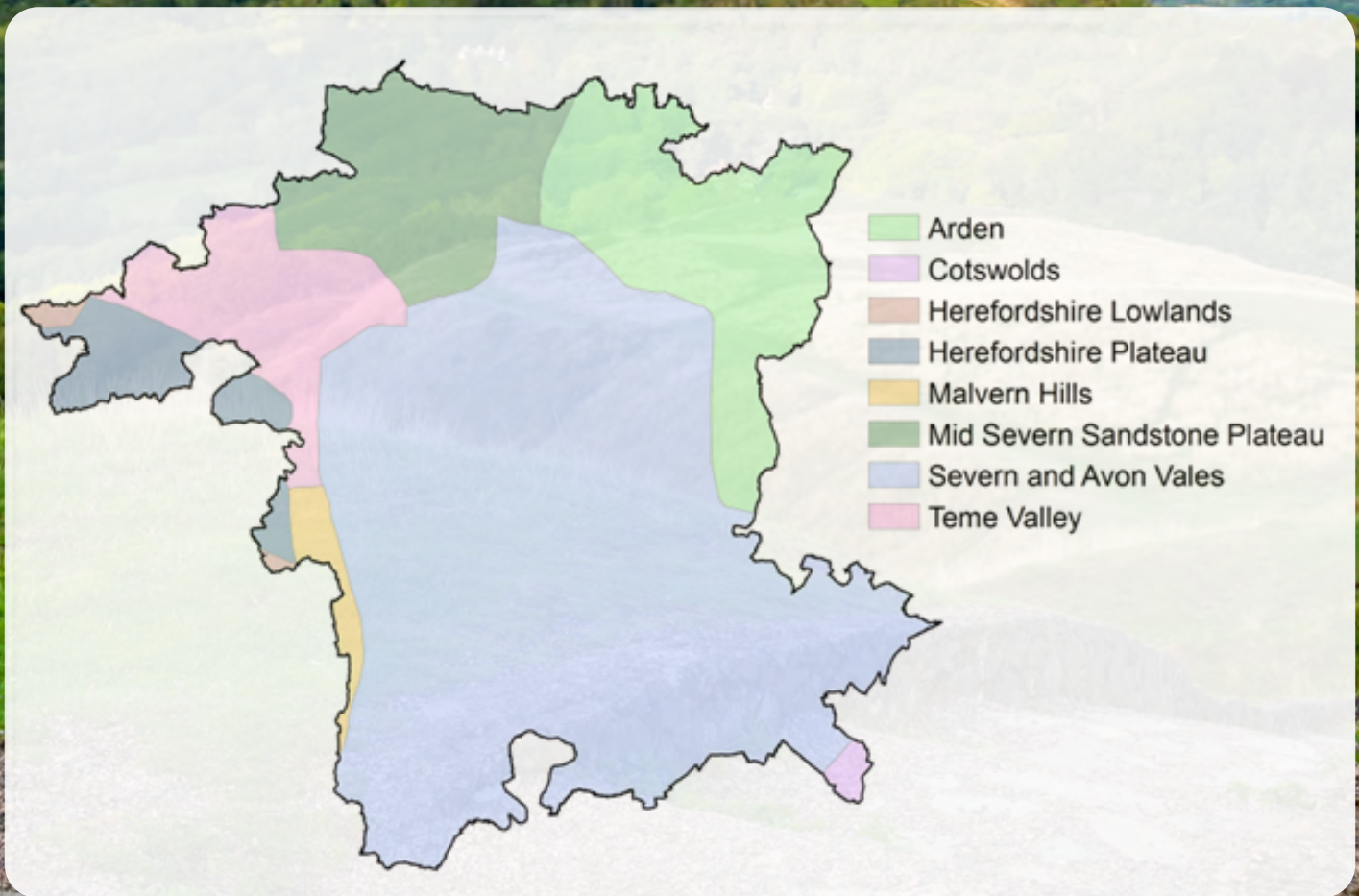
Adam Mindykowski from Worcestershire County Council

A National Character Area (NCA) is an area of distinct and recognisable landscape character at a strategic scale. Defined by Natural England, NCA boundaries follow natural lines in the landscape rather than county or district boundaries. England is subdivided into 159 NCAs, with the character of each described in a Character Area Profile⁶. Each profile incorporates a Statement of Environmental Opportunity (SEO) which seeks to identify opportunities to both protect and strengthen landscape character as well as build landscape resilience and capacity to absorb or accommodate change.

Eight NCAs incorporate parts of the county of Worcestershire.



⁶ National Character Area profiles - GOV.UK (www.gov.uk)



Top of the Herefordshire Beacon © Getty Images

National Character Areas

Mid Severn Sandstone Plateau (no. 66)



Mixture of heathland, acid grassland and scrub oak woodland at Pound Green Common © Historic England

The central part of the Severn and the lower Stour river catchments and regionally important for water supply. Predominantly rural, with large arable fields in the central and eastern areas and remnant lowland heath and estate parkland. The plateau is drained by fast-flowing tributaries which have incised the Permian and Triassic rocks resulting in many steep-sided, wooded dingles. Wyre Forest (NNR/SSSI), one of the largest ancient lowland oak woodlands in England, hosts nationally important species.

Herefordshire Lowlands (no. 100)

A mixed-farming landscape. Woodland is a significant feature on hill tops and valley sides. Represented in Worcestershire only by a very small area southwest of Suckley.

Arden (no. 97)



Mixed native and coniferous woodlands on the Clent Hills © Historic England

A gently rolling landscape of farmland and wood pasture south and east of Birmingham and extending into north Worcestershire to meet the Severn and Avon Vales. Higher ground to the west includes the Clent and Lickey Hills. Fragmented areas of semi-natural and ancient woodland and, in places, distinctive piecemeal enclosed fields with mature hedgerow trees define the overall character.

Herefordshire Plateau (no. 101)

A small area falls within Worcestershire in the extreme northwest. A gently rolling plateau of Old Red Sandstone rock overlain with shallow, clay soils, small irregular fields of mixed farming, ancient woodland, and species rich hedgerows. The settlement pattern is dominated by dispersed farmsteads.

Cotswolds (no. 107)

A predominately oolitic Jurassic limestone landscape of which only a small area, around Fish Hill, extends into Worcestershire: a steep scarp with expansive views to the northwest. The limestone creates a strong sense of place and unity which carries through to buildings and walls. The distinctive character of the area is reflected through its designation as an Area of Outstanding Natural Beauty.

Teme Valley (no. 102)



Mosaic of habitats in the Teme Valley © Historic England

Composed of Silurian limestones and siltstones and capped with Permian Haffield Breccia, the undulating landscape of the Teme Valley retains its historic character of dispersed settlement, with a strong tradition of timber-framing and notable concentrations of hop kilns and cider houses. The Abberley Hills are the most conspicuous landscape feature, forming a visual continuation of the north–south Malvern Hills ridge. The fertile, red soils support a mosaic of farmland, enclosed common, woodland, ancient woodland, traditional orchards and hop yards. The River Teme is nationally important for nature conservation.

Malvern Hills (no. 103)



Malvern Hills ridge with earthworks of British Camp at centre © Historic England

Dominated by a prominent, narrow ridge of high, unenclosed hills of acidic grassland, woodland habitat, and significant archaeological sites. Surrounded by large pockets of lowland heath and bracken, traditional orchard, hop yards, meadows, species rich hedgerows with low wooded escarpments at Eastnor and the Suckley Hills, and a mosaic of woodland and pasture to the west. A largely mixed pastoral landscape, interspersed with estate landscapes, with extensive areas of wood pasture and parkland. Most of the area lies within the Malvern Hills AONB. The varied geology incorporates some of the oldest rocks in England.

Severn and Avon Vales (no 106)



Low lying agricultural landscape east of the River Severn © Historic England

A predominately low-lying, vale landscape. The Cotswolds outliers of Bredon Hill and the Broadway scarp rise above the vale. Field

patterns are diverse and woodland coverage and age structure is variable. Hedgerow trees, historic parkland and traditional orchard contribute to overall tree cover. Small commons of acidic grassland are prevalent in the west. Fragments of unimproved calcareous grassland survive as does unimproved neutral grassland, around Feckenham and Malvern Chase. Floodplains include grazing marsh, willow pollards and alders. Market gardening, traditional orchards and arable farming dominate the Vale of Evesham. The settlement pattern exhibits varying levels of dispersal and nucleation with traditional building materials evident, including timber-frame, red brick and grey lias and Cotswold stone.

Environmental Character Areas

Cody Levine from Worcestershire County Council

The character of Worcestershire’s natural environment varies across the county. The Environmental Character Areas (ECAs) were developed by the Worcestershire Green Infrastructure Partnership⁷ to assess and map Green Infrastructure (GI) provision. GI is the network of green spaces and natural habitats within both our urban and rural landscapes⁸. It includes public parks, nature reserves, river and canal corridors (‘blue’ infrastructure), allotments, gardens, street trees and other wildlife-friendly spaces. Good GI allows us access to nature in our daily lives and maintains healthy ecosystem services, which in turn underpin our economy and society.

The 30 ECAs describe the variation in our landscape based on landscape character⁹, biodiversity and the historic environment and identify connectivity of GI across parish and district boundaries. The Worcestershire Green Infrastructure Strategy¹⁰ and its accompanying technical documents set out the methodology for defining the ECAs, along with GI priorities and delivery mechanisms.

7 <https://www.worcestershire.gov.uk/gi>

8 <https://designatedsites.naturalengland.org.uk/GreenInfrastructure/Home.aspx>

9 <https://www.worcestershire.gov.uk/environmental-policy/landscape-character-assessment>

10 <https://www.worcestershire.gov.uk/gi>





Common pipistrelle © Hugh Clark

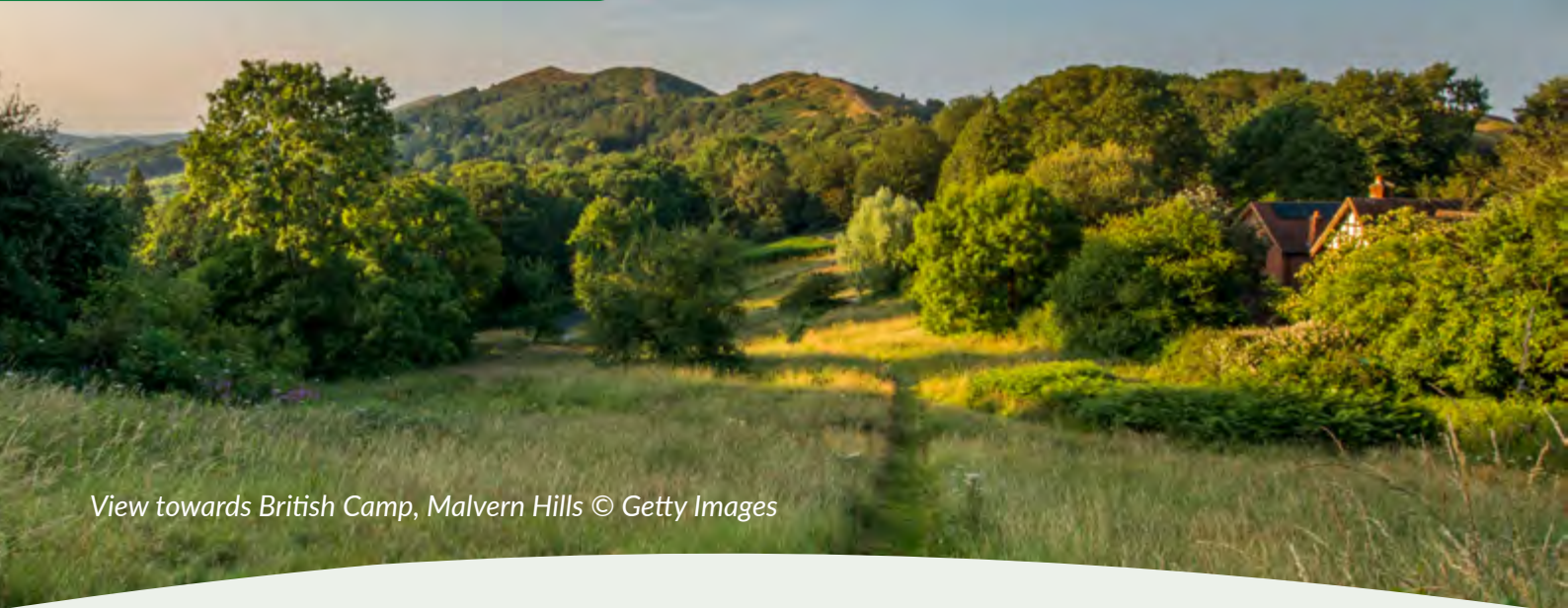
Connected habitat networks: their importance for nature

Mapping the quality of our natural environment is an important part of identifying opportunities to support nature's recovery. Wildlife is affected by habitat loss, a decline in habitat quality and fragmentation, where habitat patches that remain become more isolated, surrounded by land uses hostile to wildlife or cut off from one another by physical barriers such as roads. Species become more vulnerable to disease, loss of genetic diversity and to localised extinction. Restoring not just the habitats themselves but the connections between them is vital for nature's recovery. These connections may comprise healthy watercourses, intact species-rich hedgerows, woodlands, grasslands, wildflower-rich road verges and all other aspects of our landscape which are permeable to and capable of sheltering wildlife.

Bats are just one group of species that benefit from good habitat connections within the landscape. 16 of the 18 UK resident bat species are found in Worcestershire. All have identical vulnerabilities: roost loss, habitat deterioration, habitat severance and fragmentation by intensive and insensitive land-use, and a proliferation of modern pollutants, including strong, cold, artificial-light-at-night. Common pipistrelles and noctules are not an uncommon sight: acrobatically flitting through our urban and urban-edge habitats, exploiting Worcestershire's green and blue and dark corridors. Scarcer bat species, such as Bechstein's, Barbastelle and Greater Horseshoe bats, have far fewer and isolated colonies, which are more closely associated with Worcestershire's remnant and fragmented ancient countryside. However, all our bat species benefit from structurally diverse, connected habitats providing flightpaths through our landscape, linking places which are critical in bats' lifecycles for hibernating or breeding.

View towards British Camp, Malvern Hills © Getty Images

Environmental Character Areas



View towards British Camp, Malvern Hills © Getty Images

The ECA's are assigned one of three categories to indicate the quality of the existing GI provision:

- Protect and enhance (greatest existing green infrastructure value)**

Much of the county is of high GI quality. This is particularly the case in the north and west, around the Malvern Hills and Commons, the Wyre Forest and the Teme Valley. Significant areas of high-quality GI also exist to the east in the Forest of Feckenham and on Bredon Hill.
- Restore and create (lowest existing green infrastructure value)**

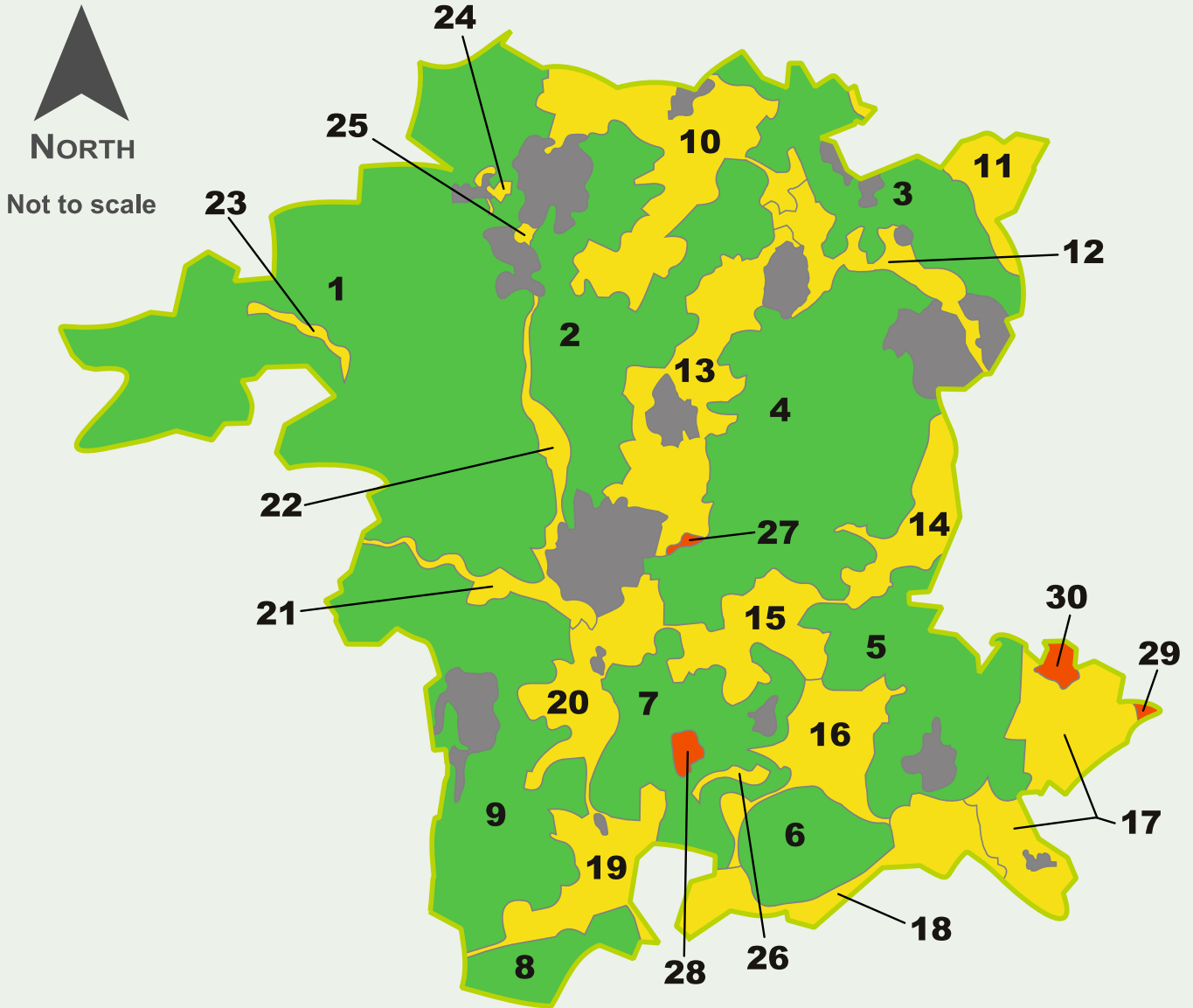
There are only four small areas in the 'restore and create' category. These areas represent opportunities to restore degraded characteristics and to create new GI where none currently exists. However, in some cases areas have a low score because the level of information is limited, and this may not necessarily reflect a low GI quality.
- Protect and restore (medium existing green infrastructure value)**

There is a corridor of GI categorised as 'protect and restore' linking Redditch, Bromsgrove, Droitwich and Worcester and following the Severn Valley in the south of the county. A further area of medium-quality GI also exists in and around the Vale of Evesham in the southeast of the county.
- Urban areas**

The level of detail required to map GI provision within urban areas was not available when the ECAs were originally developed. This can now start to be addressed as better data is available at a national level¹¹.

11 <https://designatedsites.naturalengland.org.uk/GreenInfrastructure/Map.aspx>

Environmental Character Areas Map Worcestershire



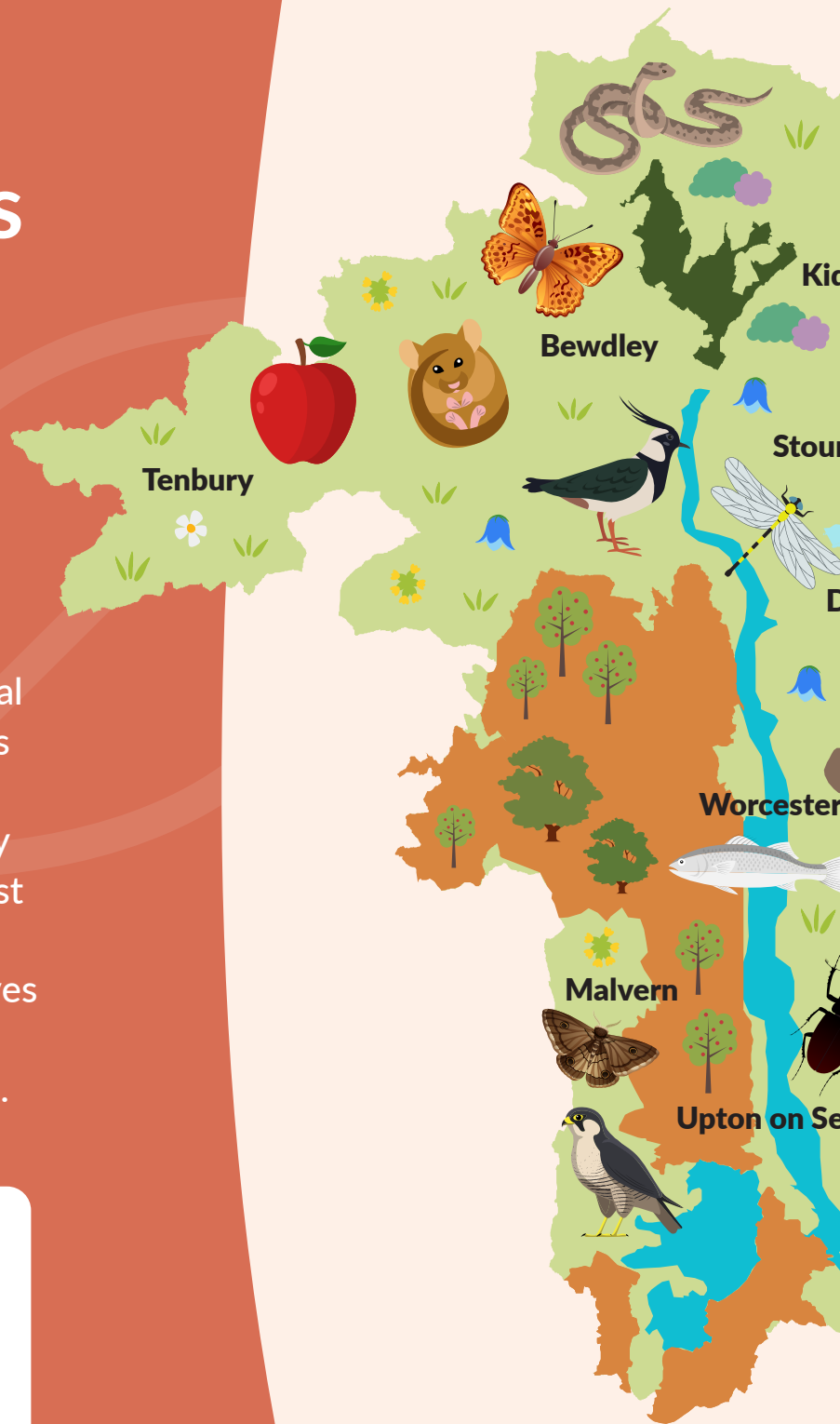
Key

- | | |
|--|---|
| <ul style="list-style-type: none"> Protect and enhance (Areas 1 - 9) Protect and restore (Areas 10 - 26) Restore and create (Areas 27 - 30) Urban areas
Unsurveyed | <ol style="list-style-type: none"> 1. Teme Valley & Wyre Forest 2. Severn Valley North 3. North Worcestershire Hills 4. Forest of Feckenham & Feckenham Wetlands 5. Lenches Ridge 6. Bredon 7. Severn Valley South 8. Bushley 9. Malvern Chase & Commons 10. Hagley Hinterland 11. Hollywood & Wythall 12. Bromsgrove - Redditch Corridor 13. Mid Worcestershire Corridor 14. East Wychavon 15. Bow Brook South 16. Evesham Valley 17. Broadway & Cotswold Corridor 18. Carrant Brook Corridor 19. Longdon Hinterland 20. Kempsey Plain 21. River Teme Corridor 22. Severn Meadows Corridor 23. Eardiston 24. Bewdley Fringe 25. Birchen Coppice 26. Birlingham 27. Crowle 28. Defford 29. Bickmarsh 30. Long Marston |
|--|---|






Biodiversity Delivery Areas

Rebecca Lashley from Worcestershire County Council

The five Biodiversity Delivery Areas¹² (BDAs) were agreed by the Worcestershire Biodiversity Partnership in 2011 and were subsequently updated and endorsed by Worcestershire’s Local Nature Partnership in 2016. BDA’s are Worcestershire’s strategic priority areas for biodiversity; they are considered to have the greatest potential to deliver our Local Biodiversity Action Plan¹³ objectives and form a spatial focus for partnership activity and resources.



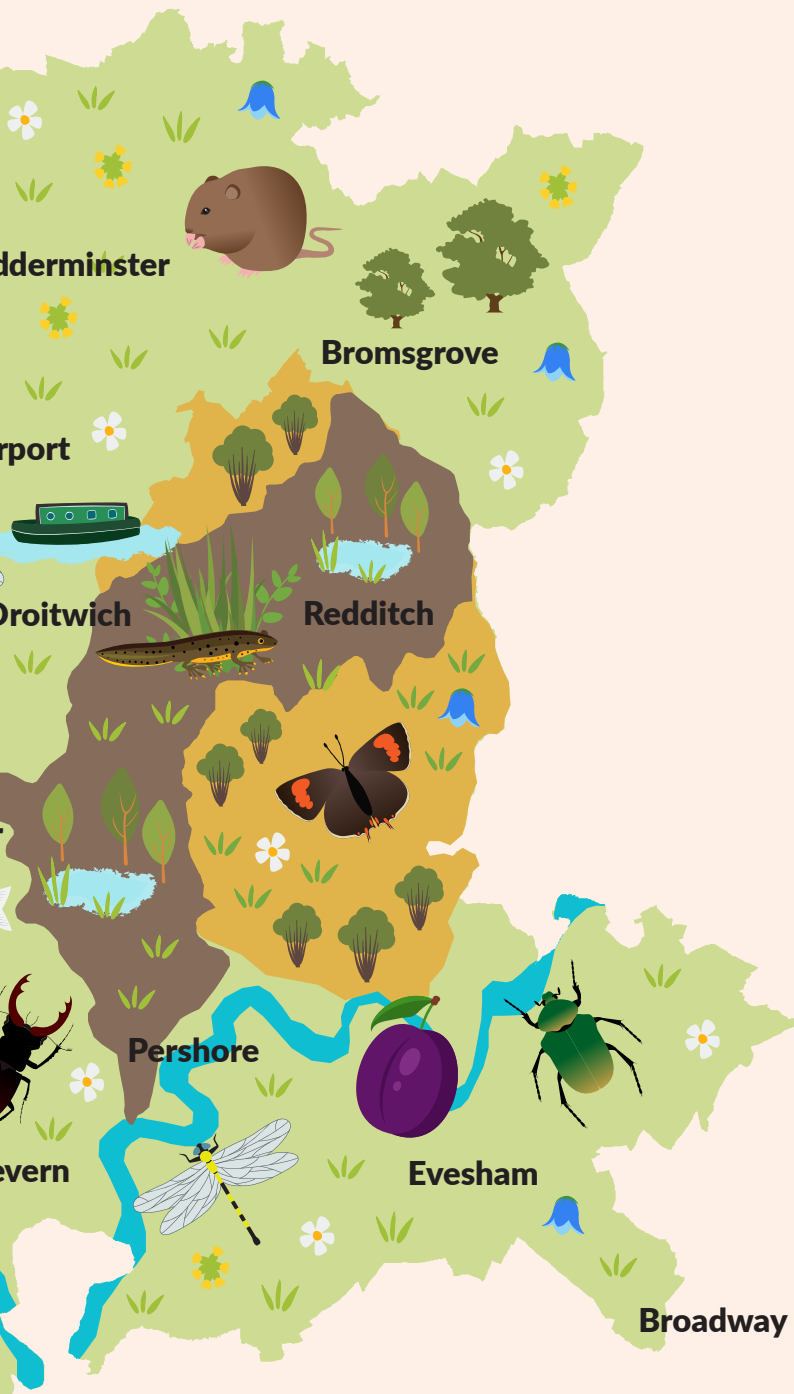
Worcestershire Biodiversity Delivery Areas

-  Bow Brook
-  Forest of Feckenham
-  Malvern Chase and Laugharne Valley
-  Severn and Avon Vales and Longdon Marsh
-  Wyre Forest Acid Grasslands and Heaths

¹² <https://www.worcestershire.gov.uk/environmental-policy/biodiversity-action-plan>

¹³ <https://www.worcestershire.gov.uk/council-services/planning/environmental-policy/biodiversity-action-plan>





Bow Brook

The Bow Brook rises near Redditch and flows east and south to join the River Avon at Defford. The catchment was once dominated by wet pasture meadows and extensive areas of marshland, supporting breeding snipe, redshank and marsh warbler. Habitat fragmentation, drainage for the conversion of land to arable use, and the intensive management of grassland has led to an overall decline in biodiversity value whilst presenting wide-spread opportunities for the restoration and defragmentation of remaining priority habitats. Diffuse and point source pollution from agricultural and urban sources is also a significant issue for parts of the watercourse today.



Bow Brook © Peter Case

What have we done? A partnership initiated in 2011 between Worcestershire Wildlife Trust and the Environment Agency provided funding to work with landowners in the Bow catchment to address issues of poor habitat and water quality¹⁴. The project enabled the reversion of 2.5ha of land from arable to grassland, created more than 8000m² of ponds and scrapes and enhanced over 1600m of bankside habitat for wildlife.

¹⁴ <https://www.worcswildlifetrust.co.uk/bow-brook-project>

Biodiversity Delivery Areas

Forest of Feckenham



Facilitation Fund event © Jess Nott

The Forest of Feckenham is a landscape of lowland pasture, species-rich meadows, traditional orchards, parkland, veteran trees, and more than 650 hectares of scattered and fragmented ancient semi-natural woodland. Contained within this landscape are remnants of formally extensive Royal Forests and Chases. The Forest of Feckenham also supports the West Midlands' only known population of Brown Hairstreak butterfly, and is a very important area for arable wildflowers and species such as great crested newts and Bechstein's bats. The survival of many of these wildlife-rich habitats is threatened by fragmented landownership and the fact that many sites are small and isolated, making appropriate management, such as extensive grazing and hay making, challenging.

What have we done? Worcestershire Wildlife Trust is engaging landowners within the Forest of Feckenham in the Wild Pollinator¹⁵ and Nature Recovery Networks project, funded by a Countryside Stewardship Facilitation Fund. The project works with landowners to undertake wild pollinator health checks, to identify actions that can be taken to reduce pesticide use and create and restore habitat networks.

¹⁵ <https://www.worcswildlifetrust.co.uk/wild-pollinators>

Malvern Chase and Laugherne Valley

The Malvern Chase and Laugherne Valley together contain a rich mosaic of acid grassland and species-rich neutral meadows, wooded hills and valleys, traditional orchards and a substantial proportion of the county's remaining wood pasture and parkland (over 460 hectares). These habitats support species reliant on ancient woodland and traditional orchard, such as dormouse and noble chafer beetle, in what are otherwise fragmented and dwindling populations. Hedgerows and veteran oak pollards are a characteristic feature and around the Malvern Commons black poplars are frequent as roadside and streamside trees. The River Teme and its floodplain also feature within the northern half of the area.

What have we done? Between 2014-18 the Malvern Hills AONB Partnership coordinated delivery of the Three Counties Traditional Orchard Project¹⁶. Working with local community and volunteer groups within 14 orchard 'cluster' areas, the project resulted in 34 orchards being restored through pruning and new planting with the involvement of over 300 local people. In Worcestershire, focus areas were Tenbury, Alfrick, Pershore and Evesham. Alfrick, situated within the Malvern Chase and Laugherne Valley BDA, which was once a significant cherry growing area.



New planting in old cherry orchard © Rebecca Lashley

¹⁶ <https://www.malvernhillsaonb.org.uk/tctop-home-page/>

Severn and Avon Vales

The Severn and Avon Vales encompasses the two river systems with their associated floodplains. Wetland features found along their lengths include wet pasture meadows, reedbed, wet woodland, ditches and old pollards. The rivers themselves were historically heavily modified for navigation and much of the surrounding landscape is intensively farmed. In some locations, arable and horticulture production close to the riverbank results in soil erosion and run-off, leading to significant water quality issues. Riparian habitat is often fragmented.



Flooded River Severn on Kempsey Ham
© Rebecca Lashley

What have we done? In 2022, Twaite Shad were confirmed to have migrated up the River Severn for the first time in almost two centuries, thanks to the installation of fish passes at six weirs along the Severn and Teme. Led by the Canal & River Trust, Severn Rivers Trust, Environment Agency and Natural England, the Unlocking the Severn¹⁷ project opened up access to 158 miles of river habitat for migrating and spawning fish.

¹⁷ <https://www.unlockingthesevern.co.uk/>

Wyre Forest Acid Grasslands and Heaths



Calf on Burlish Meadows © Cameron Adams

The geology of north Worcestershire supports a lowland heathland and acid grassland resource that is contiguous with that found on the Birmingham Plateau and northwards into Staffordshire. Around 85% of England's heathland habitats have been lost over the last 150 years. Within Worcestershire, 90% of these habitats have been lost in the last 200 years. Remnant areas can still be found within several large nature reserves, but outside of this are scattered and fragmented sites in private ownership. These sites are particularly valuable for species such as adder, common lizard and scarce specialist insects such as the hornet robberfly. Many of these sites are in poor condition botanically, with nitrate input and, in places, intensive horse grazing being major factors which are contributing to their deterioration and loss.

What have we done? Wyre Forest District Council is transforming approx. 60ha of the old Wyre Forest Golf Club into the Burlish Meadows Local Nature Reserve¹⁸. Beginning in 2019, the council has introduced a conservation grazing regime, created ponds and planted areas of woodland. Public access has been designed with input from local communities and fencing, paths and gates installed. In 2021 Worcestershire Wildlife Trust purchased 38ha of agricultural land immediately adjacent to Burlish Meadows at Dropping Well Farm¹⁹. These two sites are now part of what is set to become the largest cohesive area of heathland habitat in the county, totalling over 120ha.

¹⁸ <https://www.wyreforestdc.gov.uk/things-to-see-do-and-visit/countryside-and-nature/nature-reserves/burlish-meadows-local-nature-reserve/>

¹⁹ <https://www.worcswildlifetrust.co.uk/heathland-hero>

Protected Landscapes in Worcestershire

Paul Esrich from the Malvern Hills Area of Outstanding Natural Beauty and Simon Smith from the Cotswolds National Landscape

An Area of Outstanding Natural Beauty (AONB) is exactly that: a landscape whose distinctive character and natural beauty (which includes its habitats and species) is so precious that it is safeguarded in the national interest. The primary purpose of the AONB designation is to conserve and enhance this natural beauty, whilst taking account of the needs of its communities, the local economy and the demand for recreation.

AONBs and Nature

AONBs contain a significant proportion of England's most important and sensitive habitats. As large areas of land and water, supported by diverse and active partnerships of organisations, they are ideally placed to support nature recovery at a 'landscape' scale.

In 2019 all English AONB Partnerships signed a Declaration on Nature²⁰, pledging to make AONBs places of rich, diverse and abundant nature and to put nature's recovery at the heart of the conservation and enhancement of natural beauty.

²⁰ <https://landscapesforlife.org.uk/projects/colchester-declaration>

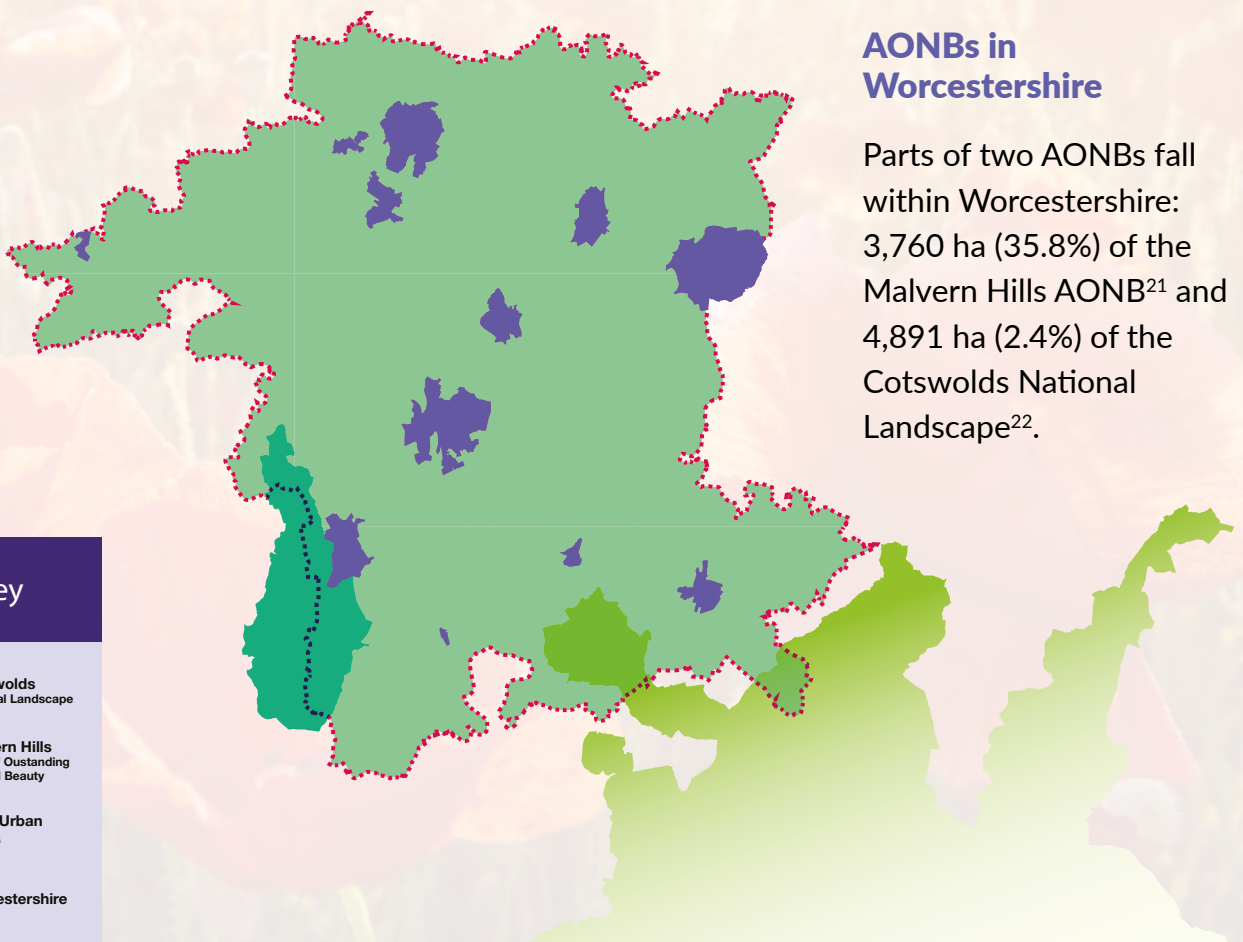




There are **34 AONBs** in England, covering **15%** of the country



256,000ha of England's designated Sites of Special Scientific Interest are within AONBs.



AONBs in Worcestershire

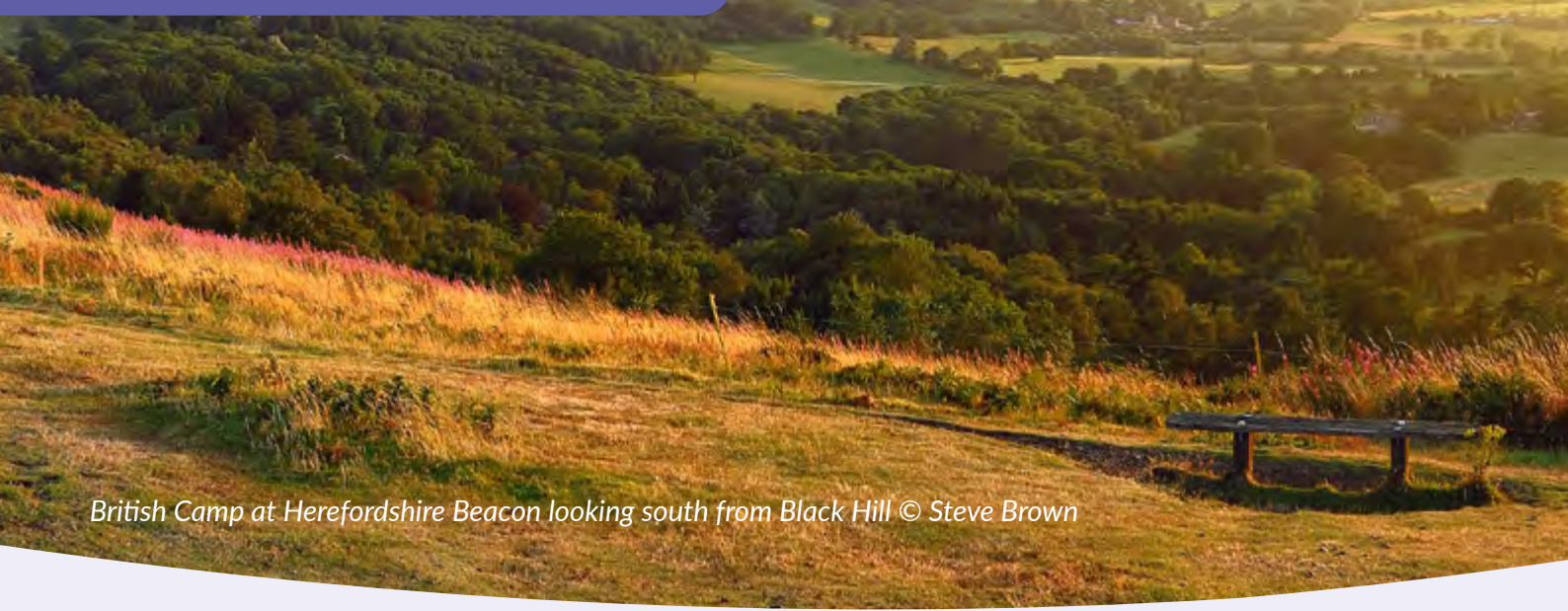
Parts of two AONBs fall within Worcestershire: 3,760 ha (35.8%) of the Malvern Hills AONB²¹ and 4,891 ha (2.4%) of the Cotswolds National Landscape²².

Key

- Cotswolds National Landscape
- Malvern Hills Area of Outstanding Natural Beauty
- Main Urban Areas
- Worcestershire

21 <https://www.malvernhillsaonb.org.uk/>
22 <https://www.cotswoldsaonb.org.uk/about-us/>

Protected Landscapes in Worcestershire

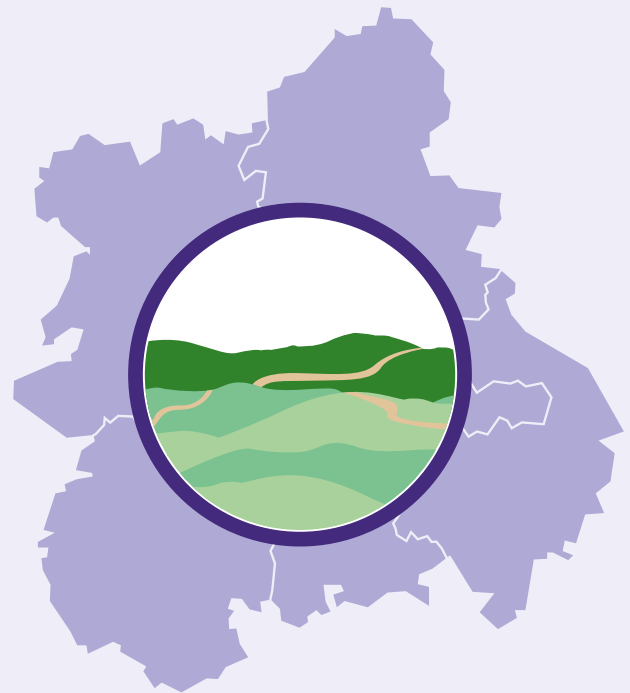


British Camp at Herefordshire Beacon looking south from Black Hill © Steve Brown

The Malvern Hills AONB

The Malvern Hills AONB covers 105 km² and includes parts of Herefordshire, Worcestershire and Gloucestershire. The AONB is defined by its contrasts. The distinctive, narrow, north-south ridge of the Malvern Hills is a mountain range in miniature, dividing the flat Severn Vale to the east from more ancient, rolling hills and valleys to the west. Ten different Landscape Character Types are recognised within the AONB²³.

The great variety in geology and landscape across the AONB, coupled with thousands of years of human habitation and management, have given the area great ecological value and diversity. Priority habitats of particular significance include species-rich acidic and calcareous grasslands, lowland meadows, traditional orchards and wood pasture and parkland. Many priority species are found in the area, including lesser horseshoe bat, white clawed crayfish, adders, fritillary butterflies and many plants.



The Malvern Hills SSSI is one of the LARGEST in the West Midlands

²³ <https://www.worcestershire.gov.uk/environmental-policy/landscape-character-assessment>

In the Malvern Hills AONB:



1145ha of the Malvern Hills AONB is designated as a SSSI, covering almost 11% of the land area

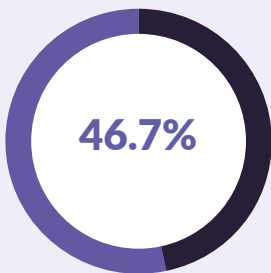


There are 67 Local Wildlife Sites within the Malvern Hills AONB, covering 1773 ha

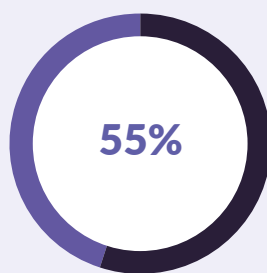


20% of the Malvern Hills AONB is woodland, with much of this being ancient, mixed deciduous woodland.

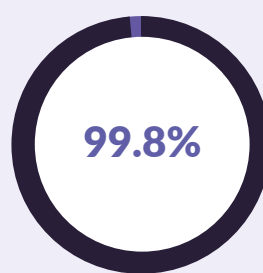
In the Malvern Hills AONB a 'State of the AONB' monitoring exercise²⁴ was last completed in 2018, in advance of the review of the AONB Management Plan²⁵. This condition assessment is based on a range of headline indicators, with information derived from both local and national data sets.



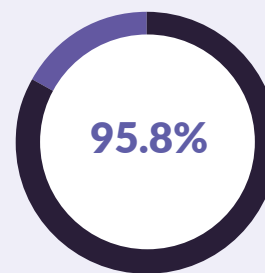
of the agricultural area is managed under agri-environment schemes



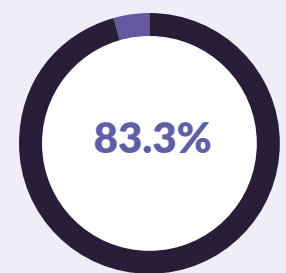
of woodland is actively managed



of SSSIs are in Favourable or Unfavourable Recovering condition



of water courses are of moderate quality



of Local Geological Sites are in a desirable condition

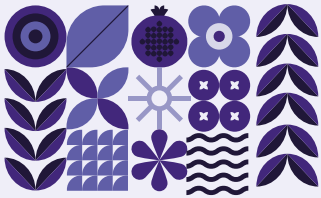
Taken from the Malvern Hills AONB Management Plan 2019-24.

²⁴ <https://www.malvernhillsaonb.org.uk/wp-content/uploads/2022/03/FINAL-MHAONB-State-of-the-AONB-Report-2018.pdf>

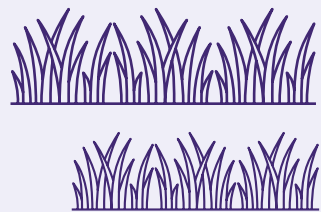
²⁵ <https://www.malvernhillsaonb.org.uk/wp-content/uploads/2022/08/19-24-MHAONB-Management-Plan.pdf>

Protected Landscapes in Worcestershire

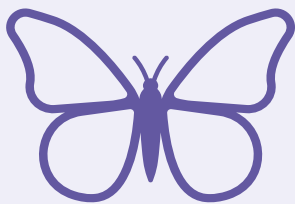
In the Cotswolds National Landscape:



123 nationally rare, scarce, near threatened or threatened vascular plant species are found in the Cotswolds National Landscape



52% of the UK's upright brome and tor grass grassland is found in the Cotswolds National Landscape



The Cotswolds National Landscape is a hotspot for the Duke of Burgundy Butterfly



The Cotswolds National Landscape contains 4,119ha of land designated as a SSSI

The Cotswolds National Landscape

At 2,038 km² the Cotswolds National Landscape is England's largest AONB. It has been identified as an Important Plant Area²⁶ for the exceptional quality of its ancient woodland and calcareous grassland flora and is a hotspot for the conservation of grassland butterflies²⁷ and farmland birds. Ancient woodlands are widely distributed with species rich calcareous grassland concentrated on valley sides and the western scarp. Ancient neutral grasslands can be found in the river valleys and arable habitats on the high wold. The Cotswolds scarp comes into Worcestershire above Broadway where there is a concentration of species rich grassland and woodland. The sheer size of the Cotswolds

provides the opportunity to create an 80-mile-long wildlife corridor with a broadly north-south orientation along its western scarp. The Cotswolds also links east to west across the calcareous landscapes of southern England²⁸.

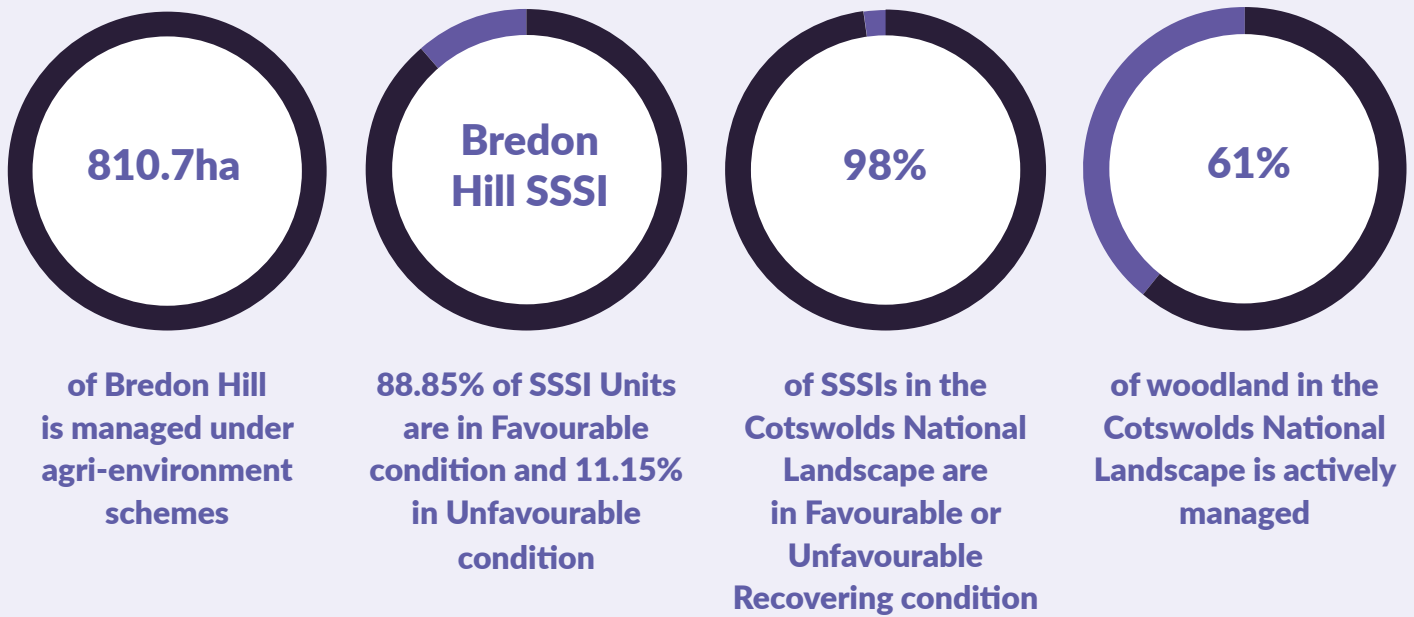
Bredon Hill in Worcestershire is an isolated outlier of the Cotswolds scarp and there is a similar outlier nearby at Oxenton Hill in Gloucestershire. Both hills contain land designated as a Special Area of Conservation (SAC) for the presence of the violet click beetle. The Carrant Valley, which joins Bredon Hill SAC to Dixton Wood SAC on Oxenton Hill, has long been recognised as an important ecological link and is the subject of targeted conservation activity.

26 <https://www.plantlife.org.uk/protecting-plants-fungi/important-plant-areas/>

27 <https://naturebftb.co.uk/projects/limestones-living-legacies/>

28 <https://www.cotswoldsaonb.org.uk/looking-after/big-chalk/>

The last State of the Cotswolds report was published in 2017²⁹. In 2021 a range of environmental data was brought together for the first time and made available on an on-line dashboard³⁰.



Bredon Hill data provided by Natural England. Other statistics taken from The State of the Cotswolds 2017

Nature Recovery Plans have been published by the Malvern Hills AONB³¹ and the Cotswold National Landscape³².

29 <https://www.cotswoldsaonb.org.uk/wp-content/uploads/2017/11/state-of-the-cotswolds-feb-17.pdf>

30 <https://www.cotswoldsaonb.org.uk/looking-after/cotswolds-nature-recovery-plan/>

31 <https://www.malvernhillsaonb.org.uk/wp-content/uploads/2022/06/MHAONB-NRP-Final-Mar22.pdf>

32 <https://www.cotswoldsaonb.org.uk/wp-content/uploads/2022/02/Cotswolds-Nature-Recovery-Plan-Full-Version.pdf>



Worcestershire's Nationally Designated Sites

Julie Button from Natural England

Worcestershire has some fantastic sites designated for nature conservation. These are sites considered to be of such high value for the wildlife, natural habitats, landscape or earth heritage they support that they are protected by law.



Types of designation include:



There are **656** Special Areas of Conservation within the UK and its offshore waters, covering almost **13,500,000** hectares³³.

Special Areas of Conservation (SAC):

sites of international importance for wildlife protected under the 1992 European Directive on the Conservation of Natural Habitats.



In England there are more than **4,000** Sites of Special Scientific Interest³⁴, covering about **8%** of the country.

Sites of Special Scientific Interest (SSSI):

protected under the UK's Wildlife and Countryside Act, SSSIs are selected on the basis that they offer one of the finest examples of a particular habitat type to be found in the UK. The designated features of a SSSI can include both biological and geological elements, ranging from individual species of interest, both plant and animal, to habitats and geological formations of national or historical landscape importance.



There are **221** National Nature Reserves in England with a total area of over **105,000** hectares.

National Nature Reserves (NNR):

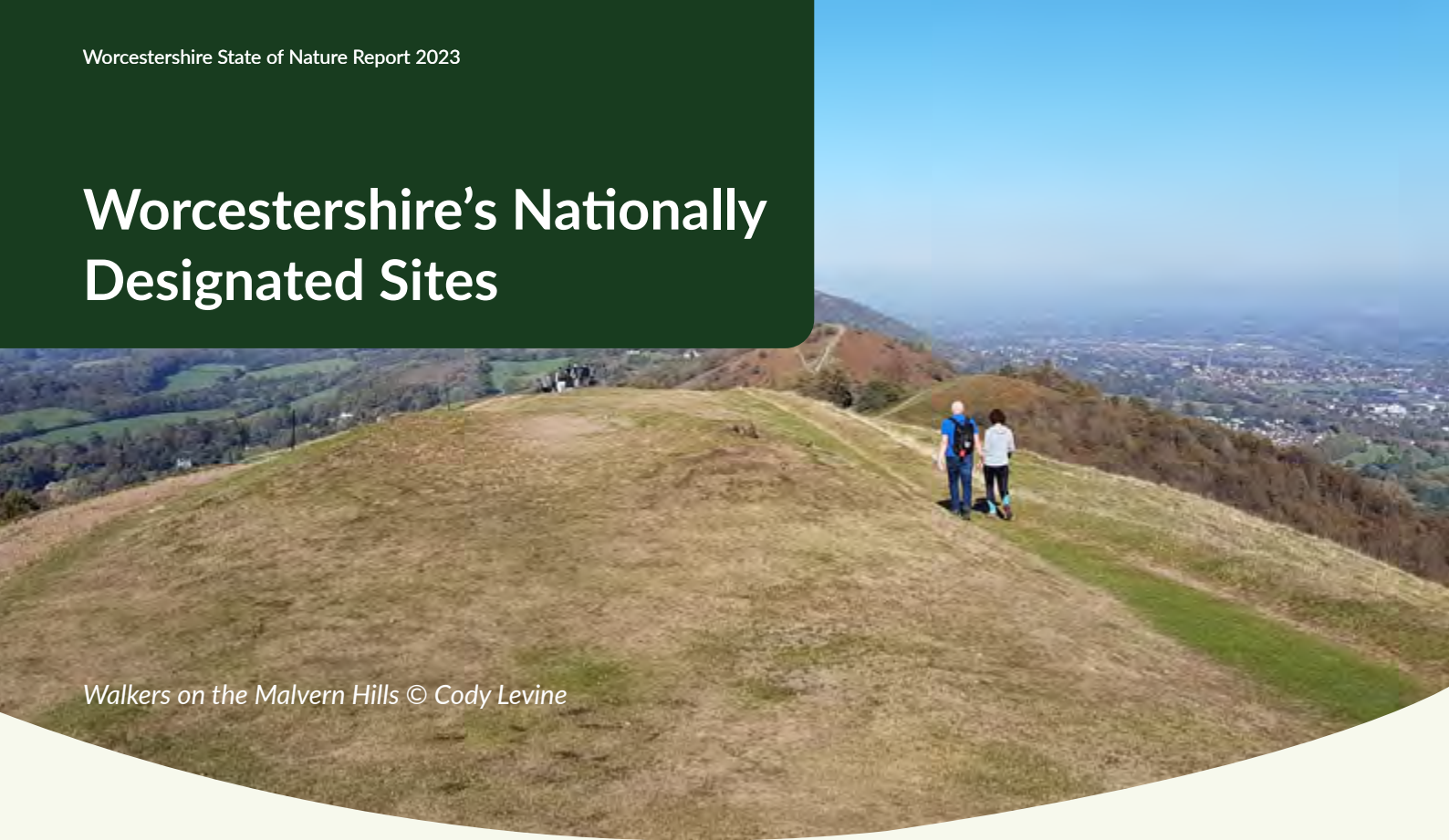
land declared under either the National Parks and Access to the Countryside Act or the Wildlife and Countryside Act. They are established to protect some of our most important habitats, species and geology, and to provide 'outdoor laboratories' for research. Natural England manages about two thirds of England's NNRs. The remaining reserves are managed by organisations such as National Trust, Forestry England, RSPB, The Wildlife Trusts and local authorities³⁵.

33 <https://jncc.gov.uk/our-work/special-areas-of-conservation/>

34 <https://designatedsites.naturalengland.org.uk/SSSIGuidance.aspx>

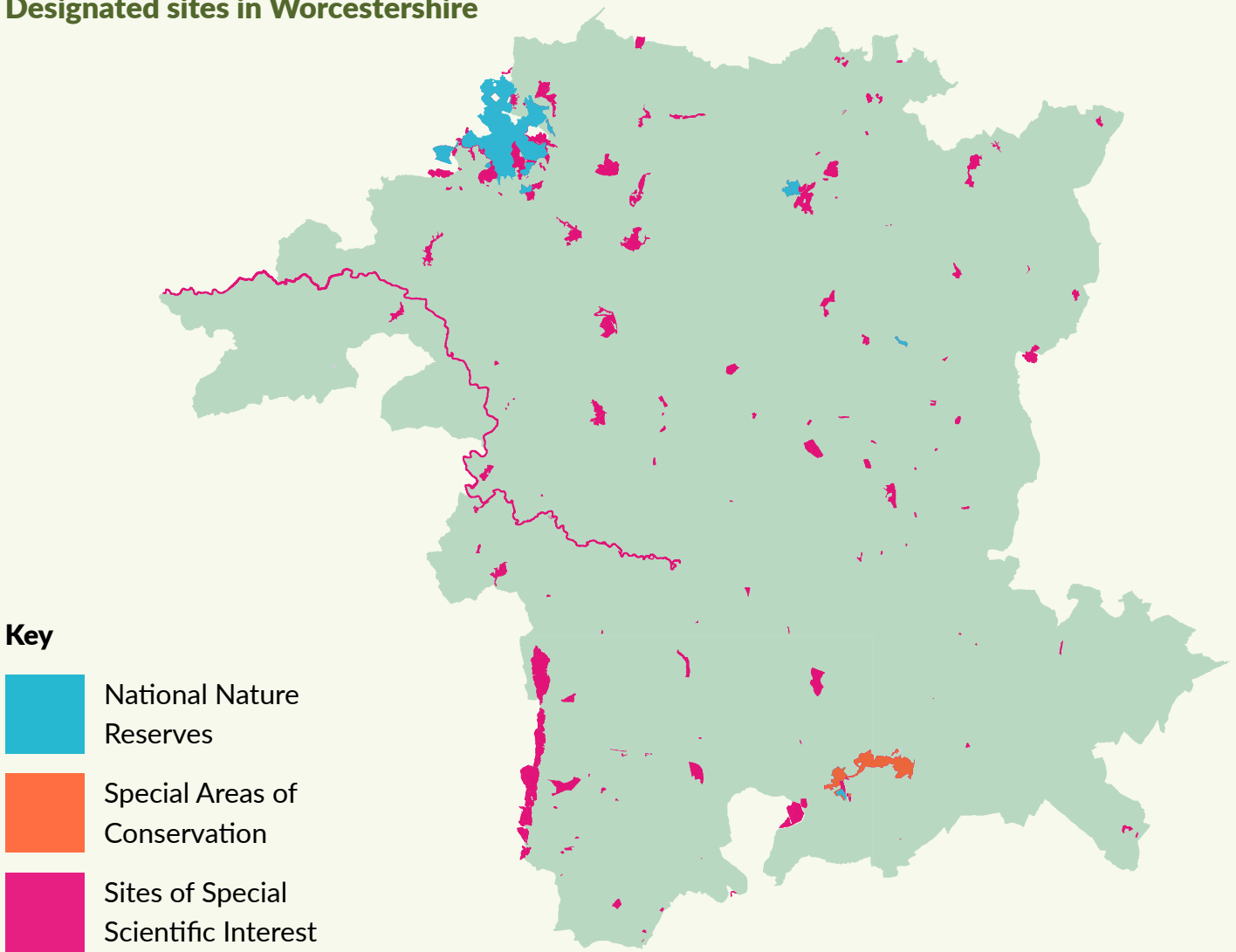
35 <https://www.gov.uk/government/collections/national-nature-reserves-in-england>

Worcestershire's Nationally Designated Sites






Walkers on the Malvern Hills © Cody Levine

Designated sites in Worcestershire



Key

-  National Nature Reserves
-  Special Areas of Conservation
-  Sites of Special Scientific Interest

Total Worcestershire land area protected by each designation:



Special Areas of Conservation

Worcestershire has two Special Areas of Conservation. 361ha of land on Bredon Hill is designated for the presence of the violet click beetle, a species dependent on the dead and decaying wood habitat provided by the many veteran ash trees found here. The other SAC covers a small (1ha) but important pond complex at Lyppard Grange on the edge of Worcester, which was designated for its breeding metapopulation of great crested newts.

Case study

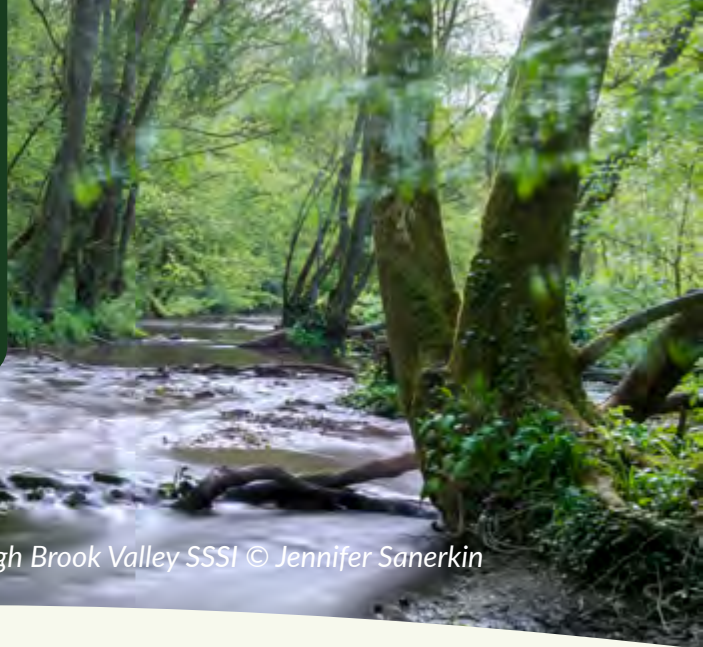


Veteran oak tree on Bredon Hill © Robert Wolstenholme

Bredon Hill has one of the best assemblages of dead-wood dependent insects in Britain. Ancient and veteran ash, oak, beech and field maple are found all along the northern side of the hill, with concentrations in Elmley Castle Deer Park and at Bredon's Norton³⁶.

³⁶ <https://publications.naturalengland.org.uk/publication/5415467531370496>

Worcestershire's Nationally Designated Sites



Stream at the Knapp and Papermill nature reserve, part of the Leigh Brook Valley SSSI © Jennifer Sanerkin

Sites of Special Scientific Interest

Worcestershire has 115 Sites of Special Scientific Interest totalling 3701ha. The interest contained within these sites includes a mix of biological and earth heritage features. Some of our smallest SSSIs highlight just how important and how precious Worcestershire's remaining species-rich hay meadows are: sites such as Penny Hill Bank, Tunnel Hill Meadow, Tudor Cottage Meadow and Avenue Meadow are all less than 1ha in size yet have been selected as nationally significant examples of this habitat type.

National Nature Reserves

Worcestershire has four National Nature Reserves totalling 1575ha. The Wyre Forest, with 1455ha covered by the NNR designation (overlapping the Worcestershire-Shropshire border), is England's largest woodland NNR³⁷. Chaddesley Wood NNR is a 60ha site containing oak woodland, scrub and grassland glades and is thought to be a remnant of the former Royal Forest of Feckenham. Foster's Green Meadows NNR (incorporating Eades Meadow) is one of Worcestershire's most spectacular species-rich hay meadows. The 12ha site supports plants such as green-winged orchids and meadow saffron³⁸. A small area of Bredon Hill (48ha) is designated as an NNR, overlapping with the SAC designation. The reserve is notable for its wood pasture habitat and the presence of an active landslip.

³⁷ <https://www.gov.uk/government/news/wyre-forest-nature-reserve-is-largest-native-woodland-in-england#:~:text=Wyre%20Forest%20has%20today%20become,places%20for%20wildlife%20and%20geology>

³⁸ <https://www.worcswildlifetrust.co.uk/nature-reserves/fosters-green-meadows>

Case study



Penny Hill Bank © Paul Lane

Penny Hill Bank is a small but perfect patch of limestone grassland rich in wildflower species such as bee, pyramidal and greater butterfly orchids, twayblade and dyer's greenweed. Butterflies and moths are abundant and glow worms have also been recorded here. The site is managed as a nature reserve by Worcestershire Wildlife Trust³⁹, with access restricted to prevent damage to the sensitive habitat.

³⁹ <https://www.worcswildlifetrust.co.uk/nature-reserves/penny-hill-bank>

Case study



Old railway track now walkway, Wyre Forest
© Getty Images

Natural England and Forestry England began delivery of a joint management plan for the Wyre Forest⁴⁰ in 2016, and the NNR designation was expanded at this time to cover all the land owned by both organisations. As well as the main Wyre Forest block, the plan also includes a number of smaller, outlying woodlands. The focus is to restore and enhance the ancient semi-natural woodland composition, by reducing the amount of conifer and beech and managing a habitat mosaic that includes grassland and orchards as well as woodland.

40 Wyre Forest Plan | Forestry England

Extent of habitats protected by SSSI designation in Worcestershire:

Acid grassland
10.77%



Earth heritage
3.49%



Boundary and linear feature
0.26%



Fen, marsh and swamp
2.49%



Broadleaved, mixed and yew woodland
54.72%



Littoral
0.26%



Built up areas and gardens
0.02%



Neutral grassland
14.50%



Calcareous grassland
1.31%



Rivers and streams
4.25%



Dwarf shrub heath
4.38%



Standing open water and canals
3.56%



Condition of SSSIs in Worcestershire:

Destroyed
0.07%



Favourable
49.20%



Partially destroyed
0.09%



Unfavourable - Declining
4.66%



Unfavourable - No change
5.78%



Unfavourable - Recovering
40.19%



Locally important sites for nature conservation in Worcestershire

Jasmine Walters from Worcestershire Wildlife Trust

There are many sites which fall outside of the legally designated European and UK site network yet have substantive value for nature conservation at a county and sometimes national level. Identifying and listing these sites enables recognition and conservation of their incredible importance for nature. Alongside the designated sites, these local sites form the foundation of Worcestershire's nature recovery network and enhance the wellbeing of communities that live amongst them.

With the exception of Local Nature Reserves, sites do not receive any legal protection but are recognised within local government policy and the planning system. Listing of sites does not grant additional rights of public access to land, does not justify a statutory designation, and does not directly impose legal obligations on a landowner or directly affect current agricultural activity.



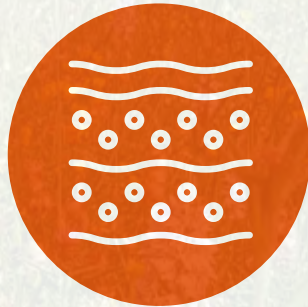
In Worcestershire we have the following types of local sites:



There are 537 Local Wildlife Sites in Worcestershire totalling 9,274ha



There are 44 Roadside Verge Nature Reserves in Worcestershire totalling approx. 17ha



There are 105 Local Geological Sites in Worcestershire totalling 442ha



There are 688 Grassland Inventory Sites in Worcestershire



There are 31 Local Nature Reserves in Worcestershire totalling 640ha

Locally important sites

Local Wildlife Sites (LWS) and Local Geological Sites (LGS)

These sites form the county's rich network of ancient hedgerows, orchards, woodlands, heathlands, grasslands, rivers, wetlands and geological deposits or exposures. A site may be the smallest of hay meadows in the Forest of Feckenham or Malvern Chase, or a major river corridor such as the River Severn. The survival and recovery of some of Worcestershire's most iconic species, such as dormice, slow-worms, and noble chafer beetles, is dependent on the

maintenance and sympathetic management of these habitats. Most Local Sites are in private ownership and are reliant on the goodwill of the landowner or manager. The Worcestershire Local Wildlife Sites Partnership⁴¹ and the Worcestershire Local Geological Sites Partnership⁴² manage the list of Local Sites and aim to support landowners and managers to look after them.

Habitat types found within Local Wildlife Sites

Main Worcestershire BAP Habitat*	Sum of LWS Area (ha)	Proportion of total LWS area (%)
Woodland	5173.5	55.79%
Rivers and streams	1718.4	18.53%
Grassland	1406.2	15.16%
Ponds and lakes	223.3	2.41%
Ancient and veteran trees	210.8	2.27%
Lowland heathland	118.6	1.28%
Fen and marsh	98.6	1.06%
Traditional orchards	96.4	1.04%
Wet woodland	80.7	0.87%
Canals	80.4	0.87%
Reedbed	28.7	0.31%
Wet grassland	25.7	0.28%
Hedgerows	6.6	0.07%
Urban	4.9	0.05%
Road verges	1.0	0.01%
Total	9273.7	100.00%

*Habitats often occur as a mosaic; therefore, area totals are an estimate only.

⁴¹ <https://www.worcestershire.gov.uk/environmental-policy/worcestershire-local-sites-partnership>

⁴² <https://earthheritagetrust.org/protecting-geosites/>

Local Nature Reserves (LNR)

These sites are designated and protected under the National Parks and Access to the Countryside Act, but designations are made by the appropriate local authority with delegated powers, such as a County Council or District Council. Most are selected to offer local communities wildlife-rich green spaces for the purposes of education and enjoyment.

Roadside Verge Nature Reserves (RVNR)

Road verges are often parcels of very old, undisturbed habitat. It is estimated that 80% of the plant species recorded in Worcestershire can be found growing on verges, including the very rare deptford pink, tower mustard and spreading bellflower. The RVNR network⁴³ is managed by Worcestershire County Council and includes verges that support rare or protected species or habitat characteristic of Worcestershire. Each verge has its own management plan and verges are monitored to ensure that their wildlife value is being maintained or enhanced.

Condition of Roadside Verge Nature Reserves (latest survey data):



RED (poor)
5 of 44
(11.3%)



AMBER (moderate)
12 of 44
(27.3%);



GREEN (good)
27 of 44
(61.3%)

Grassland Inventory Sites

The Worcestershire Grassland Inventory provides a snapshot of the extent and condition of all species-rich semi-natural grassland sites in the county at the time surveys were undertaken. The last significant review was undertaken in 1996-97. This means that a high proportion of the dataset is now more than 20 years old, and it is likely that considerable change has occurred since that time. The dataset includes grasslands designated as SSSIs or listed as LWS.



The total extent of Worcestershire's remaining semi-natural grassland is estimated at 4,807ha



Only 46% of Worcestershire's semi-natural grasslands are protected⁴⁴:

Irreplaceable habitats

These are habitats considered to be of such high conservation value, and their creation or re-creation so difficult, that they are effectively irreplaceable if lost. Government is preparing to consult on a legal definition of irreplaceable habitats in late 2024. Prior to this consultation the habitats to be considered irreplaceable (those which are found in Worcestershire) are ancient woodland, ancient and veteran trees, and lowland fen.

⁴³ <https://www.worcestershire.gov.uk/environmental-policy/roadside-verge-nature-reserves>

⁴⁴ Worcestershire Wildlife Trust (2023). The State of Worcestershire's Grasslands. Natural England

Section 2: People and Nature





Happy senior couple, outside in spring nature © Getty Images

People and Nature

Dr George Morris and Vicki Moulston from
Worcestershire County Council Public Health

There is growing evidence that being in nature can support good physical and mental health and wellbeing^{45 46 47 48}. A recent study by the University of Exeter⁴⁹ found that people who spent two hours a week in green spaces — local parks or other natural environments, either all at once or spaced over several visits — were substantially more likely to report good health and psychological well-being than those who don't.



45 Links between natural environments and mental health - EIN065 (naturalengland.org.uk)

46 Drivers of Wellbeing Inequality - What Works Wellbeing

47 How the Natural Environment can support Children and Young People - EIN067 (naturalengland.org.uk)

48 <https://www.instituteofhealthequity.org/resources-reports/natural-solutions-to-tackling-health-inequalities>

49 Spending at least 120 minutes a week in nature is associated with good health and wellbeing | Scientific Reports



Spending time in natural environments is linked with lower stress and higher mental wellbeing



Living closer to green spaces may be linked with better mental wellbeing



Spending two hours a week or more in and around open green spaces is linked with reporting significantly better health and higher wellbeing



Evidence suggests that exposure to nature is linked with lower rates of diabetes and heart disease



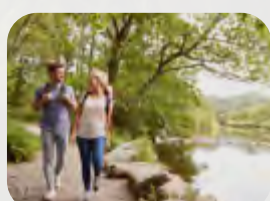
Physical activity in natural environments by adults can provide greater overall benefits than in other settings



People who experience the poorest wellbeing benefited the most from accessing green spaces for health and exercise



Spending time in nature is linked with lower levels of stress and anxiety for children, as well as better focus and academic performance



Increasing access to, and use of, good quality natural environments across the population can help improve health and reduce inequalities in health

People and Nature

Feeling connected to nature

Whilst the amount of time spent in nature is important, it is also how connected people feel to nature which is linked with better mental health and wellbeing. The Nature Connectedness Research Group⁵⁰ at University of Derby have pinpointed five ways that people can build a better-connected relationship with nature.



Nature based solutions: for biodiversity, climate, and health

Climate change has been identified as the biggest global health threat of the 21st century⁵¹ and there is growing evidence of its impacts on our health and wellbeing⁵². This includes direct effects, such as increased risk of extreme weather, and indirect effects, such as growing levels of ‘eco-anxiety’⁵³ – a fear for the environment and its future. Taking a nature-based solutions approach to mitigating both direct and indirect impacts of climate change involves using nature and the power of healthy ecosystems to protect people, optimise infrastructure and safeguard a stable and biodiverse future. Nature recovery is a critical part of this approach, for example, in Worcestershire a focus on Natural Flood Management solutions is contributing to a reduction in flood impacts, as well as improvements to biodiversity and water quality.

Nature is important to people in Worcestershire

For the 2022 ‘Make your Mark’⁵⁴ consultation, 2362 local young people voted for their most important issue, with “environment” coming top. Across the country, the number one issue was “health and wellbeing”.

Adults in the Worcestershire Viewpoint residents panel⁵⁵ rated “Access to nature” the third most important factor in what makes somewhere a good place to live and “Parks and open spaces” fifth.

A series of focus groups undertaken with diverse groups of residents in Worcestershire in January-March 2022 also highlighted the perceived benefits to health and wellbeing from spending time in natural environments. Some expressed concerns about protections for green spaces, wishing to see well maintained, safe and accessible outdoor spaces for recreation.

“We’re very lucky to live where we are with all the countryside around us”

Quote from focus group with older adults

50 Nature Connectedness Research Group - Research centres and groups - University of Derby

51 A Commission on climate change - The Lancet

52 How does climate change impact health? - Grantham Research Institute on climate change and the environment (lse.ac.uk)

53 The climate crisis and the rise of eco-anxiety - The BMJ

54 Worcestershire Youth Cabinet | Worcestershire County Council

55 Worcestershire Viewpoint Panel | Worcestershire County Council

Opportunities to engage with nature

Exercising and volunteering time are two ways in which people can spend time in nature as part of their daily lives. There are many conservation charities and groups in Worcestershire who are supporting volunteers to take action for nature’s recovery.

Case Study



Hardwick Green Meadows © Wendy Carter

As part of Worcestershire Wildlife Trust’s Hardwick Green Meadows project, a partnership with Sustrans resulted in the development of the ‘Meadows of the Malvern Chase’ cycle route⁵⁶, which takes in nine beautiful nature reserves over 34.3 miles of Worcestershire countryside.

⁵⁶ www.worcswildlifetrust.co.uk/meadows-malvern-chase-cycle

Case Study



Community Conservation Champion volunteers lead a walk at Kendal End Quarry, Lickey Hills © Herefordshire & Worcestershire Earth Heritage Trust

The Herefordshire and Worcestershire Earth Heritage Trust support a volunteer group of Community Conservation Champions who are actively involved in helping to maintain and promote some of the county’s Local Geological Sites⁵⁷.

⁵⁷ <https://ehtchampions.org.uk/ch/>



94% of adults who had visited a green and natural space in the previous 14 days agreed that spending time outdoors was good for their physical health



92% agreed it was also good for their mental health



82% of adults agreed that being in nature made them very happy.



59% of adults agreed that they felt part of nature.



Urban green spaces (such as parks, playing fields or playgrounds) were the most visited type of outdoor spaces.

All data points taken from ‘The People and Nature Survey for England: Year 2 Annual Report (April 2021-March 2022)’ published by UK Government.

Section 3: Worcestershire's Habitats and Species





Water Vole © Getty Images

Arable Farmland

(flora, birds and invertebrates)

Caroline Corsie from Worcestershire Wildlife Trust

Worcestershire is an important county for arable flora, a specialist group of plants growing on cultivated land and one of the most critically threatened groups of plants in Britain. These plants, such as poppies, cornflowers and mayweed, thrive in the habitat niches associated with bare soil and ground disturbance. They play a key role in supporting insect and bird populations but face many threats in the modern agricultural landscape.



Important features

- Arable flora can be found in nectar/ pollen-rich margins and plots, stubbles and fallow land, cultivated margins or headlands, grass buffer strips and ditches and wet flushes.
- The seeds of arable flora can survive for years in the soil, offering opportunities for restoring populations of these plants.
- Arable field margins support rare insects including pollinators such as the brown-banded carder bee and scarce black mining bee.
- Many farmland bird species, such as yellowhammer, skylark and linnet, rely on the seeds of arable plants or the insects feeding on those plants.



Yellowhammer *Emberiza Citrinella* © GettyImages



Corn buttercup at Lower Smite Farm © Jasmine Walters

Flower-rich field margin at Lower Smite Farm © Wendy Carter

Arable Farmland

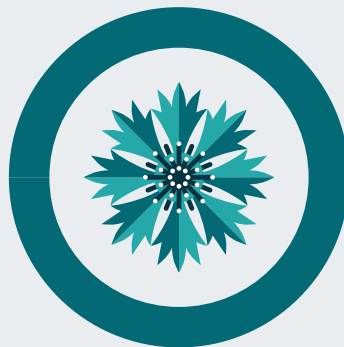
(flora, birds and invertebrates)

Current Status

There has been a severe decline in the populations and distribution of arable flora species since 1945. Post-war agricultural intensification, the introduction of the Common Agricultural Policy in 1962, and changes in the timing of cropping has resulted in significant loss and degradation of arable plant habitats. Widespread use of insecticides and herbicides has also resulted in a decline in many insect and farmland bird species.



Insect pollination affects the yield or quality of 75% of globally important crops⁵⁸.



54 species of arable flora are considered to be at high risk of extinction⁵⁹, including cornflower, corn buttercup, shepherd's-needle and narrow-fruited cornsalad.



Around 2000 species of insect (excluding soil microorganisms) are commonly found in cereal fields⁶⁰.



Around 150 species of wild plants can occur in arable fields.

58 <https://www.ceh.ac.uk/press/surviving-plants-and-insects-are-tougher-we-think>

59 Winspear, R and Davies, G (2005). A management guide to the birds of lowland farmland. The RSPB, Sandy.

60 <https://naturebftb.co.uk/wp-content/uploads/2019/07/Conserving-Important-Arable-Plants.pdf>

Key Pressures

- Widespread use of broad-spectrum herbicides and pesticides.
- Applications of lime altering soil pH.
- Lack of adoption of Integrated Pest Management.
- Reduction in the diversity of crop habitats.
- Predominance of winter cropping over spring cropping resulting in crops that allow increasingly less light through the canopy from early spring.
- Deep cultivations/subsoiling affecting individual species requirements.
- Planting of high nitrogen requirement crops.
- Autumn ploughing of stubbles.
- Historic removal of hedgerows.
- Field drainage resulting in loss of wet areas.
- Potential loss of arable land to crop production for biofuel.
- The drive away from leaving bare ground due to Flood Risk Management concerns.
- The general poor and declining state of soil health.
- Lack of knowledge and awareness of rare arable flora and its conservation.



Poppies in bloom on an Arable Plant Area managed for rare arable wildflowers on the Kemerton Estate © Kate Aubury

Key locations

- The Worcestershire Flora Project (1987-2005) recorded clusters of arable flora species in the following broad areas: Southern Forest of Feckenham from Cowsden to Bishampton (including Naunton Court Fields); around Madresfield from north-east Malvern across to Callow End and Clevelode; the area around Coombegreen Common and across to Upton-upon-Severn; the very south-west of the county around Gadfield Elm; north of Pebworth; around Defford and Birlingham; the western slopes of Bredon Hill across to Bredon's Norton.
- Cotswolds pennycress site near Strensham.
- Kemerton Estate.
- Lower Smite Farm, managed by Worcestershire Wildlife Trust.

Case Study



*Bumble-bird wildflower mix at Lower Smite Farm
© Wendy Carter*

Worcestershire Wildlife Trust's operational base, Lower Smite Farm is a 65ha part-organic farm where the focus is on soil health, year-round food for wildlife and habitat connectivity. Successive Countryside Stewardship schemes have enabled a transition to Integrated Pest Management and away from pesticide and fertiliser use. Woodland, hedgerow and orchard planting, creation of species-rich grassland and wetlands, and the establishment of areas of fallow to allow the germination of rare arable plants have also been undertaken. Corn buttercup, mousetail and spreading hedge-parsley, all endangered arable plants, are a few of the species now found here.

More hedgerows and tussocky margins have increased overwintering habitat for invertebrates and spiders. Improved connectivity across the farm has been important for less strong flying insects. Sowing of bumble bird mixes and diversification of plant species has extended the flowering times to ensure there is a nectar source from early spring until late into the year. Butterflies and other insects, and farmland bird populations have all clearly benefited.

Traditional Orchards

John Iles from the Wyre Community Land Trust

Traditional orchards are a distinctive and much-loved feature of Worcestershire's landscape and can support significant biodiversity, including nationally rare, scarce, and declining species. Fruit production was an important part of the county's rural economy from the mid-19th to the mid-20th century, when the expansion of the railway and canal systems enabled the bulk transportation of fresh produce to new and more distant markets, encouraging the planting of orchards on a large scale.



Important features

- Traditional orchards often support a diverse mosaic of associated habitats, including fruit trees, scrub, herb-rich grassland, hedgerows, and hedgerow trees.
- Decaying fruit timber supports the larvae of the rare Noble Chafer beetle.
- Fruit trees are valuable hosts for mistletoe, fungi and lichens.
- Blossom provides an important source of nectar in early spring.
- Fallen fruit is an important food source for mammals, birds and invertebrates in autumn and winter.
- Orchards are celebrated for their genetic diversity, with many fruit varieties carefully selected and bred over decades.
- Traditional orchards have a rich associated cultural heritage, for example Apple Day and wassailing celebrations, and local festivals such as the Bewdley Cherry Fair and Pershore Plum Festival.



Edward VII apple variety
© Wade Muggleton



Noble chafer beetle
© Rebecca Lashley



Song Thrush feeding on
apple © Gettyimages

Apple Orchard in the Teme Valley © Rebecca Lashley

Traditional Orchards



Hipton Hill orchard overlooking the Vale of Evesham, home to the noble chafer beetle © Gary Farmer, Vale Landscape Heritage Trust.

Current Status

Since 1950 the area of orchards in England has decreased by 63%, with up to 45% of remaining orchards in declining condition⁶¹. Local data suggests that losses in Worcestershire may be closer to 85%. Despite this, the county still contains about 2000ha of the habitat, around 8% of all remaining traditional orchards in England⁶². A small number of Worcestershire’s traditional orchards fall within a SSSI, are listed as a Local Wildlife Site, or are protected by Tree Preservation Orders, but most have no protection.

Key pressures

- Loss of commercial viability with increased reliance on imports to provide cheap fruit all year round.
- Agricultural intensification and conversion to other land uses.
- Conflict between commercial farming and nature conservation objectives.
- Gradual decline through neglect or poor management.
- Land development pressures, particularly for new housing on the outskirts of villages and towns.
- Loss of, and financial implications of maintaining and using, traditional management skills.
- Capital grants are often available for planting or restoring traditional orchards, but securing long-term sustainability and finding markets for produce is challenging.
- Increase in pesticide/herbicide use.
- Inappropriate grazing, especially with larger livestock such as cattle and horses, resulting in damage to trees.
- Changing climate.

⁶¹ People’s Trust for Endangered Species traditional orchard inventory

⁶² Robertson, H and Wedge, C (2008). Traditional orchards and the UK Biodiversity Action Plan. In: Rotheram, ID.ed. Orchards and groves: their history, ecology, culture and archaeology, 109-118. Sheffield: Wildtrack Publishing.

Key locations

Although once common across much of the county, speciality orchards developed in some key areas including:

- Cherries, damsons, and pears west of the Severn, including in the Wyre Forest and around Bewdley and in the Teme Valley.
- Plums in the Avon Valley, Upper Teme Valley, Worcester area and smallholding landscapes around Bromsgrove.
- Cider apples in west Worcestershire, particularly the Teme Valley and Malvern Plain.

Case Study



Wade Muggleton from Worcestershire County Council demonstrating the formative pruning of young fruit trees © WCLT

During 2004 the Wyre Forest Study Group undertook a survey in orchards at Bowcastle Farm. This identified 224 species dependent on the dead and decaying wood of the old fruit trees, including the rare Noble Chafer beetle. Further work by English Nature identified 264 remnant orchards in and around the Wyre Forest, 31 of them within Sites of Special Scientific Interest. Many of these orchards were in unfavourable condition and at risk of being cleared or 'tidied up'.

The Wyre Community Land Trust (WCLT) was formed in 2007 to care for and manage orchards, meadows and woodland within the greater Wyre area. WCLT was able to access Heritage Lottery funding for the 'Grow with Wyre' initiative to reverse the decline in these precious habitats. This £4m programme sought to pump-prime the restoration of 72 square km of landscape across 18 projects. By engaging with landowners, recruiting volunteers, running training events and drawing in additional Countryside Stewardship funding, Grow with Wyre restored 14 traditional orchards (25ha) and created 25 new ones (13ha) including a special gene bank orchard with 82 different varieties.



Young fruit tree planted in an old orchard © WCLT

Hedgerows

Simon Primrose from Butterfly Conservation

Hedgerows are characteristic of much of Worcestershire's countryside. They combine the benefits of scrub, woodland and woodland ground flora, providing valuable habitat corridors for wildlife. They can also include earth banks as well as associated ditches. Most hedgerows were planted or created during clearance of woodland for agriculture (assarting), to enclose livestock or to define ownership boundaries. They can be of high historic as well as landscape and wildlife value.



A hedgerow is a boundary line of mixed shrubs, often with trees, over 20m long and less than 5m wide at the base



Five different woody species per 30 metres, in a mixed hedge, is regarded as very valuable for wildlife.



Important features

- Source of nectar, foliage, flowers, fruit, and egg-laying or nesting locations for insects, birds and small mammals, including brown hairstreak butterfly and dormouse.
- Typical hedgerow shrub species in Worcestershire include hawthorn, blackthorn, hazel, dogwood, English elm, elder, field maple and guelder rose. Less common species include spindle, wild privet, wayfaring tree and holly.
- Hedgerow trees often show evidence of past management such as laying, coppicing or pollarding.
- Ancient hedgerow trees have great landscape value and are important for roosting bats, nesting birds and dead wood-dependent insects.
- Hedgerows can be markers of ancient estate or parish boundaries.
- Local traditions of planting fruit trees such as damson, apple and pear in hedgerows is characteristic of the county.
- Well maintained and dense hedgerows can act as biosecurity barriers between livestock herds on different landholdings.



Small to medium scale, piecemeal enclosed fields with mature hedgerow boundaries, in north east Worcestershire © Historic England



Veteran small-leaved lime coppice in hedgerow © Rebecca Lashley



Sloes In A Rural Hedgerow © Gettyimages

Farmland with hedgerows and hedgerow trees © Rebecca Lashley

Hedgerows



Woodland edge habitat with suckering blackthorn © Rebecca Lashley

Current Status

Since 1945, 50% of Worcestershire's land area has undergone some kind of landscape character change⁶³, 28% of which resulted from field boundary loss through hedgerow removal. Worcestershire lost very large numbers of hedgerow elm trees to Dutch Elm disease in the 1970s and 1980s, although immature elm is still an important surviving resource in the county.

Key pressures

- Historic hedgerow removal in support of agricultural intensification.
- Inappropriate management, such as excessive or badly timed flail cutting.
- Adjacent arable land use, leaving the hedge vulnerable to plough damage and to herbicide or pesticide sprays.
- Damage by livestock, including browsing and raised nitrate levels in the soil.
- Lack of management leading to the hedge growing out into a line of trees.
- The loss of hedgerow trees through disease (such as Chalara ash die back disease and Dutch elm disease) and felling without replacement planting.
- Difficulty of establishing and managing hedgerow flora, especially underneath newly planted hedges.
- Removal of hedgerows due to development.

⁶³ Worcestershire Historic Landscape Characterisation Project, 2012

Key locations

- The ancient landscape of the west, north and central parts of the county has a significant wooded characteristic, and this woodland cover includes the prominent presence of hedgerows and hedgerow trees.
- Hedgerows in west Worcestershire containing small-leaved lime and wild service may be nationally important.
- All hedgerows provide a vital landscape connectivity function and, in this context, should all be considered 'important sites'.

Case Study



Brown hairstreak caterpillar © Rebecca Lashley

The Brown Hairstreak butterfly exists in only a handful of regions in southern England and Wales. Eggs are laid and overwinter on young and suckering blackthorn growth, and occasionally other prunus species such as bullace. Hedgerows (including roadside ones), scrub and woodland edges are favoured, so annual winter flailing of hedgerows is extremely detrimental: egg losses can reach 90%. The Worcestershire population of Brown Hairstreak is centred on Grafton Wood in the heart of the Forest of Feckenham, and Butterfly Conservation volunteers have been

surveying for the species here for several decades⁶⁴. Over the last 10 years Butterfly Conservation has worked closely with the owners of a farm near Feckenham, close to the Grafton Wood stronghold, to implement hedgerow management practices that will support the lifecycle of the Brown Hairstreak⁶⁵, ensuring that there is always a good supply of suitable blackthorn growth for egg laying. Over the last ten years, winter egg counts have proved that the butterfly has flourished, and the farm now holds what is almost certainly the largest farmland population of Brown Hairstreaks in Worcestershire.



A Rare Brown Hairstreak Butterfly © Getty Images

⁶⁴ <https://westmidlandsbutterflyconservation.wordpress.com/2016/12/12/brown-hairstreak/>

⁶⁵ <https://butterfly-conservation.org/sites/default/files/1.brown-hairstreak-species-factsheet.pdf>

Scrub

Gary Farmer from Vale Landscape Heritage Trust

Scrub communities can be incredibly varied and support a wide range of species. Scrub is a valuable habitat in itself, an important component of a habitat mosaic, and is often found as a successional habitat, for example as open habitats transition to woodland. Most definitions of scrub describe it as vegetation dominated by shrubs or bushes, with height and growth form used to separate areas of scrub from areas of woodland. In Worcestershire, scrub is most likely to comprise readily seeding or suckering species such as birch, ash, hawthorn and blackthorn. In wet areas willow may be a frequent component. Amenity planting on highways verges can develop into valuable scrub habitat, as can young, abandoned, or under-managed woodland.



Important features

- Scrub can provide an invaluable food source, including nectar, foliage and fruit.
- Scrub provides nesting habitat for birds such as linnet, blackcap and whitethroat, and egg-laying habitat for species such as brown hairstreak butterfly.
- Scrub edges to fields provide a refuge for grassland plant species that are intolerant of grazing.
- For many grassland butterflies scrub provides important shelter from the prevailing wind and helps maintain a warm micro-climate to support breeding.
- Scrub as part of a wetland or wet woodland mosaic can provide breeding or resting areas for otter.



Brown hairstreak butterfly eggs laid on suckering blackthorn scrub © Rebecca Lashley



Common hawthorn with white flowers © Getty Images

Scrub developing in old apple orchard © Rebecca Lashley

Scrub

Hartlebury Common © WCC

Current Status

Around 550ha of scrub woodland is mapped in Worcestershire, but this is limited to areas of scrub with a continuous closed-canopy greater than 0.25ha and is likely to be an underestimate.

Key pressures

- Lack of awareness of the conservation value of scrub to wildlife.
- Management of other habitats needs to be balanced with the continued presence of scrub. For example, grazing needs to be carefully managed on sites with a scrub component as under-grazing speeds succession to woodland, whereas over-grazing prevents scrub regeneration and growth.
- Browsing by deer can have a detrimental effect on regeneration and the structure of scrub and woodland understory habitat.
- Lack of scrub creation on land adjacent to woodland or of permitting a scrub woodland edge habitat to develop and remain.
- Lack of acceptance of transitional scrub as part of a habitat mosaic that would contribute to supporting a wider variety of species.

Key locations

Scrub in its different forms is present throughout Worcestershire. Sites where scrub is actively managed as an important habitat component include:

- Bredon Hill, where the SAC/SSSI designation includes species-rich hawthorn scrub important for breeding birds and invertebrates.
- The Malvern Hills and Commons are significant for their areas of scrub-grassland mosaic and isolated scrub in open habitats.
- Cherry Orchard Local Nature Reserve in Worcester has developed an important grassland and scrub mosaic through natural succession.
- Hartlebury Common SSSI is a scrub / heath mosaic that is protected as one of the most important areas of dry dwarf shrub heathland surviving in the West Midlands.
- Kinver Edge SSSI, part of which falls within Worcestershire, was also designated for its dwarf shrub heath community.

Case Study



Common linnet © Getty Images

Haines Meadows is a 55acre grassland and wetland site owned by Vale Landscape Heritage Trust⁶⁶ in the floodplain of the River Avon. Several of the fields form part of a floodplain meadow restoration project and scrapes have been added to support passage and breeding wading birds. Scrub has been allowed to develop naturally on a two-acre field, with hawthorn being the dominant woody species and blackthorn and bramble spreading from the adjacent hedgerow. Uncut grasses have formed tussocks and pendulous sedge is present. In the first two years the number of insects increased dramatically

including many grasshoppers and bush-crickets. Dragonflies and damselflies breed in the river and feed and shelter in the scrub. Birds including song thrush, linnet and reed bunting were quick to take advantage of the abundant supply of insects and have been recorded nesting in the newly developing scrub habitat. Harvest mouse nests have also been found here and hares are present. Small areas are cut each year to retain patches of open grassland and ruderals.



Long-winged conehead female © Gary Farmer

66 [Vale Landscape Heritage Trust - Vale Landscape Heritage Trust Home \(weebly.com\)](http://www.vale-landscape-heritage-trust.com)



National Trust volunteers manage scrub at Kinver Edge as part of maintaining a habitat mosaic that supports populations of rare species including adder © National Trust

Woodland

Wayne Barnes from the Forestry Commission

Woodlands are habitats where trees dominate the landscape. The distribution of woodland across Worcestershire is not uniform, and the presence, distribution or absence of woodland is important in defining landscape character. Different woodland types can all support unique shrub and ground flora layers, mosaic habitats of open spaces (which can include grassland, heathland and traditional orchard), woodland-edge habitats and scrub. The species and structural diversity (and ecological condition) of woodlands varies greatly, being influenced by woodland type, age, location, climatic conditions, landowner objectives and both past and current management. Ancient woodlands are sites that have been continuously wooded since at least 1600, and long-established woodland has been present since at least 1893. Plantation woodland is younger, with fewer species and less structurally diverse than ancient sites growing on similar soil types. Mixed-species, productive woodlands provide environmental, social and economic benefits.



Important features

- Ash and field maple woodland is the predominant woodland type across the south and west of Worcestershire on base-rich and calcareous soils.
- Pedunculate oak woodland is common on neutral and moderately acid soils, occurring throughout the county and the dominant type in the Severn Vale.
- Oak-birch woodland is common on acidic and sandy soils and is particularly frequent in the north and west: in the Wyre Forest, the Teme valley and around Kidderminster.
- There are considerable numbers of beech plantations on the edge of the Cotswolds in the southeast of the county.
- Worcestershire has a single example of yew woodland on the Abberley Hills.
- Ancient semi-natural woodland (ASNW) is notably absent from the so-called 'planned' landscapes of the southeast of the county but is a significant component of the 'ancient landscapes' of north and west Worcestershire.
- Plantations on Ancient Woodland Sites (PAWS) are those where the original ancient woodland has been cleared or partly cleared in modern times and replanted, often with commercial broadleaf and/or conifer species for timber production.
- Coppice management of woodland has historically been common in parts of Worcestershire, creating a diverse canopy and age structure which is beneficial to wildlife.



Nuthatch in woods
© Getty Images



Trench Wood is important for butterflies and woodland birds © Rebecca Lashley



Many woodlands around the Malvern Hills are remnants of the Malvern Chase, a Royal Forest that was disafforested by Charles I in 1644.



Woodland



Tiddesley Wood, an ancient woodland managed as a nature reserve by Worcestershire Wildlife Trust © Rebecca Lashley

Current Status



2.4% of the UK is covered by ancient woodland.



10% of Worcestershire's land area is covered in woodland, less than the U.K. average of 13.2%.



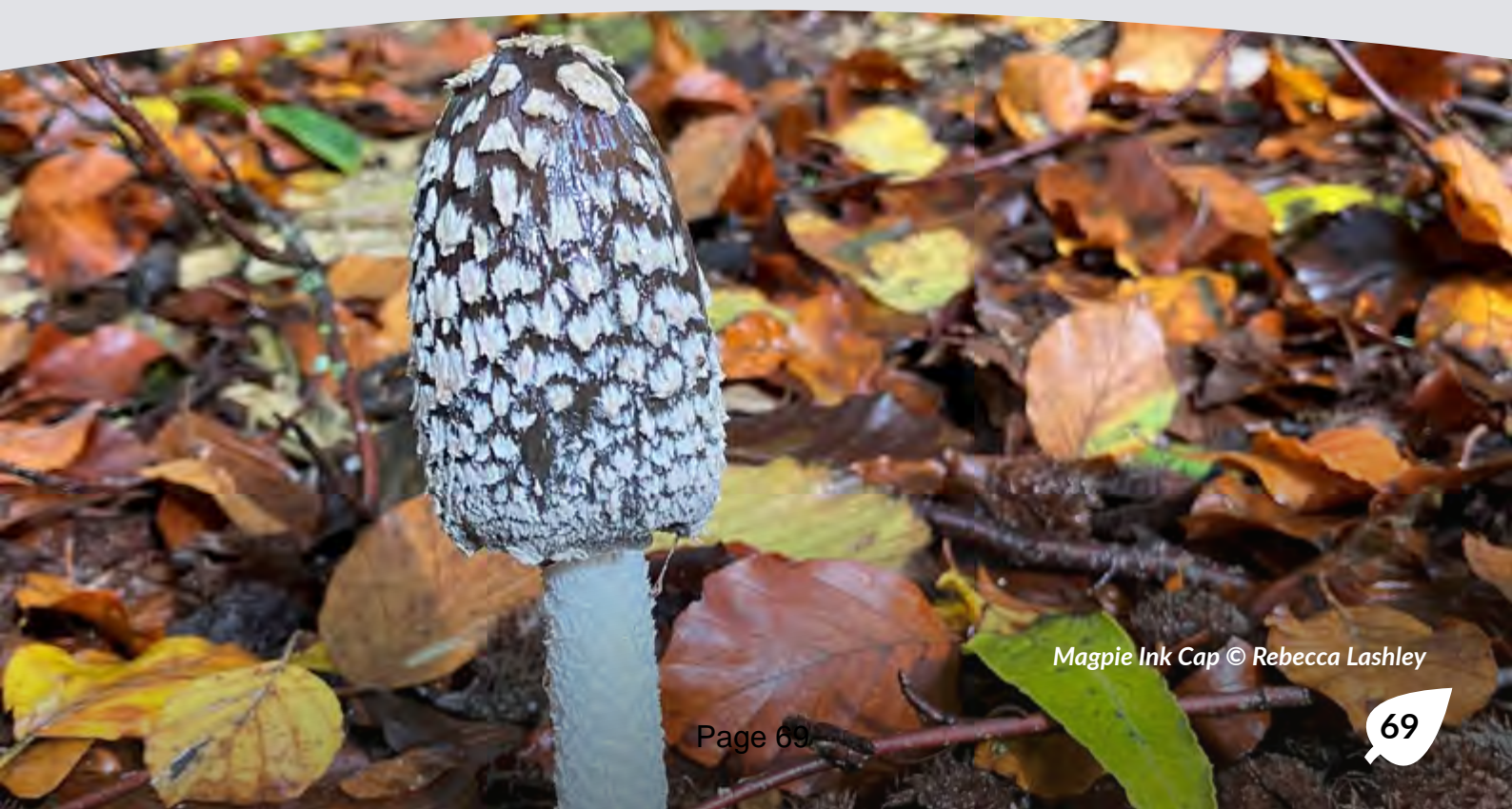
There are 6,253ha of ancient woodland in Worcestershire, 3.6% of land cover, of which 60% is ancient semi-natural woodland and 40% is plantations on ancient woodland sites.



There are around 17,500ha of woodland in Worcestershire, comprising 2,600ha of conifer and 14,900ha of broadleaved woodland.

Key pressures

- Impacts of climate change and extreme weather events such as drought, wildfire and inundation by floodwater.
- Loss and fragmentation of woodland due to development of housing, roads or other infrastructure, or clearance for other land uses.
- Influence of surrounding land-use and the management of boundary features and woodland edges.
- Tree diseases such as acute oak decline and Chalara ash dieback have the potential to severely impact the native tree stock.
- Scrub clearance may reduce the potential for woodland in some areas.
- Damage to trees and prevention of woodland regeneration due to deer browsing.
- Bark stripping damage caused by grey squirrels.
- Invasion of semi-natural woodlands by non-native plant and tree species.
- The practice of ‘woodlotting’ – splitting woodlands into smaller compartments resulting in multiple ownerships and differing management aspirations.
- The use of heavy machinery during forestry operations can cause damage through soil compaction.
- Skewed age class distribution and limited species and structural diversity of trees in managed and production woodlands.
- Excessive recreational use of woodlands causing disturbance to wildlife and damaging exposed root structures.
- Air pollution and spray drift from nearby application of agricultural chemicals.
- Fly-tipping of organic matter can negatively impact the field layer.
- External market forces supporting the abandonment of woodland management due to reduction in profits for timber products or desire to convert land to other uses.



Magpie Ink Cap © Rebecca Lashley

Woodland



Tolladine Wood Local Wildlife Site © Steve Bloomfield

Key locations

- Important areas of PAWS and ASNW are found on the West Malvern to Abberley Hills ridge and across to the Teme Valley.
- The woods of the Teme Valley form an interesting series of limestone woodlands with a species-rich shrub and ground flora layer.
- Most of the woodlands in central Worcestershire are typically pedunculate oak over hazel coppice. Many support rich ground floras such as herb-paris, early-purple orchid and greater butterfly-orchid.
- Wild service tree can be common in some woodlands in west Worcestershire, occasionally being found as a dominant woodland edge species.
- Urban woodlands provide vital green infrastructure, allowing access to nature close to home. Examples include Nunnery Wood, Perry Wood and Tolladine Wood in Worcester, and Pitcheroak Wood, Southcrest Wood and Walkwood Coppice in Redditch.
- The Wyre Forest, much of which is a National Nature Reserve and/or SSSI.
- Chaddesley Wood National Nature Reserve.
- Roundhill Wood, Grafton Wood and surrounding woodlands are at the core of the only brown hairstreak butterfly population in the West Midlands.
- Shrawley Wood SSSI.
- Tiddesley Wood SSSI.
- Large expanses of new native woodland being planted by Heart of England Forest in the east of Worcestershire around the Lenches, Pebworth and Honeybourne.

Case Study



Bluebells in Shrawley Wood © Rebecca Lashley

Shrawley Wood was designated as a SSSI as it consists of a large tract of ancient woodland dominated by coppiced small-leaved lime, a habitat unusual in the West Midlands. The woodland is notable for its display of spring bluebells, as well as ramsons garlic in damper parts of the wood. Other notable plant species include herb-paris, broad-leaved helleborine, spreading bellflower and soft hornwort. Shrawley is also important for its fungi and populations of breeding woodland birds.

Case Study



Diverse ground flora along a wide ride in Grafton Wood © Wendy Carter

A notable group of PAWS woodlands are found in the centre and south of the county, including Trench Wood, Monkwood and Grafton Wood. They are known as the 'Harris Brush Company Woods', where large areas of coppice were managed to provide timber for brush handles. All were within easy reach of the company's factory at Stoke Prior. They are notable today for their rich ground flora, butterflies and woodland birds.

Case Study



Wyre Forest © Cody Levine

The Wyre Forest is the third largest area of ASNW in England. The plateau soils are generally acidic, but the valleys and slope

bottoms are more base-rich. Sessile and pedunculate oak are common with ash, English elm, small-leaved lime, the nationally rare true service tree and common alder in the valleys. Large-leaved lime, narrow-leaved helleborine, soft-leaved sedge and columbine are amongst the scarcer species found. Wyre's National Nature Reserve designation makes it an important location for education and research, including being part of Natural England's Long Term Monitoring Network⁶⁷. Across the forest, weather, air quality, birds, butterflies, soil and vegetation surveys are carried out by groups of experts⁶⁸.

⁶⁷ <https://publications.naturalengland.org.uk/publication/4654364897050624>

⁶⁸ https://wyreforest.net/wp-content/uploads/Woodland_Management_Articles/PDF/46-53-Playing-the-long-game-in-Wyre-Copy.pdf

Ancient and Veteran Trees

Simon Wood from Worcestershire Biological Records Centre

Ancient trees are those at an ancient stage of their life and are old relative to other trees of the same species. Key characteristics include a low, fat, and squat shape, a wide trunk, a lowering of the canopy as higher branches die back and a hollowing trunk. Veteran trees are not necessarily ancient in age but show similar characteristics, due to premature ageing or because of natural damage, management operations (such as pollarding) or pressures of the surrounding environment. Ancient and veteran trees alike are of high biodiversity, landscape, heritage, and cultural value.



Important features

- Ancient and veteran trees are especially valuable for the fungi, lichens, bryophytes and huge range of invertebrates (1700+ species) associated with decaying timber.
- Hollowing offers important nesting and roosting sites for bats and birds.
- Oak are one of the longest-lived native tree species. Several oak trees recorded on the Worcestershire Ancient Tree Inventory⁶⁹ are believed to be over 1000 years old.
- Ancient and veteran trees are visible relics of past land-use, land-management, and land-ownership patterns.
- Wood-pasture and parkland are habitat structures consisting of large, open-grown trees situated within grassland maintained by grazing livestock or deer.

69 <https://www.wbrc.org.uk/WBRC/index.html>



Decaying tree with fungi
© Rebecca Lashley



Ancient oak pollard in arable field
© Rebecca Lashley

Ancient and Veteran Trees

Veteran Small Leaved lime coppice in hedgerow © Rebecca Lashley

Current Status

Worcestershire is recognised nationally as an important county for ancient and veteran trees. The Worcestershire Ancient Tree Inventory contains around 3000 records of important trees. Records collected locally are also submitted to the national Ancient Tree Inventory⁷⁰.

Key pressures

- Lack of younger generations of trees resulting in a skewed age structure and breaks in continuity of dead wood habitat.
- Neglect of or loss of expertise in carrying out traditional tree management techniques such as pollarding.
- Tree diseases such as Dutch Elm disease, acute oak decline and Chalara ash dieback.
- Climate change leading to heat and drought stress.
- Damage from agricultural operations, inappropriate grazing, soil compaction, vandalism, and pollution.

Key locations

- Thousands of willow pollards are found throughout the Severn and Avon floodplains. In the southeast of the county, parts of the historic Longdon Marsh contain large numbers of ancient and veteran oak and willow pollards. Old black poplar pollards, a nationally scarce tree favouring damper ground, are also notable here and around Castlemorton Common.
- Ancient and veteran trees can be found along woodland boundaries and in hedgerows associated with former woodland. The landscape of the former Royal Forest of Feckenham is significant in this regard, for example at Grafton Wood.
- Veteran hedgerow pollards such as oak and ash are particularly notable across much of the county. In some areas ancient small-leaved and large-leaved lime can be found in coppice form within hedgerows.
- Worcestershire has a landscape rich in wood pasture and parkland. Ancient and veteran trees are frequent in these settings, for example at Croome Park, Hanbury Hall (both National Trust) and Spetchley Park.
- Urban parks and churchyards also frequently contain ancient and veteran trees, with ancient yews being a particular feature of the latter.

70 <https://ati.woodlandtrust.org.uk/>

Case Study



Ancient tree surveyors © Rebecca Lashley

Worcestershire Biological Records Centre (WBRC)⁷¹ manages the Worcestershire Ancient Tree Inventory, a dataset founded by the Worcestershire Recorders and expanded during WBRC's Ancient Tree Project between 2007-09. This important collection of records is the ongoing work of many individual people who find and survey our surviving ancient and veteran trees within Worcestershire's countryside. One of the county's most-surveyed locations for trees is Wichenford parish, where a comprehensive effort to map and measure hedgerow pollards was completed in 2008^{72 73}.

71 <https://www.wbrc.org.uk/WBRC/index.html>

72 https://www.wbrc.org.uk/WORCRECD/Issue%2024/survey_of_pollard_trees.htm

73 Pollarded Trees and their Historical Significance: A Study In Wichenford Parish (2009). Author: Jane Field. Published by Gatepiece Books.

Case Study



Piper's Hill © Ruth Bourne

Piper's Hill and Dodderhill Commons (also known as Hanbury Woods) are areas of former ancient wood pasture, where livestock would have been grazed beneath trees. Today, the site is a nature reserve managed by Worcestershire Wildlife Trust⁷⁴. Over 240 veteran oak, sweet chestnut and beech trees have been recorded, which support over 200 species of fungi as well as a wealth of insect, bird and mammal life.

74 <https://www.worcswildlifetrust.co.uk/nature-reserves/pipers-hill-dodderhill-commons>

Wet Woodland

Paul Allen from Wyre Forest District Council

Wet woodland occurs on poorly drained or seasonally wet soils, usually with alder, birch and willow as the dominant tree species. It is found on floodplains, as successional habitat on fens and bogs, around water bodies, along streams and in peaty hollows. The soils on which wet woodlands occur range from nutrient-rich mineral soils to very acid, nutrient-poor organic soils. Wet woodlands frequently occur in a mosaic with other, drier woodland types and wetter habitats such as fens and open water. The boundaries between habitats can be sharp or gradual and can change over time through natural succession or through habitat management.



Important features

- Some wet woodlands developed as a result of historic planting of osiers (a type of willow) for basketwork.
- Many alder woodlands are ancient and have a long history of coppice management.
- Wet woodland is important for many different wildlife species, including providing important cover and breeding sites for otter.
- The high humidity in wet woodlands can favour mosses, lichens, liverworts and dead wood fungi.
- The number of invertebrates associated with alder, birch and willow is very large and includes specialised beetles, craneflies, other flies and molluscs.
- Dead wood and saturated ground are micro habitats commonly associated with wet woodland.



Wet woodland provides important habitat for otter
© Getty Images



Dead wood habitat in wet woodlands supports a rich variety of mosses, lichens, fungi and insects © Laura Wood



Lesser-spotted woodpecker
© Getty Images

Wet Woodland



Many remaining wet woodlands in Worcestershire are listed as Local Wildlife Sites © Laura Wood

Current Status

Historical estimates of the extent of wet woodland in the UK are in the region of 50,000-70,000 ha. The Worcestershire Habitat Inventory⁷⁵ (WHI) records a total of 91.83ha of wet woodland, mostly occurring as riparian woodland alongside rivers and streams, or associated with springs or flushes, wooded river valleys, old mineral workings and mill pools.

Key pressures

- Clearance of the habitat and conversion to other land uses.
- Habitat fragmentation.
- Poor water quality arising from eutrophication, urban effluents, rubbish dumping and agricultural runoff and spray drift.
- Invasion by non-native species such as Himalayan balsam and skunk cabbage.
- Diseases, such as Phytophthora root disease of alder.
- Climate change speeding succession to drier woodland types.
- Lowering of water tables through drainage or abstraction.
- Adjacent land use providing 'hard' boundaries to the woodland, promoting limited structural diversity and lack of biologically rich woodland edge habitat.
- Abandonment of management in formerly coppiced sites.

75 <https://www.worcestershire.gov.uk/council-services/planning/environmental-policy/worcestershire-habitat-inventory>

Key locations

- Riparian habitat associated with the River Stour floodplain, where tributaries such as the Blakedown Brook contain important linear woods of alder and crack-willow. This includes the largest alder carr woodland in the county at Hurcott and Podmore Pools SSSI.
- The Hoo Brook valley.
- Hartlebury Common and Hillditch Coppice SSSI.
- Wet flushes around springs and along stream corridors throughout Wyre Forest.
- Recent wet woodland in old clay pits in the Severn Valley.
- Recent wet woodland developed from former osier beds such as at Ripple Lake and the Napps.
- Alder carr associated with the linear complexes of old mill pools in stream valleys around Kidderminster, Stourbridge, and along the River Severn.
- Locally significant pockets of wet woodland, that have developed as secondary woodland on mainly wet soils, in the river valleys, clay pits and marshes along the Rivers Severn and Avon.
- Wet woodland flushes around springs and along stream corridors throughout Wyre Forest.
- Wet woodland, including dingle woods, in the undulating landscape and steeply incised valleys, of the north and north-west of Malvern Hills District.

Case Study



Hurcott Pool © Paul Allen

Hurcott Pool is a medieval mill pool in the valley of the Spennals Brook, designated (along with neighbouring Podmore Pool) as a Site of Special Scientific Interest for its wetland and wet woodland habitat. Hurcott's water was once used to power local industries including paper making, and the wet woodland was historically used for alder coppice. The SSSI and surrounding land is now owned and managed by Wyre Forest District Council as a nature reserve, covering 50ha in total. The site has a healthy population of otter and supports several different bat species: a dilapidated boathouse on the site was fully renovated in 2019 and converted into a dedicated bat house to provide roosting, breeding and hibernating opportunities for both crevice-dwelling and perching bat species. However, the ecological condition of the woodland is challenged by a lowered water table, due to abstraction and historic drainage, invasive non-native species, and high levels of phosphate in the water. Work by the Environment Agency has installed a series of adjustable weirs to enable the periodic flooding of the wetland, mimicking natural flood events.



Bat house at Hurcott Pool © Cody Levine

Reedbed

Liz Etheridge from Wychavon District Council

Reedbeds develop when stands of young common reed colonise and come to dominate areas of open water or wet ground. The habitat includes areas of reed that are both wet and dry at their base but where the water table is at or above ground level for much of the year. Wet reedbeds are generally more biodiversity rich. As part of a wetland mosaic, wet reedbeds should grade into dry reedbeds, tall fen and then willow scrub.



Important features

- Three plant communities of reedbed, reedmace and other emergent swamp occur in Worcestershire; *Phragmites australis* swamp and reed-beds, *Typha angustifolia* swamp and *Phragmites australis-Urtica dioica* tall-herb fen.
- Reedbeds are used by bittern, Cetti's warbler and marsh harrier at various times of year as well as providing important roosting opportunities for starlings and migratory species such as swallow and sand martin.
- Reedbeds provide important habitat for several nationally notable insect species, including the reed leopard moth and a rove beetle.



A large flock of starlings fly at sunset © Getty Images



Bittern stalking for prey in shallow water during the late evening sun © Getty Images

Avon Meadows reedbed © Liz Etheridge

Reedbed



Upton Warren © Sue Duffield

Current Status

Wetland habitats in general have been seriously compromised by human activity with many drained in the last few centuries to improve the land for agriculture. There are around 5000 ha of reedbed in the UK, but of the 900 or so sites contributing to this total only about 50 of those are greater than 20 ha⁷⁶. Reedbeds are not common or extensive in Worcestershire, although they do have a countywide distribution. The main resource is found on just 20 sites, with many other small pockets of reedbed in ponds and narrow fringes of habitat along rivers, canals and ditches.

Key pressures

- The small size of individual habitat blocks, small size of the total area of habitat and the isolation of individual small sites.
- Lack of, or inappropriate, management leading to drying out, scrub encroachment and succession to woodland.
- Invasion by non-native species such as Himalayan balsam.
- Excessive water abstraction leading to lowering of the water table and sites drying out.
- Pollution by road or agricultural runoff.
- Destruction due to recreational and development pressure and land use change.

⁷⁶ Climate Change Adaptation Manual: Chapter 13, Reedbeds <https://publications.naturalengland.org.uk/publication/5679197848862720>

Key locations

- Avon Meadows Community Wetland.
- Hewell Park Lake SSSI.
- Worcestershire Wildlife Trust Sites - Upton Warren SSSI, Feckenham Wylde Moor SSSI, the Gwen Finch Wetland Reserve and Wilden Marsh and Meadows SSSI.
- Droitwich Canal (a Local Wildlife Site).
- Westwood Great Pool SSSI.
- Oakley Pool SSSI.
- Turnmill Pond, part of the Bournes Dingle and Turnmill Pond Local Wildlife Site.
- The historic Longdon Marsh area.



The Worcester Habitat Inventory maps **8.39ha** of reedbed.



30% of the county's reedbed resource is designated as a Site of Special Scientific Interest

Case Study



View from boardwalk into newly opened pool at Avon Meadows © Liz Etheridge

Avon Meadows Local Nature Reserve sits in the floodplain of the River Avon on the outskirts of Pershore. Following devastating floods in 2007, a multi-functional wetland was constructed to help slow and filter surface water run-off and create new wildlife habitat.

Common reed was established through community planting in 2009, subsequently developing into a 3ha mosaic of reeds interspersed with willow scrub, tall herbs and standing open water. Breeding Cetti's warbler, cuckoo and water rail have been recorded.

Harvest mouse nests are a relatively recent discovery, found in the reed beds and transitional tall herb habitats.

A varied reed bed age structure is maintained as part of a diverse wetland mosaic through rotational winter cutting, preventing willow scrub dominance, and retaining areas of open water. Species and habitat monitoring is undertaken by the Friends of Avon Meadows CIO and other specialist species recording groups.



Harvest mouse nest in the reeds at Avon Meadows © Liz Etheridge

Fen, Marsh and Swamp

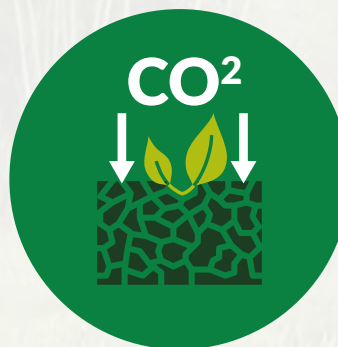
Julie Button from Natural England

Fen, marsh and swamp vegetation is found on peat, peaty or mineral soils which are permanently, seasonally, or periodically waterlogged by surface water, groundwater or rainfall. The type of habitat that develops depends greatly on the nutrient status and chemical composition of the water, as well as wetness, and can include tall fen with reeds, sedges, and tall herbs in high nutrient conditions, through to much more nutrient-limited vegetation comprising mosses and other low-growing plants. Fens, marshes and swamps are generally associated with other water-dependent habitats such as wet woodland and open water.

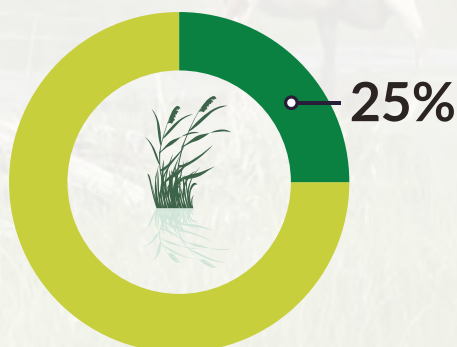


Important features

- The UK supports more than 50 different fen, marsh and swamp community types.
- Ongoing damage and degradation of England's peatlands is resulting in an estimated 3 million tonnes of CO₂-e being released from them every year.
- Fens, marshes and swamps can support a huge diversity of insects, including dragonflies and aquatic beetles, and birds such as curlew and snipe.



584 million tonnes of carbon is thought to be currently locked up within peatland soils in England.



Lowland fens are estimated to store 25% of England's peatland carbon⁷⁷.

⁷⁷ <https://publications.naturalengland.org.uk/publication/30021>

Fen, Marsh and Swamp

Ragged robin at Feckenham Wylde Moor © Paul Lane

Current Status

The extent of the historical loss of fen habitat is enormous: less than 0.5% of the fen present in England in 1637 is thought to survive today, lost to agricultural drainage, development and neglect⁷⁸. This extent of historical loss is likely to be mirrored locally. Sites remaining in Worcestershire are fragmented, generally small in size and under threat from a range of factors. Once common, they would have been found in any place that supported wet conditions, such as around groundwater-fed springs and seepages, and in river floodplains alongside other wetland habitats.



The Worcestershire Habitat Inventory gives a combined figure for fen, marsh and swamp habitat of 86.99ha.

Key pressures

- Groundwater abstraction leading to drawdown in aquifers and loss or reduction in supply of groundwater to wetlands.
- Drainage and subsequent cultivation of wetlands to convert land for agriculture.
- Nutrient enrichment through waterborne and airborne-deposition routes.
- Built development resulting in direct destruction of sites and/or impacts to the hydrology of sites.
- Lack of appropriate management leading to sites becoming derelict and scrubbed over.
- Climate change.
- Geographical and ecological isolation of sites.
- Engineering works for flood alleviation reducing water supply to floodplain sites resulting in loss of quality and extent of wetlands.
- Encroachment of non-native invasive species, for example Himalayan balsam, giant hogweed and Japanese knotweed.
- Inappropriate creation of other habitats within fen and marsh sites such as woodland planting.

Key locations

- Stour valley, including Puxton, Stourvale and Wilden marshes.
- Feckenham Wylde Moor SSSI.
- Historic Longdon Marsh area.
- Upton Warren SSSI.
- Ipsley Alders.
- Grimley Brick Pits SSSI.
- Redstone Marsh.
- Hartlebury Common SSSI.
- Castlemorton and Ashmoor Common SSSIs.

Case Study



Southern marsh orchid © Adam Hamilton

The River Stour corridor contains some of the most important wetland habitat in the Midlands and certainly some of the richest and most extensive sites remaining in Worcestershire. Around Stourport and Kidderminster the alluvial soils of the Stour valley support a network of habitats that include fen, damp meadow, marshy grassland, small alder and willow woods, reedbeds and open water. Willow pollards and black poplars are common. Wilden Marsh and Meadows SSSI, Stourvale Marsh SSSI and Puxton Marshes SSSI are closely located here, supporting species such as lesser reedmace, southern marsh-orchid, marsh cinquefoil, marsh arrowgrass, marsh pennywort, lesser water parsnip and great water dock.

Case Study



Emperor Dragonfly © Getty Images

A surface layer of fen peat overlays clay soils at Feckenham Wylde Moor. Once part of an extensive marsh in the valley of the Brandon Brook, the 12ha nature reserve is the sole surviving remnant of a programme of drainage here in the mid-1800s that converted the marshland for agriculture. Managed by Worcestershire Wildlife Trust, the site now supports wetland features including wet grassland, reedbed, ponds and scrapes. The reserve is notable for the number of damselfly and dragonfly species recorded, including the large red-eye damselfly and emperor dragonfly.

Wet Grassland

Adrian Darby from Kemerton Conservation Trust

Wet grasslands develop on land which is periodically flooded or waterlogged by freshwater and where land management practices promote swards dominated by short grasses, rushes and sedges. Wet grasslands in Worcestershire comprise one of two types: historic flood meadows managed to allow regular inundation by floodwater and used to provide a hay crop and 'aftermath' grass growth for livestock grazing ('floodplain meadows')⁷⁹, and wet grasslands coinciding with damper habitat surrounding ponds, lakes and drainage channels.



⁷⁹ [https://www.floodplainmeadows.org.uk/sites/default/files/files/Floodplain Meadows - Beauty and Utility A Technical Handbook.pdf](https://www.floodplainmeadows.org.uk/sites/default/files/files/Floodplain%20Meadows%20-%20Beauty%20and%20Utility%20A%20Technical%20Handbook.pdf)

Important features

- Traditional floodplain meadows provide valuable habitat⁸⁰ for a range of rare native plant species such as narrow-leaved water-dropwort, tubular water-dropwort, meadow-rue, pepper saxifrage, cuckoo flower and great burnet.
- Wet grasslands can be important for breeding birds such as curlew, lapwing, skylark and yellow wagtail.
- Their importance for breeding and overwintering birds means many wet grasslands in Worcestershire are considered in a wider landscape context as being 'functionally linked' to the Severn Estuary Special Area of Conservation⁸¹.

80 <http://www.floodplainmeadows.org.uk/discover/learn/biodiversity>

81 <https://publications.naturalengland.org.uk/publication/6087702630891520>

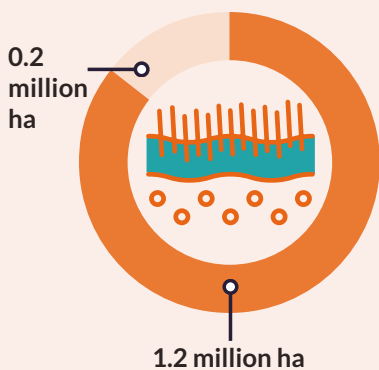


Close up of an adult curlew in
Summertime © Getty Images

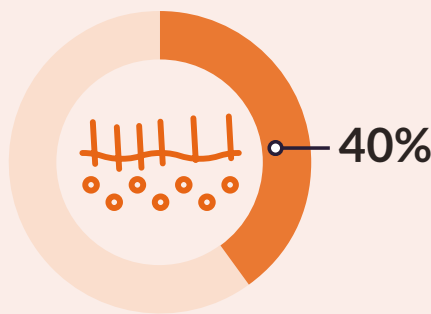
Wet Grassland



Great burnet and tubular water dropwort at Avon Meadows © Liz Etheridge



There was once an estimated 1.2 million hectares of wet grasslands in England’s floodplains, but less than 0.2 million hectares now remains.



An estimated 40% of wet grassland habitat in the UK was lost between the 1930s and the 1980s.



Only 1,100 hectares of species-rich floodplain meadow remain in the UK⁸².

Current Status

Worcestershire has extensive extant and remnant wet grassland within its river valleys but what remains is very vulnerable to loss. The level of historic habitat loss seen at a national level is very likely to be mirrored in Worcestershire. The loss of such large areas of wet grassland has had an adverse impact on breeding waders such that today, in the Worcestershire Severn and Avon Vales, snipe no longer breed and populations of redshank, lapwing and curlew are reduced to just a few pairs each.

82 O'Rourke, C (2023). Landowner Report: Avon Meadows. Flourishing Floodplains Project.

Key pressures

- Land drainage leading to loss of sites and hydrological isolation and desiccation of remaining sites.
- Reduction in ground water levels due to abstraction and engineering works for flood alleviation, leading to loss of flora and fauna dependent on high groundwater conditions.
- Eutrophication of sites through inundation with nutrient-rich (flood) water leading to a reduction in sward diversity and dominance of vigorous grass species.
- Ecological isolation of species due to fragmentation of habitat.
- Inappropriate management as a result of agricultural intensification, in particular conversion from hay to silage cutting, over/under grazing and applications of fertilisers.
- Disturbance of breeding birds by dog walkers and other recreational uses.
- Climate change.

Key locations

In Worcestershire, the floodplains of the Severn and Avon Vales and the Stour Valley hold most of the remaining wet grassland resource. Important sites include:

- Lazy Meadows SSSI, Rectory Farm Meadows SSSI, Stourvale SSSI and Upton Ham SSSI.
- The Kempsey Hams Local Wildlife Sites complex contains examples of old 'Lammas' meadows.
- The Avon Meadows LWS is managed as a Local Nature Reserve by Wychavon District Council.
- Worcestershire Wildlife Trust manages areas of wet grassland on several nature reserves including Hardwick Green Meadows and Hill Court Farm and the Blacklands.
- Lower Moor River Meadows, owned by Vale Landscape Heritage Trust.

Case Study



Upton Ham flood meadows managed by Kemerton Conservation Trust © Kate Aubury

Upton Ham is a 59.3 ha seasonally flooded grassland lying between the town of Upton-upon-Severn and the River Severn. It is designated as a Site of Special Scientific Interest for its rich and distinctive flora. Between 2009 and 2014, Kemerton Conservation Trust purchased seven sections of the Ham totalling 7.3 ha. Although in multiple ownerships, the Ham is managed

like a Lammas Meadow, being shut up for hay over the summer and grazed in common by sheep in the autumn. It is managed under Countryside Stewardship which ensures that this regime is maintained, and no herbicides or fertiliser are applied.

The majority of Upton Ham is classified as 'MG4' grassland, and its distinctive flora includes mousetail, common meadow-rue, meadow saffron, great burnet and meadow foxtail (the latter two species being particularly characteristic of this type of meadow). The nationally scarce narrow-leaved water-dropwort is also found here. The Ham provides breeding habitat for wading birds such as curlew and redshank, as well as corn bunting and skylark. The rare common club-tail dragonfly can be found along the river's edge.

Grassland

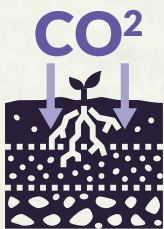
Jasmine Walters from Worcestershire Wildlife Trust

Grasslands cover large swathes of the English countryside, and most have been substantially modified or agriculturally 'improved' since the mid-20th century. Semi-natural and species-rich grassland has often developed over hundreds, and in many cases thousands of years, as a result of differing land management, soil and hydrological factors. It is typically divided into upland, above 300m, and lowland, and can be Calcareous - found on shallow lime-rich soils, Acidic - found on sands, gravels, and siliceous rocks, or Neutral - found on clay and loam soils.

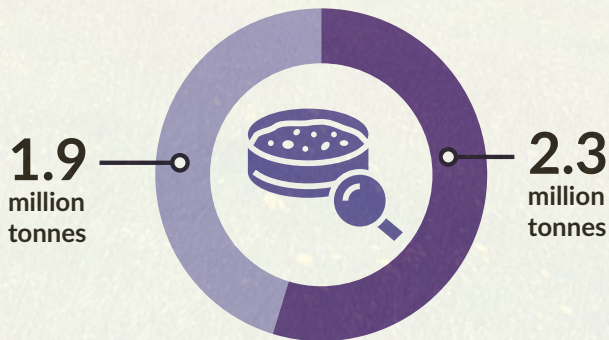


Important features

- Semi-natural or traditionally managed grasslands are lower yielding than modern agricultural grasslands, but are rich in trace elements, can be lower in gut parasites affecting livestock, are more drought tolerant and are therefore likely to be considerably more climate change resilient.
- Traditional grasslands are important wildlife habitats, not just for their diversity of plants but also for their invertebrate, fungal and microbial diversity.
- Traditional grasslands have considerable cultural importance and are more aesthetically pleasing than modern agricultural leys, adding colour and visual diversity to the landscape.
- Road verges and traditional orchards also contribute a considerable semi-natural grassland resource.



UK grasslands store two billion tonnes of carbon in their soil⁸³



An assessment of the carbon storage potential of floodplain soils in Worcestershire calculated that 2.3 million tonnes of carbon might already be stored, with the potential to capture and store an additional 1.9 million tonnes through changes to land management.



Common blue butterfly
© Rebecca Lashley



Meadow waxcap in a field
© Getty Images

Hollow Meadow Local Wildlife Site © Jasmine Walters

Grassland

Current Status

In 2023 the total area of all unimproved semi-natural grassland types in Worcestershire was estimated to be 4,807ha, 2.8% of the county land area⁸⁴. The county is particularly significant for its lowland hay meadows and lowland flood meadows. 983.5ha of grassland is included within SSSI designations in Worcestershire: 398.49ha of lowland acid grassland, 48.49ha of lowland calcareous grassland, and 536.52ha of lowland neutral grassland.

Key pressures

- Decline in economic viability leading to agricultural intensification and improvement or alternatively neglect and/or abandonment.
- Inadequately managed horse grazing.
- Losses to urban development, afforestation or quarrying.
- Impact from off-road vehicles.
- Fly tipping, including unauthorised or inappropriate granting of permissions for the dumping of waste and soils.
- Scarcity of appropriate expertise, livestock and machinery to manage sites.
- Fragmentation/isolation and small site size.
- Recreational pressure.
- Pollution, including atmospheric pollution.
- Climate change.

Key locations

Lowland Neutral Grassland

- Important concentrations in the historic Forest of Feckenham (encompassing most of central and northern Wychavon), Malvern Chase, the Teme Valley, the southern Wyre Forest, parts of the Clent Hills, the Dodford area, and on the Lias Group clays between Pershore and Inkberrow, the Lenches and the fringes of Worcester City.

Lowland Calcareous Grassland

- 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.
- 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.

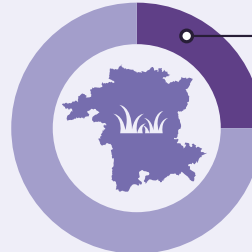
Lowland Dry Acid Grassland

- Wyre Forest and Bromsgrove Districts of north Worcestershire.
- Malvern Hills and Commons, including Shadybank, Hollybed and Coombe Green Commons near Welland.
- The Triassic sandstones around Kidderminster including at Devils Spittleful and Rifle Range SSSI, Hartlebury Common SSSI and Burlish Top Local Nature Reserve.
- Penorchard and Spinneyfields nature reserves, Habberley Valley Local Nature Reserve, Waseley Hills Country Park and the Clent Hills.

84 Worcestershire Wildlife Trust (2023). The State of Worcestershire's Grasslands. Natural England



Semi-natural grasslands (both upland and lowland) cover 10% of the UK today, just under 2.5 million hectares⁸⁵.



25% Worcestershire is believed to contain c.25% of England's remaining resource of unimproved lowland meadow.



97% of the UK's species-rich grasslands have been lost since the 1930s, around 3 million hectares⁸⁶.

97%



Since 2011, 123ha of grassland on the Worcestershire Grassland Inventory has been destroyed through woodland planting, conversion to agriculture or urban development⁸⁷.

85 Habitat extent and condition, natural capital, UK - Office for National Statistics (ons.gov.uk)

86 <https://meadows.plantlife.org.uk/>

87 Worcestershire Wildlife Trust (2023). The State of Worcestershire's Grasslands. Natural England

Case Study



Early July at Foster's Green Meadows © Eleanor Reast

Foster's Green Meadows is designated as a Site of Special Scientific Interest and National Nature Reserve, managed by Worcestershire Wildlife Trust. The meadows here have never been treated with agricultural chemicals and have not been ploughed for at least 100 years. Over 180 species of plants have been recorded and the largest meadow, Eades, is famous for its green-winged orchids and meadow saffron. The meadows are managed by a late summer hay cut followed by grazing.

Case Study



Hay making on the Village Green at Malvern Wells © Malvern Hills AONB Partnership

One part of the Village Green at Malvern Wells holds an outstanding community of wildflowers. In 2023 the Parish Council decided to manage the entirety of the Green as a meadow, limiting mowing to the creation of paths to allow local residents to enjoy the beautiful nature-rich grassland that appeared across the site. Once the plants had set seed the meadow was cut and collected by a local farmer who will feed it to his cattle over the winter.

Lowland Heathland

Paul Allen from Wyre Forest District Council

Lowland heathland is a rare and threatened habitat found from sea-level up to about 300m. It is characterised by plants such as heather, western gorse and wavy hair grass and developed as a result of forest clearance, grazing, and cutting of vegetation for fuel, fodder and building. Today, areas of best quality habitat typically offer a mosaic consisting of an ericaceous (plants belonging to the heath family) layer of varying heights and structures, some areas of scattered trees and scrub, areas of bare ground, gorse, wet heaths, bogs and open water.



Important features

- Soil on lowland heathland is impoverished, acidic and low in plant nutrients, which discourages establishment of other plants.
- The presence and numbers of characteristic birds, reptiles, invertebrates, vascular plants, bryophytes and lichens are important indicators of habitat quality.
- Important invertebrate species found within heathland habitat include the hornet robberfly, bee-wolf solitary wasp, brown-banded carder bee and over 200 species of moth including archer's dart.
- Acid grassland and heathland habitat can grade in and out of each other over time.
- Wet heath is found where either shallow peat or mineral soils are seasonally waterlogged.

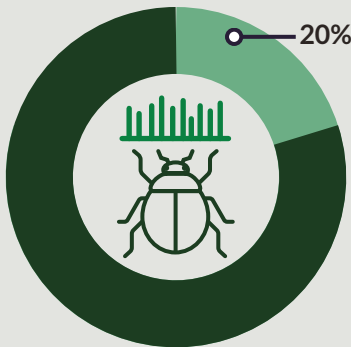


Common European Adder
(*Vipera berus*) © Getty Images



Minotaur beetle
© Gail Hampshire

Lowland Heathland



The UK has c.50,000 ha of lowland heathland habitat, about 20% of the European total.



The Worcestershire Habitat Inventory records 177.29ha of lowland heathland.

Current Status

Lowland heathland occurs at a number of geographically distinct sites across north Worcestershire although suitable soils for heathland are distributed across a much wider area, indicating that more extensive heathland may once have existed within the county. Worcestershire’s heaths are linked ecologically and on landscape terms with those in Staffordshire, forming an area of lowland heathland of national importance.

Key pressures

- Lack of management leading to succession towards woodland.
- Development pressure.
- Inappropriate grazing regimes.
- The spread of invasive species such as bracken, birch, gorse, broom, bramble, oak and ragwort.
- Damage by accidental or deliberate fires.
- Erosion caused by recreational use of sites and the illegal use of motorised vehicles.
- Reduced water availability.
- Lack of targeted funding to support ongoing, complex management.
- Isolation and fragmentation of habitat.
- Woodland planting.
- Agricultural improvement including decline in traditional management.

Key locations

Worcestershire’s extant heathland sites are found around Kidderminster, Stourport-on-Severn and Bewdley. Important sites include:

- Hartlebury Common (SSSI/LWS/LNR/Common Land).
- Rifle Range (SSSI/LWS).
- Pound Green Heath (SSSI/Nature Reserve).
- Lickey Hills Country Park (LWS/Country Park).
- Vicarage Farm Heath (LWS).
- Kingsford Forest Park (SSSI/LWS/LNR).
- Burlish Top (LNR)
- Habberley Valley (LWS/LNR).
- Spinneyfields (Nature Reserve).
- Devil’s Spittleful (SSSI) and Blackstone Farm Fields (LWS/Nature Reserve).

Case Study



Burlish Meadows nature reserve
© Cameron Adams

Large areas of lowland heathland habitat are being managed or restored by Wyre Forest District Council in the landscape surrounding Stourport, Bewdley and Kidderminster, including the Rifle Range SSSI, and Burlish Top, Vicarage Farm Heath and Habberley Valley Local Nature Reserves⁸⁸. A disused golf course, now the Burlish Meadows nature reserve, is being used to create acid habitats to connect and enhance the existing areas of heathland. Rare breed cattle or sheep are used to graze the sites to prevent regeneration of oak and birch woodland.

⁸⁸ <https://www.wyreforestdc.gov.uk/things-to-see-do-and-visit/countryside-and-nature/heathland-restoration-project/>

Case Study



View over Hartlebury Common © Steve Bloomfield

Hartlebury Common, on the edge of Stourport-on-Severn, is the county's largest area of lowland heathland at 91ha. The site is a mosaic of heather, gorse, broom, grasses, other small plants and scattered trees. It contains two notable areas of wetland, including the only acidic bog in the county and the ancient Rush Pool, a potential surviving kettle hole - a periglacial feature with high archaeological/palaeolithic interest - which supports a swamp community of plants that includes marsh cinquefoil and reedmace as well as scarce species such as bogbean. Hartlebury Common was fenced in 2010-11 to re-introduce cattle grazing to the common as part of an agri-environment agreement. The site is owned and managed by Worcestershire County Council, with support from volunteers of the Hartlebury Common Local Group⁸⁹.

⁸⁹ <https://www.hartleburycommon.org.uk/>



Rush Pool on Hartlebury Common © David Everett

Road Verges

Wade Muggleton from Worcestershire
County Council

Road verges are important wildlife corridors, usually comprised of grassland but often incorporating trees and scrub. A hedge and/or ditch at the boundary of the verge adds wildlife interest. Road verges can show great variability in age, width, soil type, geology, aspect and slope, extent of shading by vegetation, drainage, management and ownership, all of which determines the range of flora and fauna present. Road verges can also have geological and/or archaeological interest.



Important features

- Parish lengthsman would traditionally have hand-cut verges with a scythe or slasher and verges may even have been part of local hay making or grazing regimes.
- With sensitive management verges can be rich in wildflowers and provide important habitat for pollinating and other beneficial insects.
- Wildflower rich verges have usually survived in locations where mechanical management is difficult, or where the soil type and geology restrict the growth of taller, vigorous plants, and so the intensity or frequency of cutting is reduced.
- Wildflower rich verges are often all that remains of a traditional hay meadow.



Wildflower-rich road verge © WCC



Small Tortoiseshell butterfly on Ragwort © Getty Images

Road Verges

Current Status

The priority for management of the road verge network in Worcestershire is ensuring safety and visibility for road users. However, the importance of verges in supporting biodiversity, particularly pollinators, informs the management regime and wherever possible management is informed by best practice guidance produced by Plantlife⁹⁰. Away from junctions, and where road user safety will not be compromised, only the first metre of the verge is routinely cut and kept short to prevent vegetation falling onto the carriageway. Behind this 1m strip grasses and wildflowers are allowed to set seed before being cut in late summer. Correct timing of cuts and the removal of arisings over such a large network is very challenging. Roadside Verge Nature Reserves (RVNR) are verges with rich assemblages of wildflowers or which support scarce species such as glow worm. These are managed by Worcestershire County Council's Countryside Services team.

Key pressures

- Insensitive cutting regimes or methods e.g. too-frequent cutting, flailing of verges, mulch left on the verge.
- Dumping of spoil, including temporary dumping/storage of road building materials, and fly-tipping.
- The spread of invasive non-native species, including Japanese knotweed and Himalayan balsam, along with non-native garden escapes.
- Physical damage due to e.g. trenching for mains services, clearing ditches, parking of vehicles and trampling by horses.
- Chemical run off, spray and deposits e.g. herbicide and pesticide drift from adjacent farmland, salt from gritting, pollution and spillages from vehicles.
- Urban development, including road widening schemes.
- Planting and growth of trees on grassland, planting of cultivated / ornamental plant varieties, or reseeding with inappropriate seed mixes.

Key locations

- Two sites that incorporate road verges are notified as geological Sites of Special Scientific Interest: Crophorne New Inn (0.2 ha) on the A44 and Burcot Lane Cutting (0.4 ha) at Blackwell near Bromsgrove.
- At several sites, including Castlemorton Common SSSI and the Malvern Hills SSSI, the road verge is incorporated where the designation covers land on both sides of the road.
- All road verges listed as RVNRs. A number are also listed as Local Wildlife Sites.
- Tower mustard is found on a cluster of RVNRs around Kidderminster, comprising one of only two meta-populations of tower mustard in the UK.
- Several district councils in Worcestershire are taking action for pollinators by seeding verges and green spaces with wildflowers⁹¹.
- Some of Worcestershire's verges are notable for orchids, including those at Knightwick, Forthampton and Craycombe.

⁹⁰ <https://www.plantlife.org.uk/our-work/road-verges/>

⁹¹ <https://www.worcester.gov.uk/news/blooming-lovely-worcester-s-roadside-verges-and-green-spaces-help-boost-biodiversity>



Worcestershire Highways
manage **8,000km**
of road verge.



There are **44** Roadside Verge
Nature Reserves in Worcestershire
totalling approx. **17ha**

Case Study



Bee Orchid on road verge © Wade Muggleton

The Roadside Verge Nature Reserve at Knightwick was once subject to a land slip and subsequent remedial works so was effectively reset as an area of bare ground. It is now notable for the presence of branched lichen *Cladonia rangiformis*, which occupies a large area to the top of the slope, Yellow Wort and St John's Wort, and also for the occurrence of six species of orchid. The floristic diversity of the site is likely due to the poor nutrient levels in the soil. In addition, the site hosts a Dingy Skipper butterfly colony. Worcestershire County Council are working with the West Midlands branch of Butterfly Conservation to manage the scrub encroachment on the site and maintain the open ground. Increasing numbers of Dingy Skippers shows how this level of micro-management can yield results for certain species.

Case Study



Cut and collect verge management © Malvern Hills AONB Partnership

In 2019 the Malvern Hills Area of Outstanding Natural Beauty Partnership initiated a pilot study on two road verges with the aim of increasing the number and diversity of wildflowers and grasses. Vegetation and topsoil were removed from the verges to reduce nutrient levels and wildflower seed was sown, followed by green hay spreading. A cut-and-collect regime was put in place to manage the verges in a similar way to traditional hay meadows. The verges were resurveyed in 2023: on one, the number of species had increased from 30 to 40; on the second, from 26 to 42.

Urban

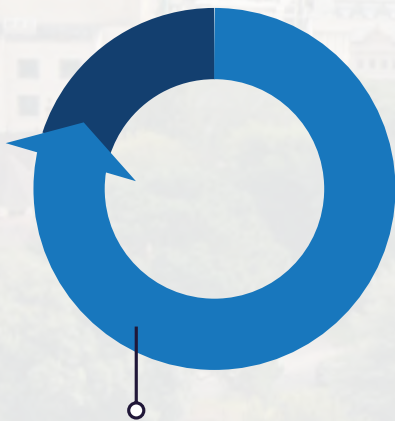
Chris Dobbs from Worcester City Council

Our cities, towns and villages can support a wide range of habitats and species. Urban habitats that can be rich in biodiversity include allotments, churchyards, brownfield sites, municipal parks, gardens and public greenspace, playing fields and school grounds, street trees, urban woodlands, river, stream and canal corridors, and orchards. These elements are often termed 'green and blue infrastructure' and they provide ecological links through our urban areas, connectivity for both wildlife and people into the surrounding countryside, and opportunities for people to get close to and explore nature on their doorstep.



Important features

- Well-planned and managed green and blue infrastructure has multi-functional benefits, for example for wildlife, for flood risk management, and the physical and mental health and well-being of the human population.
- Well-planned new development can create opportunities for wildlife by integrating new habitats and connecting greenspace across and within urban areas.
- Wildlife friendly features and natural habitats can also be 'retrofitted' within urban areas or included in re-design or redevelopment schemes.



Over 80% of the UK population lives in urban areas



Worcestershire's built environment provides roosting and nesting opportunities for bats and birds including swift and peregrine



Hedgehog highways between urban gardens can help native wildlife © Getty Images



Pollinator-friendly planting in gardens can attract spectacular species such as the hornet mimic hoverfly © Rebecca Lashley

Great Malvern town viewed from the Malvern Hills © Getty Images

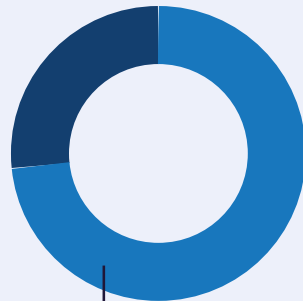
Urban



Footpath through Redditch woodland © Laura Wood



15.5% (269.4 km²) of Worcestershire's land area is classed as urban city, town or conurbation, and 84.5% (1,471.1km²) as rural village or town.



73.4% of Worcestershire's population lives in urban areas, and 26.6% in rural areas.



Wychavon has the greatest proportion of its population living in rural areas; Redditch and Worcester City the least.

Current Status

A citizen science project supported by Forest Research is mapping the canopy cover of towns and cities across the UK⁹². The canopy cover measure maps the area of land covered by the trunks, branches and leaves of trees when viewed from the air. The baseline study in 2016 gave the following results for average canopy cover in four of Worcestershire's urban areas: Bromsgrove: 13.4%; Kidderminster: 20.6%; Redditch: 25.4%; Worcester: 14.6%. The study is continuing, and some locations in the county have now been mapped in more detail⁹³.

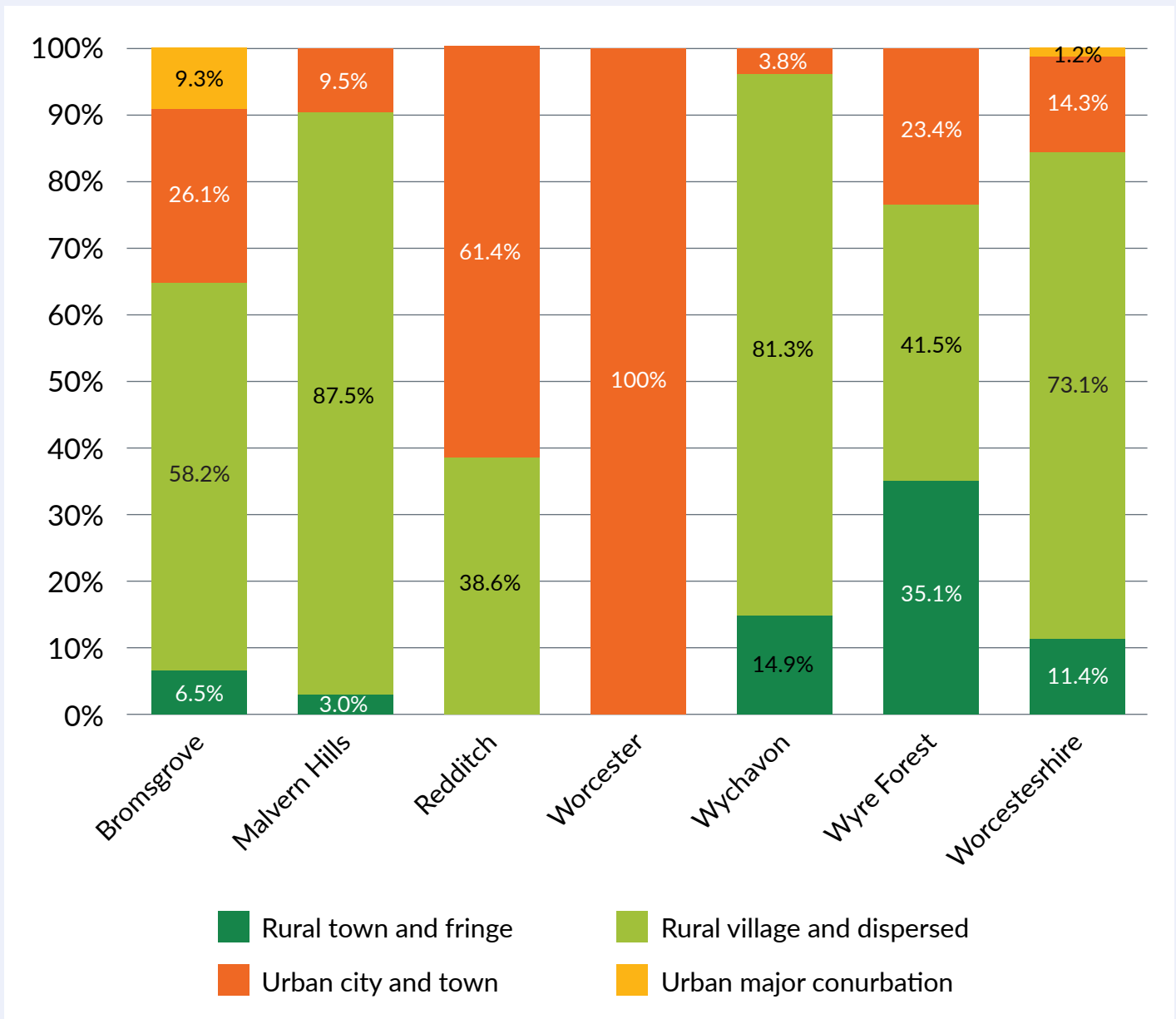
Information on local access to natural greenspace and an assessment of the 'naturalness' of the entire England land surface are among some of the data provided as part of the new National Green Infrastructure Framework⁹⁴.

92 <https://www.forestresearch.gov.uk/research/i-tree-eco/uk-urban-canopy-cover/>

93 <https://forestry.maps.arcgis.com/apps/webappviewer/index.html?id=d8c253ab17e1412586d9774d1a09fa07>

94 <https://designatedsites.naturalengland.org.uk/GreenInfrastructure/Map.aspx>

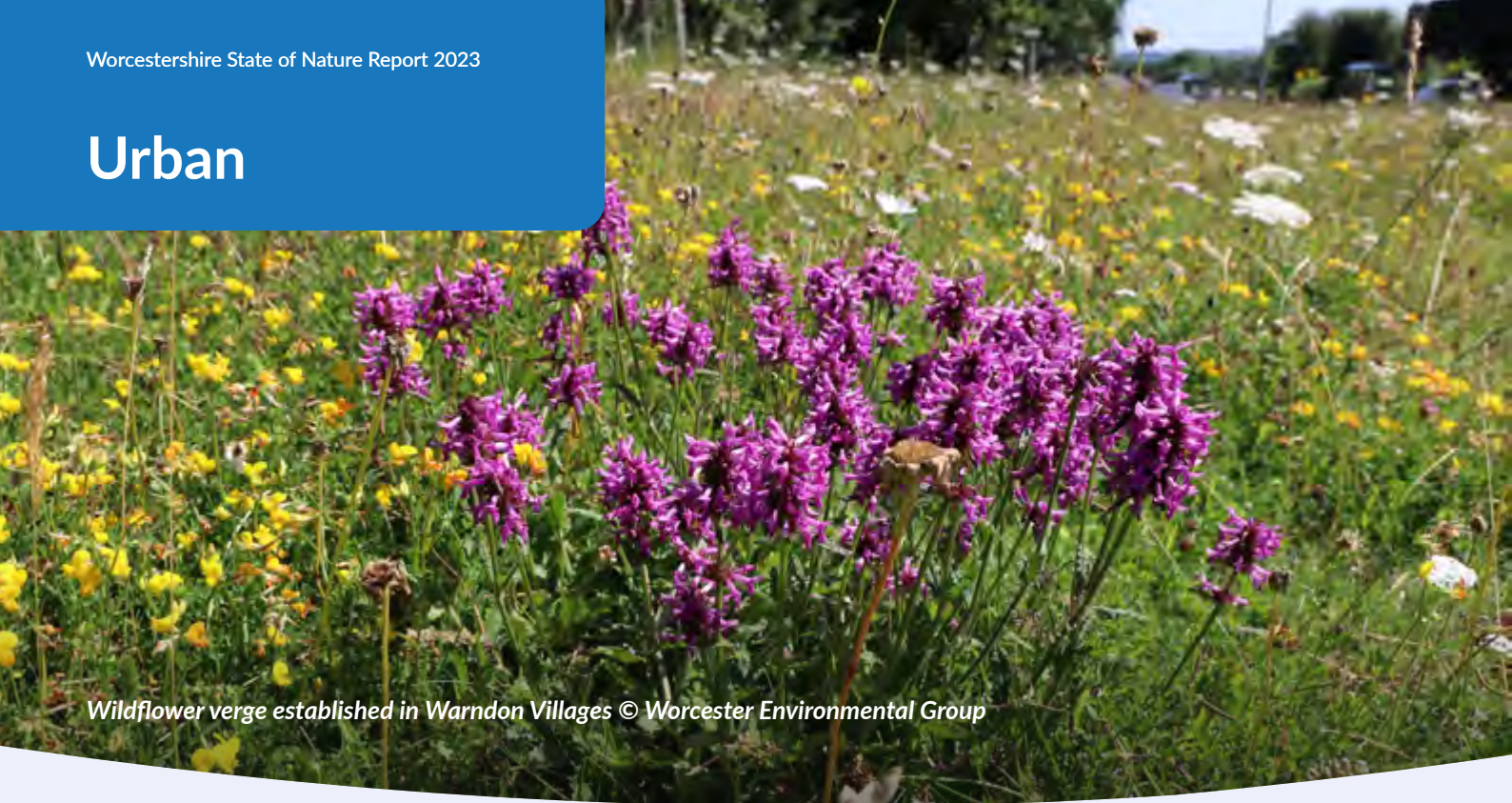
% of County classed as urban and rural



Key pressures

- Requirement to consider the needs of multiple users as well as health and safety concerns in the management of public urban greenspace.
- Use of pesticides and herbicides.
- Development pressures, including development within large former gardens.
- Disturbance, impact of domestic cats and dogs, littering and fly tipping, contamination by industrial pollutants, traffic hazards, and pollution from artificial light at night.
- Increasing isolation and fragmentation of sites because of development or changing land use.
- Lack of permeability within and through urban areas, creating barriers to the free movement of species.
- Use of hard engineering 'grey' infrastructure solutions when green alternatives are available.

Urban



Wildflower verge established in Warndon Villages © Worcester Environmental Group

Key locations

- The county has several urban sites designated as a Site of Special Scientific Interest, including Ipsley Alders Marsh in Redditch and Northwick Marsh in Worcester.
- Dense networks of ponds can support metapopulations of great crested newts. Lyppard Grange Special Area of Conservation in Worcester was designated for this reason.
- Allotment sites in Worcester are amongst the best sites for slow worms in the West Midlands and can hold significant breeding populations.
- Canal basins and the canal corridors can be important for invertebrates, scarce plants, otter, water vole and bats.
- Terraced houses, especially in Worcester, are important sites for breeding colonies of swift.
- Industrial areas such as railways yards and sidings can contain significant habitat mosaics of grassland, scrub and other habitats. Honeybourne Sidings is a partially disused railway yard of particular importance for invertebrates including the grizzled skipper butterfly.
- Urban orchards can be of tremendous value for biodiversity and can also be important from a cultural and historical perspective.
- Large urban parks are found in most of the bigger towns and more of these are now being managed sympathetically for wildlife, with reduced chemical use and reduced mowing regimes.



Slow worm © Getty Images

Case Study



Arrow Valley Country Park Lake © Getty Images

The expansion of Redditch followed the New Town designation in 1964. The development was designed to incorporate natural and historic features of the surrounding countryside, including hedgerows and veteran trees, and involved major landscaping works including the planting of 2 million trees. Green space was also designed to alleviate climatic conditions, utilising treelines to provide wind breaks and direct cold air flows. Today Redditch incorporates a green network of six local nature reserves, over 100 hectares of ancient semi-natural woodland, wildflower meadows, the 320 ha Arrow Valley Country Park and an extensive pond network, which includes former mill ponds and leats, important for species such as great crested newt.

Case Study



Common Kingfisher © Getty Images

A riverside conservation area in Stourport was created in a partnership between Wyre Forest District Council and a group of volunteers from the adjacent housing development. A 3ha area of land, which contained a large pool dug as part of the original planning permission, was enhanced with woodland planting and reedbed creation, and now supports various wildlife including a winter starling roost, reed and willow warblers, kingfishers and grass snakes.

Case Study



Worcester riverside © WCC

The Worcester Riverside Park is a new 5km long linear green corridor through the heart of city, covering 80ha along the banks of the River Severn. The park incorporates areas managed for biodiversity, as well as linking into the Severn Way walking trail and Route 46 of the National Cycle Network. It connects to other key areas of greenspace in the city such as Chapter Meadows, Cherry Orchard Nature Reserve, Cripplegate Park and Gheluvelt Park. A very rare urban lesser horseshoe bat colony within the Riverside Park confirms the high biodiversity value of the river corridor.

Canals

Paul Wilkinson from Canal & River Trust

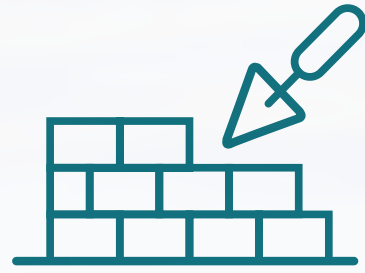
Canals are engineered waterways built for the transportation of goods and water and for irrigation. Canal corridors consist of the water channel itself, with a towpath to one side, often embanked or in a cutting. The corridor often includes a grass verge or bank, hedgerow, adjacent wetland habitats such as unimproved damp grassland, marsh and carr, feeder streams, ponds, and bankside trees. The working infrastructure includes water supply reservoirs, feeder streams, ponds, locks, bridges, buildings, culverts and, in Worcestershire, over 2.5km of tunnels: these built features can also offer habitats for plants and animals.



*Reed Bunting perched on
bramble © Getty Images*

Important features

- Canals are a significant part of the green infrastructure network and have unique built, industrial, and cultural heritage. Many have been the focus of regeneration and redevelopment projects.
- Canals provide important habitat for mammals such as otter, water shrew, bats and water vole.
- Bridges and tunnels can provide roosting, foraging and hibernation sites for bats.
- The presence of a silt and mud layer on the bed of many canals, combined with diverse marginal plants on the banks, makes them ideal habitat for eel.
- Great crested newts and common toads can thrive in disused canal sections and in associated wetland habitats such as overflow ponds at locks.
- Canal hedgerows offer important habitat for birds and key species such as brown hairstreak butterfly.
- Reedbed fringes along canals provide habitat for birds such as reed bunting, grass snakes and glow worm.
- Canals can contain a high diversity of aquatic plants and pondweeds associated with open water habitat.



Most UK canals were constructed between c.1750 and 1830.



Worcestershire has almost 69 miles of canals: the Worcester and Birmingham Canal, the Staffordshire and Worcestershire Canal and the Droitwich Canals.



108ha of canal and canal-side habitat is listed as a Local Wildlife Site in Worcestershire.



Canals can offer important 'dark corridors' for wildlife through urban areas

Canals



Fringe reedbed along the Droitwich Canal © Paul Wilkinson

Current Status

All of Worcestershire's canals are listed as Local Wildlife Sites. Bittell Reservoirs at Barnt Green, built to provide water to the Worcester and Birmingham Canal, is designated as a Site of Special Scientific Interest.

Key pressures

- Inappropriate development and unsympathetic restoration, such as the installation of steel sheet piling or wide tarmac surfacing on towpaths.
- Damage from high levels of recreational use, particularly walking, cycling, fishing, and powered boat traffic.
- Run-off or point source pollution entering the water, especially in urban and industrial areas.
- Pressure for tidy and amenity-managed towpath vegetation.
- Litter and fly tipping.
- Over feeding of waterfowl resulting in excessive fouling, nutrient enrichment, over-grazing of wetland plants and algal growth.
- Invasive non-native plants such as floating pennywort, waterweed (*Elodea* sp) and New Zealand stonecrop, all of which can be spread around the canal system by boat traffic or on angling equipment. Giant hogweed, Japanese knotweed and Himalayan balsam are other invasive non-natives found on canal banksides.
- Alien species such as the American mink, American signal crayfish, zebra mussel and the zander.
- Impact of light pollution, which can degrade habitat quality and sever connections between areas of habitat
- Climate change impacting water supply from reservoirs during prolonged dry weather, with warmer water and increased evaporation also reducing dissolved oxygen levels.

Key locations

The Worcester and Birmingham Canal starts at the River Severn in Worcester and leaves the county at Wast Hills near King's Heath. The canal has frequent narrow stands of common reed and occasional wetlands associated with winding holes, marginal ditches, weirs and reservoirs.

The Staffordshire and Worcestershire Canal starts at the River Severn in Stourport-on-Severn and follows the River Stour for 13km to the county boundary at Caunsall. The lock gates and walls of the canal support notable species of fern, liverwort and moss.

The Droitwich Canals start at the River Severn and follows the River Salwarpe to Droitwich before connecting to the Worcester and Birmingham Canal at Hanbury. Abandoned as a commercial waterway in 1939, the canal was reopened in 2011. The 4.3ha Coney Meadow reedbed was created to mitigate the restoration works and is now managed as a nature reserve by the Canal & River Trust.

Case Study



New pond created at Bittell Reservoir © Paul Wilkinson

Bittell Reservoirs SSSI supplies water to the Worcester & Birmingham Canal and is owned by the Canal & River Trust (CRT), in partnership with Barnt Green Waters⁹⁵. The site is designated for birds, rare plants and invertebrates, including the rare mud snail, slender spike rush and mudwort. The site has seen declines in many of its aquatic plant species, due to unfavourable water quality and the dominance of certain waterweeds. With funding from the Green Recovery Challenge Fund in 2021, CRT created six new ponds to diversify the reservoir shoreline and provide ground water away from high nutrient waters. The ponds have already been colonised successfully by nationally rare and scarce native pondweeds and dragonflies and have been visited by birds including the hobby.

⁹⁵ <http://www.sailingbarntgreen.com/Club/history-of-barnt-green-sailing-club>

Case Study



Biological control for invasive non-native plant species © Charles Hughes

As part of the Canal & River Invasive Species Eradication Project, funded by Severn Trent, CRT has been tackling priority invasive plants on the canal network. Within Worcestershire, the project has focused on floating pennywort, which poses a significant issue on the Worcester & Birmingham Canal and associated waterways. Working with CABI UK⁹⁶, a biological control for this aquatic invasive plant (a beetle) was released at two Worcestershire sites: New Wharf Arm on the Worcester & Birmingham Canal; and Jacob's Cut Feeder on Bittell Reservoirs SSSI. The project will monitor the effectiveness of a nature-based solution for controlling the plant alongside continued mechanical removal. CRT also has an extensive Japanese knotweed control program across 19 actively managed sites in Worcestershire.

⁹⁶ <https://www.cabi.org/what-we-do/cabi-centre/uk/>

Ponds and Lakes

Adrian Darby from Kemerton Conservation Trust

The value of ponds and lakes lies in both the role they play within our landscape and cultural heritage and in the high levels of biodiversity a functioning freshwater ecosystem can contain. They are a significant feature in terms of local distinctiveness and may form a parish or village focal point. The value of ponds to wildlife is immense: a huge variety of invertebrate, plant, amphibian and bird life is dependent on ponds or lakes for part or all of their life cycle, and they are also used by a number of mammal species.



The pied avocet
© Getty Images



Important features

Ponds form naturally when water begins to fill a depression in the ground and first submerged and then emergent plant species begin to colonise. There are very few large natural open water bodies in Worcestershire, but artificial open water habitats are created for many reasons, including:

- The county has a high density of medieval fishponds and moated sites.
- Small ponds created by excavation of clay for marling, and later the brick industry, are found on Worcestershire's heavy clay soils.
- Restoration of mineral workings
- Provision of water for industry or farming.
- Water supply reservoirs.
- Ornamental landscaping or recreation (e.g. fishing).
- Flood alleviation.
- Maintenance of canal levels.
- Nature conservation: agri-environment grants have supported the creation and maintenance of ponds and associated wetland habitats.
- Brine pumping and salt extraction.
- Sustainable Drainage Schemes (SuDS) designed to collect and treat run-off from development can incorporate open water features.



Ponds may support a greater diversity of species per cubic metre than any other habitat in Britain.



Networks of ponds in close proximity are vital for species such as the great crested newt.



Great crested newt
© Getty Images

Pond creation alongside the Bow Brook as part of the Natural Networks grant scheme © Steve Bloomfield

Ponds and Lakes

Current Status

A study estimated that between 1920 and 1982 up to 49% of the county's ponds had been lost to intensive agriculture, development or neglect, and that there were around 5000 ponds remaining in the county at that time⁹⁷. A survey in 1998 of a 1km² area north of Redditch reported that around 45% of all ponds shown on OS mapping had since been destroyed, giving a comparable result to the earlier survey. The Worcestershire Habitat Inventory records just 125 standing open water bodies that are over 1 hectare in size, and that the total area of 'eutrophic standing water' in the county is approximately 1000ha.

Key pressures

- Waste disposal and fly tipping.
- Pollution, including agricultural runoff and salt runoff from roads.
- Development, which can lead to the destruction or fragmentation and isolation of pond habitats.
- Neglect and lack of management or insensitive management.
- Invasive non-native plant species including New Zealand pygmyweed, water fern, creeping water-primrose, parrot's feather, floating pennywort and Himalayan balsam.
- Large numbers of introduced waterfowl, which cause a loss of aquatic vegetation through grazing and nutrient enrichment.
- Recreational and amenity pressures.
- Intensive stocking or inappropriate introduction of fish.
- Unsustainable or unlicensed abstraction from ground and surface waters.

Key locations

- An oxbow lake on the River Teme, and an acid pool at Hartlebury Common SSSI on peat dating back 7000 years, are two of the very few large natural open water bodies in Worcestershire.
- Areas with high-density pond networks, known as 'pondscapes', such as those in the north east of the county, including in Redditch and the countryside surrounding Hanbury and Feckenham.
- Lyppard Grange Ponds SSSI/SAC in Warndon Villages.
- Bittell Reservoirs SSSI.
- Westwood Great Pool SSSI.
- Upton Warren SSSI.
- Hewell Park Lake SSSI.
- Oakley Pool SSSI.

Case Study



Beckford Gravel Pit © WCC

This sand and gravel working at Beckford was restored once extraction ceased in the late 1980s. Part of the site was designated as a geological Site of Special Scientific Interest for the geology that had been exposed during quarrying. The area is now managed as a community nature reserve⁹⁸.

⁹⁸ <https://www.beckfordnature.org.uk/>

⁹⁷ Green, G H and Westwood, B (1991). *The Nature of Worcestershire: The Wildlife and Ecology of the Old County of Worcestershire*.

Case Study



Evening view over Kemerton Lake Nature Reserve
© Kate Aubury

Kemerton Lake Nature Reserve is an 18.8 ha wetland complex managed by Kemerton Conservation Trust⁹⁹. Created out of a former gravel working it has a diverse range of habitats including a 6.9 ha lake, pools, seasonal wet scrapes, reed beds, scrub and both neutral and calcareous grassland. The lake was formed by creating an impermeable clay bank on the lower margin and allowing ground water to fill it. A small quantity of

common reed was planted which now forms a near continuous fringe around the edge. The lake was colonised naturally by stoneworts and pondweeds then, as the lake became more eutrophic due to the large numbers of waterbirds, these were largely crowded out by Nuttall's waterweed. The botanical interest is now largely limited to emergent plants and those growing on the banks. Because the lake is isolated from any watercourse it has been adopted as an Ark site¹⁰⁰ for the native white-clawed crayfish. More than 170 species of birds have been recorded at the lake and in winter it hosts large flocks of wintering wildfowl including wigeon, teal and pochard. The reserve is one of the top sites in Worcestershire for dragonflies and damselflies, with 23 different species recorded. Otters are regularly recorded and at least nine species of bat are found in the reserve and neighbouring woodland.

⁹⁹ <http://www.kemerton.org.uk>

¹⁰⁰ [https://cdn.legacy.buglife.org.uk/sites/default/files/Ark sites for crayfish_1.pdf](https://cdn.legacy.buglife.org.uk/sites/default/files/Ark%20sites%20for%20crayfish_1.pdf)

Case Study



Oxbow lake formation

The River Teme is associated with a number of historic and future oxbow lakes. Some are actively developing, others have dried up, and one, 1km west of Cotheridge, is still extant. Oxbow lakes typically form in low-lying or

occasionally valley landscapes where a river begins to meander and the processes of erosion and deposition eventually cut through the banks, forming a new river channel that isolates the meander as a lake. As they slowly dry out and silt up, soils rich in pollen and seeds are deposited and preserved in the waterlogged conditions. This becomes a valuable archaeological and environmental history resource, providing a record of past environments within the setting of the lake. The example at Cotheridge is at an early stage of this process. Once silted up, oxbows are referred to as palaeochannels and often contain centuries of deposited material.

Rivers and Streams

Oda Dijksterhuis from Environment Agency

Rivers, streams and their associated wetland habitats create a vital wildlife corridor, linking fragmented habitats through often intensively farmed rural as well as urban landscapes. Rivers and streams provide water for many of the other water-dependent habitats in our countryside, such as lakes and fens. Most of the bigger watercourses in Worcestershire are typical of lowland rivers in that they meander through large floodplains. The natural flooding of rivers and streams is an essential requirement for most of our floodplain wetlands.



Important features

- The best river and stream corridors for biodiversity are those that have been least affected by human modification, with the greatest diversity of flow patterns and channel features created by riffles, pools, glides, side bars, coarse woody debris, islands, meanders, and erosion.
- The floodplains and wetlands of the Severn and Avon Vales are functionally linked with the Severn Estuary and are important for birds such as curlew and redshank.
- The rivers and streams of Worcestershire support a wide range of important native species, some protected by UK or European law. These include:
 - Atlantic salmon
 - Twaite shad
 - Lamprey species
 - European eel
 - Otter
 - Water vole
 - White-clawed crayfish
 - Common club-tail dragonfly
 - Depressed river mussel



The River Severn is the UK's longest river, flowing 354km from its headwaters in Wales to the Severn Estuary.



Smaller rivers in Worcestershire are the Avon, Teme, Salwarpe, Stour, Arrow and Isbourne.



Extensive areas of lowland Worcestershire would once have been marshland alongside our main rivers.



In Britain there are only around 275km of SSSI rivers. The River Teme SSSI, at around 100km, makes up 33% of this total

Rivers and Streams



Water Quality Status in Worcestershire, based on 2019 Water Framework Directive monitoring data

WFD C3 2019

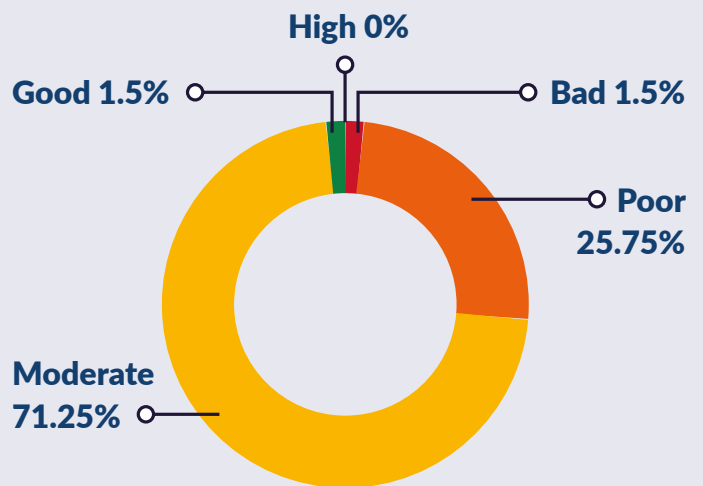
Overall Classification

- Moderate
- Poor
- Bad

Current Status

The majority of watercourses in Worcestershire have been listed as Local Wildlife Sites. The River Teme is designated as a Site of Special Scientific Interest: its condition in Worcestershire is assessed as 'Unfavourable - No Change'. All of Worcestershire falls within the Severn River Basin District (SRBD)¹⁰¹, which spans 21,000km² of Wales and England. Four of the catchments within the SRBD fall partly within Worcestershire: the Teme, Severn Middle Worcestershire, Severn Vale and Avon Warwickshire. These are subdivided into smaller operational catchments of which 8 fall wholly or mainly within Worcestershire.

The Environment Agency publishes data on the environmental condition of waterbodies. The percentage of Worcestershire catchments* in each Ecological Status category are:



* Data taken from the Catchment Data Explorer¹⁰² for the following 8 operational catchments: Midlands West; Malvern Hills; Bushley, Longdon, Marlbank and Ripple Brook; Severn River and Trib; Teme Lower; Severn River Worcestershire; Salwarpe River; Stour River and Trib.

101 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718336/Severn_RBD_Part_1_river_basin_management_plan.pdf

102 <https://environment.data.gov.uk/catchment-planning>

Key pressures

- Many of our rivers and streams have historically been heavily modified from their natural state, including by canalisation, culverting, straightening, plus widening, deepening and dredging to improve navigation, install weirs or build flood defences. This has resulted in habitat loss and fragmentation, and the disconnection of rivers from their floodplains.
- Physical barriers in rivers such as weirs have caused a reduction in fish migration, loss or inaccessibility of physical habitat for fish spawning and juvenile development, and a reduction in the value of aquatic flora, along with reducing the quality of riparian habitat.
- Water pollution, including from agriculture, housing development, industry, highway runoff, and the release of untreated or poorly treated sewage.
- Climate change impacts, including storm events, resulting in greater run-off from land, more frequent and extensive flooding, seasonally lower minimum river flows, reduced water quality, and higher water temperatures, leading to heat-stress in fish and other water dependent wildlife.
- Flood defence and land drainage works, which can destroy the natural form and functioning of rivers and streams.
- Development within the floodplain and land drainage for agriculture and other land uses, leading to loss of open water and wetland habitats and the severing of connections between watercourses and their floodplain.
- Impact of light pollution, which can degrade habitat quality and sever connections between areas of habitat.
- Invasive non-native species including the American signal crayfish, mink, zander, zebra mussel, Japanese knotweed, floating pennywort, water primrose and Himalayan balsam.
- Recreational activity disturbing wildlife and damaging habitats, if poorly regulated and managed.



River Sever flowing through north Worcestershire © Steve Bloomfield

Rivers and Streams



Diglis Fish Pass © WCC

Key locations

- Most rivers and streams in Worcestershire ultimately flow into the River Severn, except for a few small streams in the north east that flow into the headwaters of the River Blythe, and some small streams which flow into the Wye Catchment.
- The River Severn flows through the middle of Worcestershire with its major tributaries being the Avon, Teme and Stour.
- The River Teme SSSI.
- A small part of the Old River Severn SSSI, in Worcestershire at Upper Lode, is designated because of its botanical, dragonfly and bird interest.
- The Dowles Brook is part of the Wyre Forest SSSI/National Nature Reserve (NNR)
- The Ipsley Brook flows through Ipsley Alders SSSI.

Case Study



eDNA testing for Shad © Severn Rivers Trust

Unlocking the Severn¹⁰³ was a multi-million-pound National Lottery Heritage Fund and EU LIFE programme completed by Canal & River Trust, Severn Rivers Trust, the Environment Agency and Natural England. The project removed barriers and installed fish passes to restore 158 miles of access to historic spawning grounds on the River Severn and River Teme for endangered fish species including shad, salmon and lamprey. Severn Rivers Trust led a citizen science project to count shad moving upstream, map spawning locations, and to collect DNA samples, feeding into a cutting-edge scientific research programme. Shad were tagged and tracked to understand more about their movements in the rivers. Shad DNA was recorded above the most northerly fish pass in 2022, proving that shad have reclaimed historic spawning habitats.

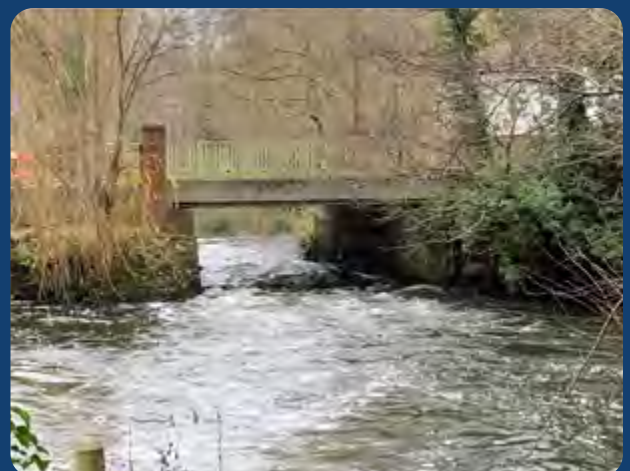
¹⁰³ <https://www.unlockingthesevern.co.uk/>

Case Study



Barriers on the River Stour were altered to allow fish passage © Environment Agency

Barriers to fish movements along the River Stour have been overcome in two locations in works carried out by Severn Rivers Trust and the Environment Agency. At Mill Road in Stourport an eel pass was installed beneath a bridge where high water flow rates created by the bridge foundations were preventing this species moving upstream. At a site near New Road in Kidderminster the foundations of a historic water wheel acted as a barrier across the width of the channel. The structure was altered to enable fish to navigate over it more easily.



Fast-flowing water underneath Mill Road bridge prior to installation of eel pass © Environment Agency

Glossary

Term	Description
Acidic Grassland	A diverse community of grassland species occurring on soils with pH lower than 5.5, typically comprising grasses, rushes and sedges. A national and Worcestershire Priority Habitat.
Alluvial	A deposit of clay, silt and sand left by flowing floodwaters. Often associated with fertile soils.
Ancient Semi-Natural Woodland (ASNW)	Wooded sites which have been continuously wooded since at least 1600. A national and Worcestershire Priority Habitat and considered to be an Irreplaceable Habitat.
Arable Flora	A specialist group of plants which grow on cultivated land. Considered to be one of the most critically threatened groups of plants in Britain.
Area of Outstanding Natural Beauty (AONB)	A landscape whose distinctive character and natural beauty (including its habitats and species) is so precious that it is safeguarded in the national interest. There are two designated AONB's within Worcestershire: The Malvern Hills AONB and the Cotswolds National Landscape AONB.
Ark Site	A safe refuge established to conserve a population of a scarce or threatened species.
Assart	The clearance of woodland for agriculture.
Biodiversity	The variety of all living organisms and the ecological complexes which they form part of. This includes diversity within species, between species and of ecosystems.
Biodiversity Action Plan	A plan describing the biological assets of an area and the identified priorities and objectives for the conservation of biodiversity.
Biodiversity Delivery Areas	Worcestershire's strategic priority areas with greatest potential to deliver our Local Biodiversity Action Plan objectives.
Calcareous Grassland	Calcareous or alkaline grasslands form on thin, freely draining or skeletal basic soils (typically with pH higher than 7), such as chalk or limestone. They are often rich in wildflower species. Calcareous grasslands are both a national and Worcestershire Priority Habitat.
Canalisation	The process of introducing weirs and locks to a river so as to secure a defined depth suitable for navigation. Often associated with channelisation to modify a watercourse so as to follow a restricted path.
Chalara	A genus of fungi causing 'ash die back' disease, first detected in the UK in 2012 and now widespread.

Term	Description
Coppice	The practice of cutting back vegetation to ground level to stimulate growth. Certain woodlands are the product of coppice management resulting in considerable value for biodiversity.
Dutch Elm Disease	A fungus transmitted by elm bark beetles which, since its introduction into the UK in the 1960's, has killed millions of elm trees.
Ecosystem	A dynamic complex of plant, animal and micro-organism communities and their non-living environment, interacting as a functional unit.
Environmental Character Areas	Worcestershire's Green Infrastructure Partnership have undertaken an analysis of the landscape character, biodiversity and historic environment of the county, producing 30 discrete Green Infrastructure Environmental Character Areas (ECAs). ECAs describe the distinctive character of Worcestershire and set out the key Green Infrastructure priorities for any given area.
Eutrophication	Excessive richness of nutrients in a lake or other body of water, frequently associated with run-off from adjacent land, causing dense growth of plant life.
Eutropic standing water	Water bodies characterised by an excess of nutrients within the water and sediments that results in highly productive plant and algal growth.
Functionally Linked	Habitats occurring outside of the boundary of a European protected site which are deemed important ecologically in supporting the populations for which the site has been designated.
Geodiversity	The variety of rocks, landforms, minerals, fossils, natural processes, superficial deposits and soils in the environment.
Grassland Inventory	First compiled in 1996-97, the Worcestershire Grassland Inventory categorised the county's known biologically important species-rich semi-natural grassland sites.
Green Infrastructure (GI)	GI is the network of green and blue spaces and natural habitats which occur in both our urban and rural landscapes.
Integrated Pest Management	An ecosystem-based strategy focusing on long-term prevention of pests or their damage and the reduction in use of agri-chemicals, such as pesticides. This is achieved through a combination of techniques such as biological control, habitat manipulation, and use of resistant plant varieties.
Irreplaceable Habitats	Habitats of very high conservation value. The creation or restoration of Irreplaceable Habitats is considered to be so difficult as to take more than 100 years to achieve. Worcestershire is known to contain ancient woodland, ancient and veteran trees, wood pasture and parkland, and lowland fen Irreplaceable Habitats.
Lammas Meadows	An ancient pasture, where first cuts of hay are often taken after 15th June and then from 1st August (Lammas Day) is grazed by cattle.

Glossary

Term	Description
Land Cover Parcels	These are the smallest of the landscape character building blocks, arising from the sub-division of Landscape Character Units, and describe the small-scale variations in modern land use and the historic patterns of field enclosure.
Landscape Character	Describes the sum of the natural and cultural processes that shape and create unique landscapes.
Landscape Character Assessment	A tool for identifying the patterns and individual combinations of features – such as hedgerows, field shapes, woodland, land use, patterns of settlements and dwellings – that make each type of landscape distinct and often special to those who live and work in it.
Landscape Description Units	A representation of a Landscape Type in a specific location. These are the basic building blocks of the landscape and are defined by a combination of six key characteristics relating to geology, topography, soils, tree cover character, land use and historic settlement pattern.
Leats	An open watercourse used to conduct water to a mill or millpond.
Long-Established Woodland	A woodland site which has been present since at least 1893.
Metapopulation	A group of spatially separated populations of the same species which interact at some level. For example, Great Crested Newts exist in metapopulations which require a landscape containing multiple suitable ponds with connecting terrestrial habitat in order to disperse and (re)colonise, forage, breed and hibernate.
MG4 Grassland	A wet grassland or 'lowland river floodplain meadow', typified by its great burnet and meadow foxtail plant community.
National Character Area (NCA)	An area of distinct and recognisable landscape character at a strategic scale.
National Nature Reserves (NNR)	Established to protect some of our most important habitats, species and geology, and to provide 'outdoor laboratories' for research. Declared under either the National Parks and Access to the Countryside Act 1949 or the Wildlife and Countryside Act 1981.
Natural Flood Management	Natural flood management (NFM) involves working with nature to reduce the risk of flooding. It uses techniques such as leaky dams, creation of new ponds and hedgebanks to restore or mimic the natural functions of rivers, floodplains and the wider catchment. It aims to store water in the catchment and slow the rate at which water runs into rivers, reducing flooding downstream. NFM is also referred to as 'working with natural processes', 'nature-based solutions', 'slow the flow', 'sustainable land management' or 'upstream management'.

Term	Description
Neutral Grassland	Grasslands occurring on soils where the pH is within the range 5 to 6.5 and where nutrient inputs are generally low, helping maintain neutral pH balance. Cutting grasslands for hay with aftermath grazing management can maintain the botanical diversity of many ancient neutral grasslands and floodplain meadows. because of their botanical communities, some of these grasslands may constitute Lowland Meadows, a national and local Priority Habitat.
Plantation on Ancient Woodland Sites (PAWs)	Plantations on Ancient Woodland Sites are ancient semi natural woodlands (ASNW) that have been felled and replanted with other tree species, typically commercial ones such as spruce, fir and larch. With positive management these sites can often be restored to highly biodiverse woodlands.
Pollard	A management technique consisting of the removal of the top and branches of a tree, above the browsing height of livestock, so as to encourage new growth.
Roadside Verge Nature Reserve (RVNR)	A length of highway verge identified and positively managed for the Priority Species or Habitats it supports. Positive management typically includes the cutting and removal of arisings to prevent nutrient enrichment of soil and loss of sensitive habitats or species assemblages.
Scrub	A habitat dominated by shrubby, low, woody plants such as bramble, blackthorn or gorse. Typically an intermediate habitat between woodland and grasslands, scrub can offer both connective value for wildlife as well as offering places for wildlife to shelter, forage and breed.
Sites of Special Scientific Interest (SSSI)	Protected under the UK's Wildlife and Countryside Act 1981, SSSIs are selected on the basis that they offer one of the finest examples of a particular habitat type to be found in the UK.
Special Areas of Conservation (SAC)	Sites of international importance for wildlife protected under the 1992 European Directive on the Conservation of Natural Habitats.
Unimproved Grassland	Grasslands where the botanical diversity has not been diminished through ploughing, reseeding or fertilisation. These semi-natural habitats are often managed for grazing pasture and can sustain a wide range of biodiversity. Some unimproved, species-rich grasslands can also be considered to be Lowland Meadows, a national and local Priority Habitat.
Wood Pasture and Parkland	A mosaic of habitats particularly valued for its veteran and ancient trees which will often support a diversity of specialised and scarce invertebrates. Wood Pasture and Parklands can be associated with designed landscapes, however a number will have origins in medieval hunting forests, emparkments, wooded commons or pastures, which may later have been incorporated into landscaped parklands or were converted into other land uses such as arable fields, forestry or amenity land. Wood Pasture and Parkland and the ancient and veteran trees they may contain are considered irreplaceable Habitats.
Worcestershire Habitat Inventory	A mapping tool that displays land use and habitat data for the county of Worcestershire at a field-by-field scale. WHI is intended to provide a baseline of information about the natural environment of the county.





Worcestershire
Wildlife Trust

The State of Worcestershire's Grasslands

March 2023



Making hay at Eades Meadow NNR © Andy Barlett

A report produced in partnership with
Natural England and Worcestershire County Council

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Summary

This report compares records from the 1990's Worcestershire Grasslands Inventory (WGI) with the 2021 refreshed Worcestershire Habitats Inventory (WHI2) to interpret changes which have occurred over time in semi-natural grassland extent, classification, and condition within Worcestershire. Limitations exist within both datasets; therefore, the findings of this report provide a general impression only of overall trends from which to take action to secure the future of semi-natural grassland habitat in Worcestershire.

Key findings

- Worcestershire is a varied county and hosts a range of lowland semi-natural grasslands including acid grassland, calcareous grassland, neutral meadows and floodplain meadows.
- Semi-natural grasslands cover 4807ha within Worcestershire, when old and new inventories are combined. This represents only 2.8% of the county. Of the 2.8% of Worcestershire hosting semi-natural grassland, 0.62% is acid grassland, 0.27% is calcareous grassland, 1.54% is lowland meadow, and 0.03% is lowland floodplain meadow. 8% of Worcestershire is occupied by or is close (within 100m) to semi-natural grassland, representing opportunities for restoration of grassland networks.
- Worcestershire remains notable at a national level for its area of lowland meadow (including floodplain meadow) when more recent local data is considered. Various estimates of England's extent of lowland meadow have been published, and place Worcestershire's lowland meadows as representing between 7.55 – 34% of England's total resource when new local data is considered against these different national sources. Worcestershire occupies 1.33% of England.
- Some areas of the county with higher concentrations of semi-natural grassland are well known, such as acid grasslands around the Wyre Forest and Malvern Hills, and calcareous grasslands on the Cotswold fringe. Other grassland hotspots are worthy of further investigation, such as small lowland meadows within the Forest of Feckenham, Longdon & Eldersfield, north of Redditch, and the Malvern Chase.
- Only 46% of semi-natural grasslands are protected by a designation for biodiversity value; 22% are at a statutory level as Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNR) and 24% are at a non-statutory level as Local Wildlife Site (LWS). The average LWS grassland parcel size is smaller than that of SSSIs, meaning that the LWS designation is an important source of protection for smaller semi-natural grasslands, such as small hay meadows typical of the Worcestershire countryside.

- A total of 1200ha of known semi-natural grassland have been recorded as destroyed, based on data recorded since the 1990s (this area is excluded from the total 4807ha of known surviving semi-natural grassland). 1083ha of this total was recorded as destroyed prior to 2011, although in some cases may be capable of recovery. 121ha of this total is considered to have been recorded as destroyed between 2011 – 2021, having been lost to woodland, agriculture, and urban development. This latter figure would increase if less permanent causes of recent loss were also taken into account, such as a decline in grassland quality from lowland meadow to less species-rich neutral grassland.
- An additional 1853 ha of semi-natural grassland has been recorded post 2011. Some gain in area is due to recovery of grasslands which were recorded as destroyed prior to 2011. A limited gained area may be a result of grassland creation projects, however the pre-dominant cause of apparent grassland gains is considered to be a result of the WHI2 method used to identify grasslands, where technology used has identified previously unrecorded grasslands rather than newly formed grasslands, and a margin of error is also likely to reduce real-term gains.
- Recent information on semi-natural grassland condition is largely unknown for sites other than statutory designated sites. Figures derived from recent SSSI condition assessments and damaged grasslands recorded by the WGI suggest that at least 30% is not in favourable condition. A lack of information and the small, isolated nature of non-statutory designated sites makes it likely that these are at even greater risk of unfavourable condition, and SSSI condition reporting supports this with SSSI neutral grasslands suffering the greatest levels of unfavourable declining condition and destruction.

Next steps

- Carry out field surveys to improve accuracy of the inventory and add new important information about semi-natural grassland extent and condition in Worcestershire.
- Develop a complete and up-to-date inventory of semi-natural grassland which can be used as a tool for monitoring, creating, and restoring grasslands as part of the Local Nature Recovery Strategy for Worcestershire.
- Increase protection of Worcestershire's semi-natural grasslands through designation as Local Wildlife Site and defining certain grassland types as 'irreplaceable habitat' in accordance with evidence which demonstrates that recovery occurs beyond human timeframes (Maskell, Jarvis, Jones, Garbutt, & Dickie, 2014). This will embed semi-natural grasslands within strategic frameworks such as the Local Nature Recovery Strategy for Worcestershire and increase prioritisation for survey and provision of landowner advice.

- Engage people with the management, restoration, creation, and monitoring of semi-natural grassland through investing resources in provision of landowner advice and formation of community action groups.

1. Introduction

1.1. The importance of Worcestershire's grasslands

Semi-natural grasslands are an important part of the cultural and environmental character of Worcestershire's countryside, where distinct communities of plants have established over hundreds and sometimes thousands of years to reflect local soil, hydrology, and land management practices. As such, semi-natural grasslands are those which have not been altered extensively for agricultural grazing or silage production.

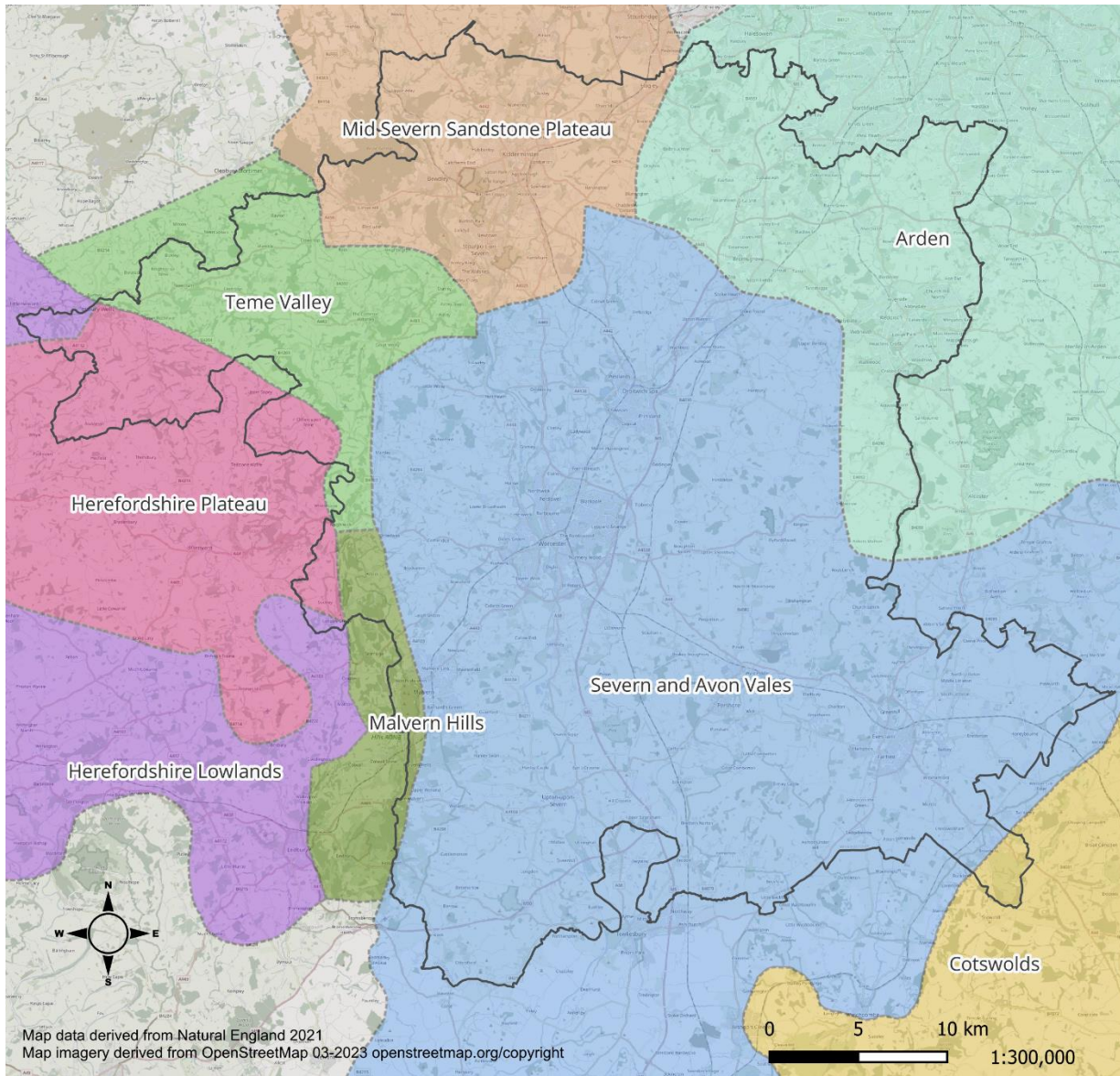
A vast range of wildlife species depend on semi-natural grasslands, ranging from breeding farmland birds such as the curlew to many species of beneficial insects. Grasslands also lock carbon in the soil when managed carefully and provide other ecosystem services such as natural flood management.

The county hosts lowland acid grasslands, lowland calcareous grasslands, lowland wet grassland, and lowland neutral hay meadows and pastures (including floodplain meadows). The National Character Areas (NCA) set by Natural England and shown in Figure 1 below provide a framework for describing the distribution of grasslands across Worcestershire's landscape.

Acid grasslands are found in the Wyre Forest and Bromsgrove districts within the Mid-Severn Sandstone Plateau and Arden area of north Worcestershire, and in association with the Malvern Hills. Calcareous grasslands in Worcestershire encompass a range of scarce community types and can be found at the Cotswold fringes of Bredon Hill and Broadway, and at scattered locations such as across the Teme Valley. Lowland floodplain meadows occur in discrete parcels within the floodplains of the Severn and Avon Vales in the southern half of the county. Lowland hay meadows are the most widespread grassland type and occur throughout the county, with important concentrations at the foot of the Malvern Hills in the Malvern Chase, the Teme Valley, Wyre Forest, Arden, and the Forest of Feckenham within the Severn and Avon Vales.

Lowland hay meadows are found at such a high concentration within the West Midlands that the region is notable at a national level (Natural England, 2008), and figures suggest that Worcestershire may support up to 25% of the entire resource of lowland meadow within England (Worcestershire Biodiversity Partnership, 2018).

Figure 1: National Character Areas occurring within Worcestershire.



□ Worcestershire County Boundary

1.2. Loss of grassland

The loss and degradation of semi-natural grassland in lowland England has been dramatic, with an estimated 97% being lost in England and Wales between 1930 and 1984 due to agricultural intensification and, to a lesser extent, development (Fuller, 1987). More recent studies have shown that grassland habitat losses have since continued unabated (King, 2004), and the national distribution of semi-natural grassland plant species supports this picture; exhibiting a general decline of iconic species such as devil's-bit scabious *Succisa pratensis* and harebell *Campanula rotundifolia* between 2000 and 2019 (Walker, et al., 2023).

Within Worcestershire an estimated 45% of remaining semi-natural grasslands were damaged and 30% completely destroyed between 1975 and 2000, leaving only 25% of remaining semi-natural grasslands intact (King, 2004) (Stephen, 1997). Ongoing loss of semi-natural grassland within Worcestershire is of particular concern for this county since grasslands are typically present as small and fragmented parcels amidst a farmed landscape. This nature makes them highly vulnerable to land use change, and difficult to record. With a recovery time of up to 100 years once damaged, it is important to look after what remains of the existing semi-natural grassland resource and look to new opportunities to restore what has been lost (Maskell, Jarvis, Jones, Garbutt, & Dickie, 2014) (Holmes & Wentworth, 2022).

1.3. Purpose of this report

Worcestershire lacks an up-to-date picture of semi-natural grassland extent and condition. The last comprehensive dataset of grassland type, extent, and condition was provided by the Worcestershire Grassland Inventory in the 1990s and was last partially updated in 2011. The Worcestershire Habitats Inventory, refreshed in 2021, now provides a more recent but high-level desk-based assessment of habitat class and extent.

The two county-wide datasets have not yet been compared to interpret changes which have occurred in semi-natural grassland extent and classification over time, and additional Natural England datasets offer an opportunity to identify broad themes in grassland protection, management, and condition. This report aims to take the first steps in this task and provide a basis from which to take further action to strengthen the evidence base and secure the future of semi-natural grassland in Worcestershire.

2. Data, methodology and limitations

2.1. Data sources

Worcestershire Grasslands Inventory

The Worcestershire Grassland Inventory (WGI) provided a comprehensive snapshot in time of the location, area, and condition of semi-natural grassland in the county when first undertaken in the 1990s. It was developed as a partnership between Worcestershire Biological Records Centre (WBRC), Worcestershire Wildlife Trust (WWT), and English Nature. The inventory was updated following field surveys of subsets of grassland sites in 1996, 1997 and 2011.

Limitations

- A high proportion of the dataset contains records made from field observations occurring over 20 years ago. It is likely that much habitat change has occurred within this time, especially given the vulnerability of grassland to land use change.
- Grasslands labelled as ‘destroyed’ are excluded from the area of semi-natural grassland calculated for this report. However, parameters for ‘destroyed’ used at the time of the last significant inventory review in 1996/97 do include reversible activities such as overgrazing or neglect, with recovery over time being feasible in some cases through changes in management.
- Some grasslands did not have an NVC classification attributed to them. In these cases, this report has retained them for consideration but translation to a UKHab class beyond level 2 has not been possible.

Worcestershire Habitats Inventory

The Worcestershire Habitat Inventory (WHI) was first developed by Worcestershire County Council in 2010 from aerial photography, historic records, and limited field surveys to identify and monitor the distinctiveness and change of broad habitats and a subset of recognised priority habitats. The WHI was refreshed in 2021 to produce WHI2. This refreshed dataset used an artificial intelligence and remote sensing data-based approach to update the habitats census and make a high-level assessment of changes in habitat extent and connectivity (Arup, 2021). The inventory can be publicly viewed using a webtool hosted on the WCC website (Worcestershire County Council, 2023).

Limitations

- A guidance report provides more comprehensive information regarding limitations specific to WHI2 (Arup, 2021). To summarise, WHI2 has been developed for use at a county and landscape scale, rather than site scale. Predictive modelling based on training data has identified the likelihood of a habitat class occurring at a location and does not provide an absolute identification. Whilst a proportion of WHI1 and WHI2 data was validated through field surveys, the inventory would benefit from further ground-truthing. This is particularly relevant to semi-natural grasslands, for which identification of type is only likely if remote observation techniques (such as those used by WHI2) are combined with satellite imagery and good quality ancillary data for factors such as soils, geology, and hydrology, as described by the Crick Framework (JNCC, 2019). WHI2's overall accuracy levels (across c.100 different habitat types) was reported to be 81%. The model used had relatively low sensitivity to lowland meadow and lowland hay meadow habitat types (67%) but high specificity (100%), meaning that WHI2 relatively infrequently resolved habitats to these typologies, but, performed 100% correctly (against training data testing) when it did so.
- Querying the dataset for the chosen semi-natural grassland classifications comprehensively was not possible within the timeframe of this report. This is because the WHI2 attribute data has been gathered from multiple sources to populate numerous fields to varying degrees of completeness and complexity. In addition, a small number of labelling errors were identified within the 'UKHab' field on which the main query was based, in terms of factors such as primary habitat codes not being coded to the greatest level possible, addition of secondary codes, case sensitive errors and spelling errors. Unfortunately, such errors are inevitable within such a large dataset. Although WHI2 was queried again on other fields to fill these gaps, some areas of known semi-natural grassland remain missing from the WHI2 query output on this occasion, such as areas of acid grassland on the Malvern Hills (this habitat is present within the WGI dataset and therefore is still considered within this report). In addition, manual spot checks have shown that the query of non-priority grasslands intersecting with grasslands mapped by the WGI is incomplete in some cases. As a result of these limitations, this report only intends to present indicative trends of the county's semi-natural grassland resource.
- The WHI2 dataset was queried based on UKHab codes g1a, g2a, g3a, g3a5, and a suite of label naming conventions to capture other semi-natural grassland parcels without a correct UKHab code. Due to the large quantity of data and limited resources available at this stage of reporting, other neutral grasslands (UKHab g3c) which are not lowland meadow (UKHab g2a, NVC MG5 and UKHab g2a5, NVC MG4) are excluded from the WHI2 data considered within this report. This means that there is more data to explore for grasslands which are

potentially in the process of losing species-richness through degradation, gaining species-richness through restoration, and wet grasslands. However, records of grasslands with an NVC classification of MG1, MG6, MG9, and MG10 are retained from WGI when present, so that recent shifts in grassland class identified by WHI2 could be identified.

2.2. Making datasets comparable

Habitat classification

This report refers to ‘semi-natural grassland’ as including lowland acid grassland, lowland calcareous grassland and lowland neutral grassland. It should be noted that neutral grassland other than lowland meadows and floodplain meadows has not been included within the WHI2 dataset at this stage, due to the large volume of data for these remaining grassland categories.

The Worcestershire Grasslands Inventory uses the NVC classification system (JNCC, 2023) to record grassland class, whilst WHI originally used the Integrated Habitat System (IHS) (SERC, 2023) and later the UKHab classification system (UKHab, 2023) when refreshed in 2021. Table 1 below lists the UKHab grassland categories which are present within the data analysed as part of this report, and the corresponding IHS and NVC codes where it has been necessary to translate codes from original sources for the purposes of this report, such as WGI. Codes at a lower specificity than acid, calcareous, and neutral grassland are present within the dataset, but other attribute information provides enough confidence that these parcels do contain semi-natural grassland for them to be included within the analysis.

Table 1 UKHab grassland categories present within the analysed data, and corresponding IHS and NVC codes.

UKHab category	UKHab code	UKHab summary description	IHS code	NVC code	WGI / WHI2
Grassland	g	Level 2 broad habitat code for all grassland habitats. This code was assigned to WGI data lacking any other habitat information.	-	-	WGI
Acid grassland	g1	Level 3 code for all acid grassland.	GA0	-	WHI2
Lowland dry acid grassland	g1a	Level 4 code for acid grassland occurring on nutrient-poor, acid, generally free-draining, dry (to moist) soils with pH 4- to 5.5, overlying acid rocks or superficial deposits such as sands and gravels. Characterised by heath bedstraw <i>Galium saxatile</i> , sheep's fescue <i>Festuca ovina</i> , common bent <i>Agrostis capillaris</i> , sheep's sorrel <i>Rumex acetosella</i> , sand sedge <i>Carex arenaria</i> , wavy hair-grass <i>Deschampsia flexuosa</i> , and tormentil <i>Potentilla erecta</i> . Dwarf shrubs and bilberry <i>Vaccinium myrtillus</i> can occur at low abundance.	GA1	U1 - 4	WGI WHI2
Other lowland dry acid grassland	g1a6	Level 5 code for lowland acid grassland which is dry and is not found on inland dunes.	GA1Z	-	WHI2
Calcareous grassland	g2	Level 3 code for all calcareous grassland.	GC0	-	WHI2

Lowland calcareous grassland	g2a	Level 4 code for lowland calcareous grassland occurring on shallow and dry lime-rich soils in the lowlands with a pH of 5-6+, often on escarpments or dry valley slopes. Characterised by upright brome <i>Bromopsis erecta</i> , tor-grass <i>Brachypodium pinnatum</i> , fairy flax <i>Linum catharticum</i> , salad burnet <i>Sanguisorba minor ssp. minor</i> , carline thistle <i>Carlina vulgaris</i> , dwarf thistle <i>Cirsium acaule</i> , horseshoe vetch <i>Hippocrepis comosa</i> , dropwort <i>Filipendula vulgaris</i> , lady's bedstraw <i>Galium verum</i> , quaking grass <i>Briza media</i> , crested hair-grass <i>Koeleria macrantha</i> , and common rock-rose <i>Helianthemum nummularium</i> .	GC1	CG1 - 8	WGI WHI2
Neutral grassland	g3	Level 3 code for all neutral grassland.	GN0	-	WGI WHI2
Lowland meadow	g3a	Level 4 code for neutral grassland occurring throughout lowland UK, often on shallow slopes or level ground with relatively deep soils that are neither strongly acidic nor lime-rich. This is a broad category of grasslands which are managed for pasture and hay-cropping and have not been substantially modified for agricultural production. A rich mixture of grasses and broad-leaved herbs are present and is characterised by crested dog's tail <i>Cynosurus cristatus</i> , red fescue <i>Festuca rubra</i> , black knapweed <i>Centaurea nigra</i> , bird's-foot trefoil <i>Lotus corniculatus</i> , ox-eye daisy <i>Leucanthemum vulgare</i> , meadow vetchling <i>Lathyrus pratensis</i> , lady's bedstraw <i>Galium verum</i> , and cowslip <i>Primula veris</i> .	GN1	MG5 / MG4 / MG8	WGI WHI2
Lowland floodplain meadows	g3a5	Level 5 code for species-rich hay meadows on little to moderately fertilised alluvial soils which are usually periodically flooded. Characteristic species include meadow foxtail <i>Alopecurus pratensis</i> , greater burnet <i>Sanguisorba officinalis</i> , marsh-marigold <i>Caltha palustris</i> , and meadowsweet <i>Filipendula ulmaria</i> .	GN11	MG4	WGI WHI2
Other neutral grassland	g3c	Level 4 code for neutral grassland occurring throughout lowland UK, which do not meet the criteria of g3a but often have <30% cover rye grass and 9-15 additional species per m ² .	GNZ / GN12	-	WGI
<i>Arrhenatherum</i> neutral grassland	g3c5	Level 5 code for neutral grassland dominated by false oat-grass <i>Arrhenatherum elatius</i> .	-	MG1	WGI
<i>Lolium-Cynosurus</i> neutral grassland	g3c6	Level 5 code for neutral grassland dominated by perennial rye-grass <i>Lolium perenne</i> and other grasses such as crested dog's-tail <i>Cynosurus cristatus</i> and sweet vernal grass <i>Anthoxanthum odoratum</i> .	-	MG6	WGI
<i>Deschampsia</i> neutral grassland	g3c7	Level 5 code for neutral grassland dominated by tufted hair-grass <i>Deschampsia cespitosa</i> and Yorkshire fog <i>Holcus lanatus</i> .	-	MG9	WGI
<i>Holcus-Juncus</i> neutral grassland	g3c8	Level 5 code for neutral grassland dominated by Yorkshire fog <i>Holcus lanatus</i> and rushes <i>Juncus spp.</i>	-	MG10	WGI

Reliability

To make the WGI and WHI2 comparable in terms of reliability, parameters within Table 2 have been used for each dataset to assign a reliability score of high, moderate or low to individual

records. The percentage of each dataset falling into reliability categories is also shown within the table.

Table 2 Parameters used to assign a common reliability score to records originating from different datasets.

Reliability	Score	WGI parameters	% dataset	WHI2 parameters	% dataset
High	1	-	0	Source = Ground truthed WBRC updated Habitat class derived from recent field surveys Source = WBRC updated Habitat class derived from recent field observations of the habitat from afar. Source = Training data Habitat class derived from training data, such as recent LWS surveys	9
Moderate	2	Survey date = 1990-2010	57	Source = Predicted Habitat class derived from 1 st model prediction with high accuracy / no WHI1 habitat class Source = Confirmed The model's first or second predicted habitat class matches WHI1 habitat class	80
Low	3	Survey date = Pre 1990 / Null / 0	43	Source = Original WHI The model prediction has low accuracy so WHI1 retained. Source = Input data Habitat class derived from input datasets alone	11

Both datasets show that there is a significant need for further ground truthing through field surveys to increase reliability of a greater proportion of data to 'High'. In addition, field survey information exists that has not yet been incorporated into either the WGI or WHI2 dataset. For example, large areas of the grassland on the Malvern Hills are recorded as having low reliability due to the recorded field survey occurring pre-1990, but NVC surveys are known to have been recently undertaken for this area. Maps 8.1 and 8.2 in the Appendix at the end of this report show the location of grasslands recorded at low, moderate, and high reliability for the WGI and WHI2.

3. Extent of semi-natural grassland

NB: Figures 2 & 3 are the only maps included within the main body of the report and can be viewed at A4 scale. All other maps produced are presented within the Appendix at the end of this report, and if printed should be produced at A3 size or larger.

3.1. Overall extent

When records of surviving grasslands recorded by WGI are combined with records of selected semi-natural grasslands recorded by WHI2, **semi-natural grasslands cover 4807ha within Worcestershire, which represents 2.8% of the county**. This is a small proportion considering that the WHI2 reported all grassland habitats cover a much greater 44.22% of Worcestershire (Arup, 2021).

WHI2 reported that Biodiversity Action Plan priority acid, calcareous and neutral grasslands covered 2.45% of Worcestershire, which represented a slight increase of approximately 1% since the first WHI was produced in 2010 owing to the model's ability to classify habitats that the previous API-approach was not able to distinguish (Arup, 2021). Now that the WHI2 is combined with the WGI, overall coverage of grassland remains largely unchanged, and it can be presumed that this figure is currently the best possible estimate of semi-natural grassland coverage in Worcestershire. It should be noted that this figure would increase with inclusion of data for other neutral grassland from the WHI2 dataset, which is likely to include numerous restoration opportunities for more species-rich acid, calcareous and neutral grasslands.

When occurrence of semi-natural grassland is represented as occupied 100m squares (Figure 3), this provides an approximation that **8% of Worcestershire hosts semi-natural grassland or is close (within 100m) to it**. This represents a substantial proportion of the county for which there are potential opportunities for connectivity and creation of semi-natural grassland.

Table 3 Area of semi-natural grassland recorded by WGI and WHI2, and the total % coverage of Worcestershire when records are combined. Area of Worcestershire = 174,052ha.

	Area (ha)	% of Worcestershire
WGI (including other neutral grassland)	2954	1.7
WGI (excluding other neutral grassland)	2355	1.4
WHI2	2970	1.7
Coverage of semi-natural grassland within Worcestershire WGI merged with WHI2 (including WGI other neutral grassland)	4807	2.8
Coverage of semi-natural grassland within Worcestershire WGI merged with WHI2 (excluding WGI other neutral grassland)	4210	2.4
Approximate coverage of semi-natural grassland within Worcestershire + land located within 100m of semi-natural grassland	14343	8.2

3.2. Overall distribution

Figures 2 & 3 on pages 17 & 18 demonstrate the distribution of semi-natural grasslands within Worcestershire. The distribution mirrors areas of the county previously identified as a priority for biodiversity conservation and identifies additional areas which are less well known. Areas supporting higher concentrations of semi-natural grassland are listed in Table 4 below. Maps 8.5, 8.6 and 8.7 in the Appendix provide mapped areas of grassland habitat classes recorded separately by the WGI and WHI2, and the mapped area when combined.

Table 4 Important areas for semi-natural grasslands within Worcestershire.

Important area for semi-natural grassland	Main grassland resource
Wyre Forest	Lowland acid grassland and lowland meadows
Clent Hills	Lowland acid grassland and lowland meadows
Malvern Hills / Malvern Chase	Lowland acid grassland and lowland meadows
Bredon Hill	Lowland calcareous grassland
Broadway	Lowland calcareous grassland
North of Redditch	Lowland meadows
Chaddesley Woods	Lowland meadows
Forest of Feckenham	Lowland meadows
The Lenches	Lowland meadows
Suckley Hills	Lowland meadows
Kyre Brook & tributaries, Tenbury	Lowland meadows
Longdon and Eldersfield	Lowland meadows and floodplain meadows

3.3. Extent and distribution of individual grassland types

Table 5 below shows the area of each semi-natural grassland type recorded separately on the WGI and WHI2. The two datasets broadly agree, with WHI2 showing a slightly greater area of calcareous grassland and lowland meadows than were recorded by WGI. It should be noted that the WHI2 was not comprehensively queried (a limitation discussed in Section 2), and the significantly lower figure for WHI2 acid grassland is a product of this rather than actual area of acid grassland recorded by the inventory.

The difference in mapped area for all grassland categories suggests that there is a large difference between distribution of grassland recorded by WGI and WHI2, however, when maps 8.9, 8.10, 8.11 and 8.12 in the Appendix are examined for each grassland category, distribution is broadly the same between the two datasets and the differences mostly occur at finer scale. This provides further evidence of the need for ground-truthing of the datasets to gain further detail than can currently be derived.

When WGI data is combined with WHI2 data, the overall % coverage of each grassland type within the county is similar, with minor increases. In the case of lowland meadows (including floodplain meadows), Worcestershire has been previously quoted to host a significant 25% of

England's total resource (Worcestershire Biodiversity Partnership, 2018). There have been various published estimates of the extent of semi-natural grassland in England since the late 1990s, based on different data sources and sometimes on differing definitions. The area of lowland meadow within England (7,282ha) used to arrive at the 25% figure was derived from the 2005 UK HAP Steering Group Targets Review for lowland grasslands (direct reference could not be found) (Rodwell, Morgan, Jefferson, & Moss, 2007). The 2013 priority habitats inventory, published by Natural England and used in the England Biodiversity Indicators (2a – Extent and condition of priority habitats), is currently considered the best available national source of extent data. This inventory estimates 36,129ha of lowland meadow within England (DEFRA, 2023). This is a large increase on the previous figure used for national reporting, and DEFRA acknowledges that overestimation exists, particularly for lowland meadows, due to the methodology used to achieve a single layer of extent and the broad inclusion of grasslands as 'lowland meadow'. As a result, they advise against drawing conclusions of change in extent of habitat over time (DEFRA, 2021).

Although drawing comparisons between different datasets should be treated with caution, these **more recent local and national datasets continue to demonstrate that Worcestershire remains notable at a national level for hosting a significant proportion of England's lowland meadows.** Worcestershire occupies only 1.33% of England yet hosts 7.55% of England's lowland meadows when the 2013 national dataset is used. If the older estimates of approximately 8000ha of lowland meadow in England are treated as more representative, then Worcestershire hosts 34% of England's lowland meadows. Calculations are demonstrated in Table 6 below.

Table 5 Area of individual grassland types mapped by WGI and WHI, and the overall % coverage within Worcestershire when datasets are combined. An indication of the difference between % coverage identified by WHI2 and that identified when WHI2 is combined with WGI is also given.

Grassland type	Area mapped by WGI (ha)	Area mapped by WHI2 (ha)	Difference in mapped area (ha)	Total area when WGI & WHI2 combined (ha)*	Overall % coverage of the county when WGI & WHI2 combined *	WHI2 % coverage
Acid grassland	890	475	798	1080	0.62	0.56
Calcareous grassland	280	355	299	467	0.27	0.23
Neutral grassland (all types)	1617	2139	-	-	-	1.66
g3a Lowland meadow	1150	2106	2111	2678	1.54	
g3a5 Lowland floodplain meadow **	34	26	46	53	0.03	

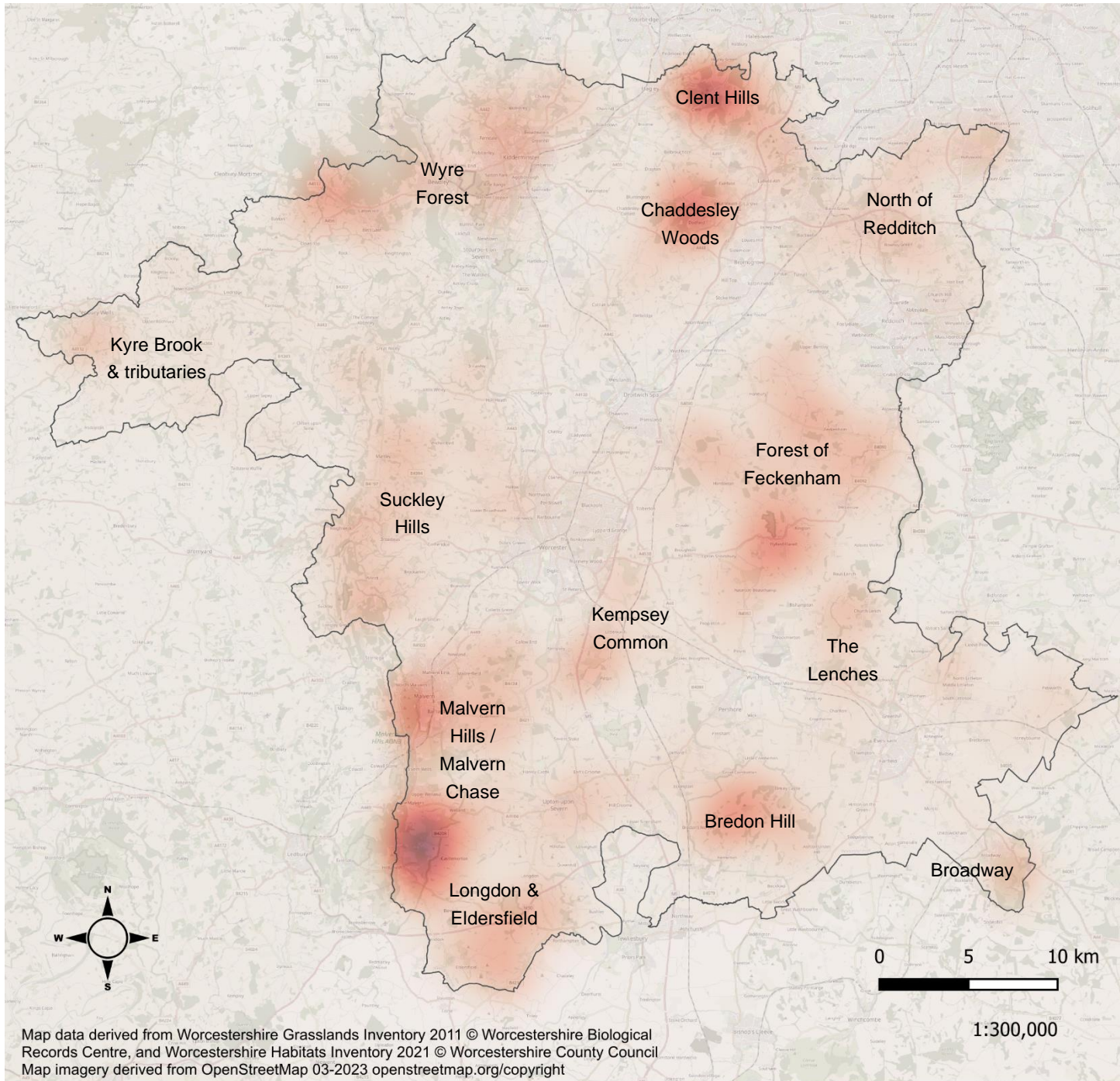
* In some instances, WGI and WHI2 record different grassland types at the same location. Therefore, these areas may overlap spatially.

** Significant known areas of g3a5 Lowland floodplain meadow are present at Upton Ham SSSI and Rectory Farm Meadows SSSI in the Severn and Avon Vales. However, the two sites were not recorded within a priority grassland category by WHI2 and were listed as predominantly lowland meadow (g3a) by the WGI. Therefore, these sites are accounted for within the g3a category rather than the g3a5 within this report. SSSI condition surveys occurring more recently than the WGI record g3a5 Lowland floodplain meadows at these sites, so this demonstrates limitations (discussed in Section 2) with the existing inventory dataset that more recent and more accurate information is not taken into account, ground-truthing of WHI2 data is important, and a grasslands inventory which incorporates new information is required.

Table 6 Area of lowland meadow within Worcestershire and England

Total area of lowland meadow and lowland floodplain meadow within Worcestershire (WGI & WHI2 combined) (ha)	2731 ha	
Total area of lowland meadow Priority Habitat within England (2013) (ha)	36129 ha	
Area of Worcestershire	174052 ha	
Area of England	13046000 ha	
% of England which is Worcestershire		1.33 %
% of England's lowland meadows occurring within Worcestershire		7.55 %

Figure 2 Heat map to demonstrate the distribution and concentration of semi-natural grasslands within Worcestershire.



Key

- Worcestershire County Boundary
- Heat map of 1km squares containing semi-natural grassland on the Worcestershire Grasslands Inventory (2011) and the Worcestershire Habitats Inventory (2021)

Figure 3 100m squares in which semi-natural grassland occurs within Worcestershire.



Key

□ Worcestershire County Boundary ■ 100m squares intersecting WHI (2021) + WGI (2011)

4. Protection of semi-natural grassland

The combined dataset of the WGI and WHI2 represents the most valuable grasslands in the county. However, **only 46% of these semi-natural grasslands are protected by a designation for biodiversity value; 22% are at a statutory level mostly as Sites of Special Scientific Interest (SSSI) and 24% are at a non-statutory level as Local Wildlife Site (LWS)**. This leaves over half of all semi-natural grasslands unprotected within Worcestershire by formal designation. Map 8.12 in the Appendix shows the location of statutory and non-statutory protected semi-natural grasslands within Worcestershire.

% Area of semi-natural grassland protected by a designation

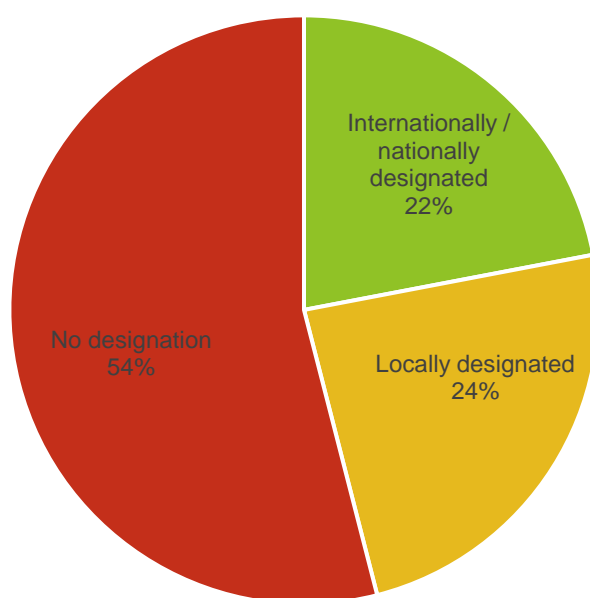


Table 6 Area of semi-natural grasslands protected by statutory and non-statutory designations within Worcestershire.

	Area of semi-natural grassland (ha)	% of total area of semi-natural grassland	Average parcel size (ha)
NNR (Foster's Green Meadows, Chaddesley Woods, Wyre Forest, Bredon Hill)	57*	1*	-
SSSI	1065*	22*	9
Total area statutorily protected	1065	22	-
LWS	1155	24	5
Total area non-statutorily protected	1155	24	-
Total area of inventory	4807	-	-
Total area unprotected	2587	54	-

*Areas designated overlap

Non-statutory designation

With a quarter of all semi-natural grasslands within Worcestershire designated as LWS, this designation is a significant source of protection within the county. To make this role even more important, **the average grassland parcel size designated as LWS is smaller than the average SSSI parcel size**, and therefore accounts for many of the smaller and more vulnerable semi-natural grasslands such as small hay meadows which are typical of the Worcestershire countryside.

However, the protection afforded by a LWS designation is currently limited to consideration within Local Development Plans and during decision-making processes undertaken by a Local Planning Authority. This consideration does not necessarily translate to firm protection and to date has been of very limited help in driving improved (or indeed any) management, which would help to avoid site loss through neglect or intensification. Noting the thresholds for agricultural EIA (2ha) and the usually small size of Worcestershire's grassland this represents a significant gap in site protection. Regular surveys and provision of landowner advice through the Worcestershire Local Wildlife Sites Partnership is an important tool for ensuring good condition and management of LWS, although this has been restricted over recent decades due to very limited availability of resources.

No designation

With the biodiversity value of over half of the best semi-natural grasslands in the county unrecognised by a site designation, this leads to them being easily overlooked when standard checks are carried out during the decision-making processes for planning, environmental consents, and environmental grant frameworks. There is significant opportunity to increase the weight of importance of these grasslands via a designation, bringing them to the attention of authorities and consultees. This is discussed further in section 6.

5. Changes in extent of semi-natural grassland

5.1. Grassland losses

The WGI and WHI2 have recorded that **a total of 1200ha of semi-natural grassland recorded since the 1990s has been destroyed so far**. 1083ha of this total was recorded as destroyed prior to 2011 at the time of the last WGI update (see Map 8.13 within the Appendix). 121ha of this total has been recorded by WHI2 as lost to woodland, agriculture, and development between 2011 – 2021 (see Map 8.14 within the Appendix). This area lost is not included within the total of 4807ha of surviving known semi-natural grassland stated in section 3.1.

It is considered likely that the area recorded as destroyed prior to 2011 may be inflated in comparison to real terms due to the stringent parameters used to label a grassland as destroyed, where in fact its condition was recoverable (a limitation discussed in Section 2). Vice versa, the area recorded as destroyed post 2011 may significantly increase if less permanent causes of loss are taken into account, such as potential decline in condition of priority semi-natural grassland to non-priority grassland excluded from the current analysis. In fact, the WGI recorded 1852ha of surviving semi-natural grassland which is absent from WHI2, but limitations such as difficulties with querying WHI2 data thoroughly make this figure unreliable and return of non-grassland WHI2 habitat codes across all WGI grassland parcels appear to be incomplete (a limitation discussed in Section 2).

Table 7 Area of surviving grassland recorded by WGI which has now been lost to permanent land-use change.

Non-priority grasslands recorded by WHI2 which intersect with WGI*	Area intersecting WGI* (ha)	% of WGI * (total 2954ha)
Woodland (broadleaf, coniferous, scrub)	68	2.3
Agriculture (cropland and modified grassland**)	42	1.4
Urban	13	0.44
* Excluding parcels labelled as already destroyed in 2011 ** The UKHab class g4 modified grassland (agriculturally improved grassland) is likely to be further broken down into finer detail in future revisions of the UKHab classification system. Ground-truthing of re-classified g4 grassland parcels may place some into semi-natural grassland categories.		

Case studies

Agriculture

- 5ha of MG5 lowland meadow east of Droitwich recorded by the WGI has since been converted to arable production.

Development

- 2.4ha of MG5 lowland meadow in Pershore was destroyed by a housing development in 2016. It should be noted that this parcel of grassland had not been recorded by the WGI or first iteration of the WHI, and so suggests that additional areas of lowland meadow identified by WHI2 and discussed in greater detail in Section 5.2 below have merit in having successfully identified previously unrecorded parcels of semi-natural grassland.

Woodland/Scrub

- 3ha of MG5 grassland near Hallow recorded by the WGI has since been recorded as dense scrub by WHI2. Aerial imagery suggests colonisation by scrub began two decades ago and is likely to be a result of under management.
- Increasing pressure to plant trees is likely to exacerbate risks to unknown parcels of semi-natural grassland. Anecdotal evidence suggests that some high-quality grassland has already been compromised by well-meaning but ultimately harmful planting.

Transition to non-priority semi-natural grassland

- 26ha of MG5/MG9 grassland designated as Smithmoor Common and Meadows LWS near Earl's Croome was recorded as lowland meadow by the WGI. WHI2 has not identified presence of a lowland meadow at this location, so it is possible that the grassland has declined in quality due to a lack of grazing or the technology used by WHI2 has failed to identify high quality grassland in this case. Ground-truthing would confirm such cases.

5.2. Grassland gains

WHI2 recorded 1853 ha of semi-natural grassland which was absent from the WGI due to having never been recorded or due to being recorded as destroyed at that time. Recovery of some grasslands recorded as destroyed prior to 2011 is one reason underlying some grassland gains, where 81ha recorded as destroyed by WGI has returned to the WHI2 dataset as one of the selected priority grassland classes, implying that the habitat has recovered. However, the predominant cause of gains is likely to be a product of the WHI2 method used to identify grasslands: the more comprehensive identification technology has identified previously unrecorded grasslands rather than newly formed grasslands, and a margin of error (a limitation discussed in Section 2) is also likely to reduce real-term gains. As such, ground-truthing is required. Map 8.6 within the Appendix shows that some **newly identified areas of grassland are small parcels of lowland meadow concentrated in areas such as the Forest of Feckenham, Longdon & Eldersfield, north of Redditch, and the Malvern Chase.**

Case studies

Recovery

- 8ha of lowland calcareous grassland important for waxcap fungi and designated as Broadway Hill Meadows LWS on the Cotswold fringe was recorded as destroyed by WGI in 1993 due to agricultural improvement. After this time, LWS records from 2008 show the site was in

positive management and WHI2 independently classified the grassland in 2021 as g2a Lowland calcareous grassland.

- 3ha of MG5 grassland adjacent to the Leigh Brook in the Suckley Hills was recorded as destroyed through 'neglect' by the WGI, but WHI2 classified the grassland in 2021 as g3a Lowland meadow.
- 2ha of MG5 grassland adjacent to Grafton Wood within the Forest of Feckenham was recorded as destroyed through 'herbicide' by the WGI, but WHI2 classified 1ha in 2021 as g3a Lowland meadow.
- 2ha MG8 grassland designated as part of Caunsell Marsh LWS along the River Stour near Cookley was recorded as destroyed by the WGI, but WHI2 classified 1ha of the grassland as seasonally wet g3a Lowland meadow and 1ha as acid grassland, indicating that a possible change in hydrology or management has resulted in a shift in priority grassland type.

Creation

- Worcestershire Wildlife Trust Reserve Hill Court Farm & the Blacklands in the Longdon and Eldersfield area at the southwest of the county was managed as intensive pasture and arable when the Trust purchased the reserve in 2001. Work has been underway to restore neutral hay meadow and wetland habitats, resulting in WHI2 now recording over 20ha of lowland acid grassland. The current grassland currently exhibits neutral meadow indicator species but does overlie slightly acid clay soil which has likely been used within the WHI2 method to make the classification. This case again demonstrates the need for ground truthing.

Increased WHI2 mapping capability

- Approximately 15ha of acid grassland which is part of a mosaic with heathland at Burlish Top and Devil's Spittleful in the Wyre Forest was successfully recorded by WHI2 but was absent from WGI, presumably due to the nature of the fine-scale habitat mosaic being challenging to map prior to WHI2 technology.

This example also draws attention to future gains of semi-natural grassland which are expected with continued conservation management but have not yet been recorded. Wyre Forest District Council and Worcestershire Wildlife Trust are undertaking a large heathland and acid grassland restoration and creation project across Burlish Meadows (former golf course), Droppingwell Farm (former arable), and Blackstone Fields (also former arable). Some areas of grassland, such as the hillside with Burlish Meadows, already show a transition towards acid grassland with presence of some indicator species, and positive conservation management will continue this trajectory towards larger areas of this priority grassland habitat.

5.3. Grassland condition

Over **1400 ha of semi-natural grassland recorded as surviving by the WGI in 2011 had also been recorded as damaged, which equates to approximately 30% of the current combined inventory.** This is a significant proportion of the inventory and suggests that much of the remaining resource of semi-natural grassland resource continues to be in poor condition, or worse may now have been lost altogether if causes behind poor condition were not changed. Map 8.15 within the Appendix shows the location of grassland mapped as damaged by the WGI.

SSSIs can be used as a representative sub-sample to indicate the general condition of semi-natural grasslands within Worcestershire. Condition monitoring undertaken between 2009-2021 does not suggest a satisfactorily positive picture of SSSI grassland condition. Only 5.4% of SSSI acid grassland is in 'Favourable' condition, and 60-66% of SSSI calcareous and neutral grassland is in 'Favourable' condition. Broadly speaking, these figures support suggestions from the WGI that at least 30% of all semi-natural grasslands are not in favourable condition overall, however it should be noted that 93% of SSSI acid grassland and 22-38% calcareous and neutral grassland is in Unfavourable – Recovering condition, indicating that management is in place to restore condition.

The **condition of semi-natural grasslands occurring outside of statutorily designated sites is likely to be significantly poorer** due to the reduced level of protection they receive, the lack of information available for these sites, and the smaller and more isolated nature of grassland parcels. Notably, over 10% of SSSI Neutral grassland is in 'Unfavourable – Declining' condition, which implies this category which includes lowland meadows is at particular risk within the county.

Table 8 Area of SSSI designated acid, calcareous and neutral semi-natural grassland in Favourable and Unfavourable condition according to condition monitoring carried out by Natural England between 2009 – 2021.

	Acid		Calcareous		Neutral	
	Area (ha)	% Area	Area (ha)	% Area	Area (ha)	% Area
Total SSSI units	396.31		48.49		532.09	
Favourable	21.5	5.4	29.27	60.4	355.76	66.9
Unfavourable - Recovering	370.12	93.4	18.24	37.6	114.2	21.5
Unfavourable - Declining	4.69	1.2	0.98	2.0	59.42	11.2
Unfavourable - no change					1.03	0.2
Partially destroyed					1.68	0.3

6. Next steps

Current sources of information show that only a small proportion of Worcestershire's grassland is high quality semi-natural grassland, and this resource has been and continues to be vulnerable to ongoing land use change within the county. Furthermore, the extent of lowland meadows within Worcestershire remains of national importance. The following actions are recommended to strengthen the evidence base and secure the existing resource and future recovery of semi-natural grassland in Worcestershire.

6.1. Field surveys

A very limited proportion of semi-natural grassland data has been ground-truthed by recent field surveys, if at all, and condition data is absent for most grassland parcels. Carrying out targeted field surveys would improve accuracy of the current inventory and add important information about semi-natural grassland extent and condition in Worcestershire.

Table 9 lists survey priorities and objectives, alongside an approximation of the resources required to achieve these. Resource approximations are based on a survey season lasting between May – September, with 80 working days available within that season. A single surveyor could feasibly survey (and carry out associated admin work) an average of 10ha per day based on a survey method of collating a species list with DAFOR codes via a walkover survey, UKHab classification of habitats present, and taking notes regarding condition of habitat. Resources required are likely to vary from the approximation according to grassland type being surveyed (e.g. acid grassland is likely to be surveyed more rapidly than calcareous grassland), the area of land for which permission is granted for access, the level of reporting required, and the survey method required to meet other objectives. For instance, a more comprehensive survey method may be required to collect sufficient evidence to classify some parcels of semi-natural grassland as irreplaceable habitat, if the opportunity arises subject to new government guidance.

Table 9 Priorities for field survey of semi-natural grassland, objectives, and approximate resources required to achieve this.

Survey priorities	Approx. area of semi-natural grassland (ha)	Location and grassland type (see Fig.2)	Approx. full time equivalent of a single surveyor for 1 field season	Objectives
Semi-natural grassland designated as LWS	549	Across Worcestershire All grassland types	0.75	LWS have substantive value for nature conservation within Worcestershire and represent a suite of grasslands which lie outside of well-known and better protected nature reserves and statutory designated sites. This makes them an ideal candidate for collecting rapid impressions of the status and condition of known semi-natural grassland sites which may also be more vulnerable to land use change than statutory designated sites. Data collected would make a contribution to Worcestershire's Local Habitat Map within the LNRS.
Undesignated semi-natural grasslands occurring within hotspots	Total = 673 LWS = 141 SSSI = 60 NNR = 12 Undes. = 460	Forest of Feckenham Lowland meadows	0.75	Survey of semi-natural grasslands for which there is little existing information and occur within apparent grassland hotspots (see Fig. 2, Section 3) would increase the accuracy of WHI2 and improve knowledge of the most vulnerable grasslands which are currently undesignated, such as small parcels of lowland meadow for which Worcestershire is renowned. Collection of this information may also provide an opportunity to designate a greater area of semi-natural grassland as LWS. Data collected would make a contribution to opportunity mapping for grassland enhancement within Worcestershire's LNRS, and would be considered by the LNRS Local Habitat Map if sites are designated as LWS.
	Total = 110 LWS = 29 SSSI = 2 Undes. = 79	The Lenches Lowland meadow / calcareous grassland		
	Total = 294 LWS = 33 SSSI = 37 Undes. = 224	Suckley Hills Lowland meadow	0.25	
	Total = 971 LWS = 319 SSSI = 420 Undes. = 232	Malvern Hills & Chase Acid grassland / Lowland meadow	0.25	
	Total = 232 LWS = 17 SSSI = 24 Undes. = 191	North of Redditch Lowland meadow	0.25	
	Total = 369	Wyre Forest	0.5	

	<i>LWS = 65</i> <i>SSSI/NNR = 131</i> Undes. = 173	Acid grassland / Lowland meadow		
	Total = 286 <i>LWS = 108</i> <i>SSSI = 36</i> Undes. = 142	Clent Hills Acid grassland / Lowland meadow		
	Total = 149 <i>LWS = 24</i> <i>SSSI/NNR = 15</i> Undes. = 110	Chaddesley Lowland meadow		
	Total = 209 <i>LWS = 33</i> <i>SSSI = 23</i> Undes. = 153	Longdon & Eldersfield Lowland meadows / floodplain meadow	0.25	
	Total = 61 <i>LWS = 4</i> <i>SSSI = 4</i> Undes. = 53	Kyre Brook & tributaries Lowland meadows		
	Total = 126 <i>LWS = 81</i> <i>SSSI = 23</i> Undes. = 22	Kempsey Acid grassland / Lowland meadow	0.25	
	Total = 72 <i>LWS = 19</i> <i>SSSI = 15</i> Undes. = 38	Broadway Calcareous grassland		
	Total = 261 <i>LWS = 25</i> <i>SSSI/NNR = 180</i> Undes. = 56	Bredon Hill Calcareous grassland		
Semi-natural grassland recorded as destroyed	1200	Across Worcestershire All grassland types	1.5	Survey of semi-natural grasslands which have been recorded as destroyed will provide a more accurate picture of real-term grassland losses, and potentially identify the most urgent opportunities to restore semi-natural grassland where this is possible.

6.2. Semi-natural grassland inventory for Worcestershire

The sources of information about grasslands in Worcestershire currently remain separate. A combined inventory which uses the best available sources of information and incorporates new information as it arises is a crucial tool for monitoring, creating and restoring grasslands in the county, as well for as monitoring progress towards targets steered by the emerging Local Nature Recovery Strategy.

Potential areas of work include:

- Use parameters common across different data sources to create a combined inventory with no overlaps, which takes the most reliable source of information available for every grassland parcel.
- Process attribute information to simplify, complete, and correct errors. This would make the inventory easier to query comprehensively.
- Invest resources into a mechanism (such as the WCC WHI2 web-tool) to record new grassland information as it arises and incorporate it into a dynamic grassland inventory which is integrated with the Natural England Priority Habitat Inventory available on MAGIC.

6.3. Protection of semi-natural grasslands

Worcestershire's lowland meadows and areas of acid and calcareous grassland make a substantial contribution to the county's natural character and biodiversity and form critical components of the nature recovery network. However, over half of the current known resource of semi-natural grassland is unrecognised and unprotected by a designation, leaving parcels vulnerable to land use change.

Potential areas of work include:

- Designate a greater proportion of semi-natural grassland as LWS. This will embed important grasslands within the Local Habitat Map of the Local Nature Recovery Strategy, showing areas which are or could become of particular importance for biodiversity and the environment to target nature recovery action through avenues such as Biodiversity Net Gain.(DEFRA, 2023).
- Define semi-natural grasslands as 'irreplaceable habitat' wherever possible, to strengthen their protection and embed them within the Local Habitat Map of the Local Nature Recovery Strategy. Evidence suggests that complete restoration of calcareous grasslands will take more than 100 years and ultimately may even be impossible to

achieve (Maskell, Jarvis, Jones, Garbutt, & Dickie, 2014) (Holmes & Wentworth, 2022). This period is beyond human timeframes, and therefore should be considered as irreplaceable habitat in the same way as ancient woodland.

- Invest resources into ongoing monitoring of SSSI condition and landowner engagement, and action to protect SSSI grassland from land use change and damage.
- Lobby for improved protections for sites, including through revisions to agricultural EIA, strengthened protection of irreplaceable and Priority habitat through the planning system and delivery of increased resources for relevant bodies and programmes. Appropriate weight must be given to LNRS commitments and to grassland restoration as well as protection.

6.4. People engagement

Enabling people to better engage with semi-natural grassland in Worcestershire is crucial if there is to be greater value placed on them and positive action occurring to manage, create, restore, and monitor grasslands.

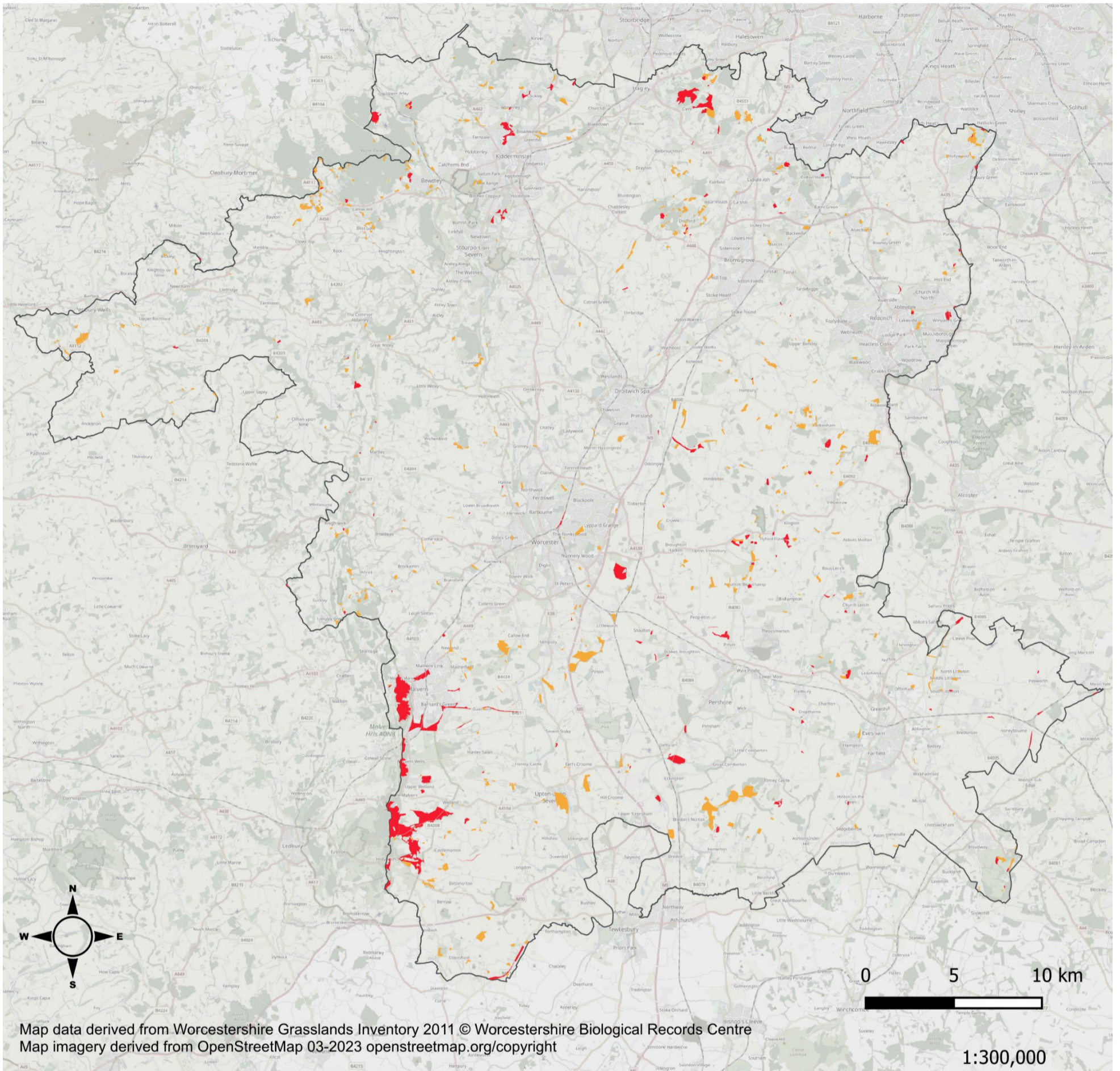
Potential areas of work include:

- Invest resources into provision of expert advice to land managers of semi-natural grassland designated as LWS. Expert advice will help land managers understand the value of the grasslands they manage and make informed habitat management decisions.
- Explore the creation of community and landowner groups, such as a 'Worcestershire Meadows' group, where engaged people can join training workshops and visits to learn how to manage, restore, create, and monitor semi-natural grasslands.

7. References

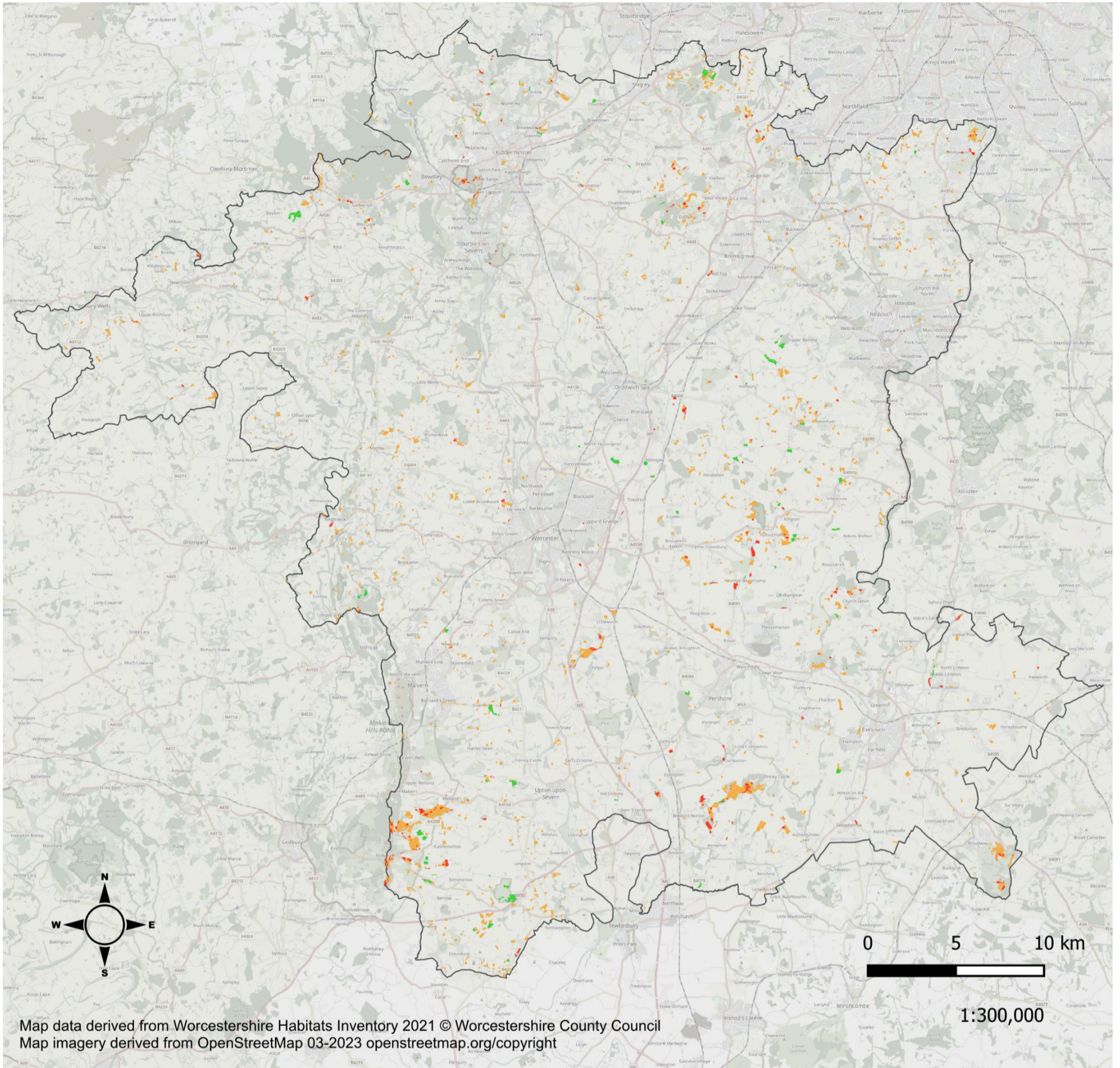
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8.1. Reliability of Worcestershire Grasslands Inventory



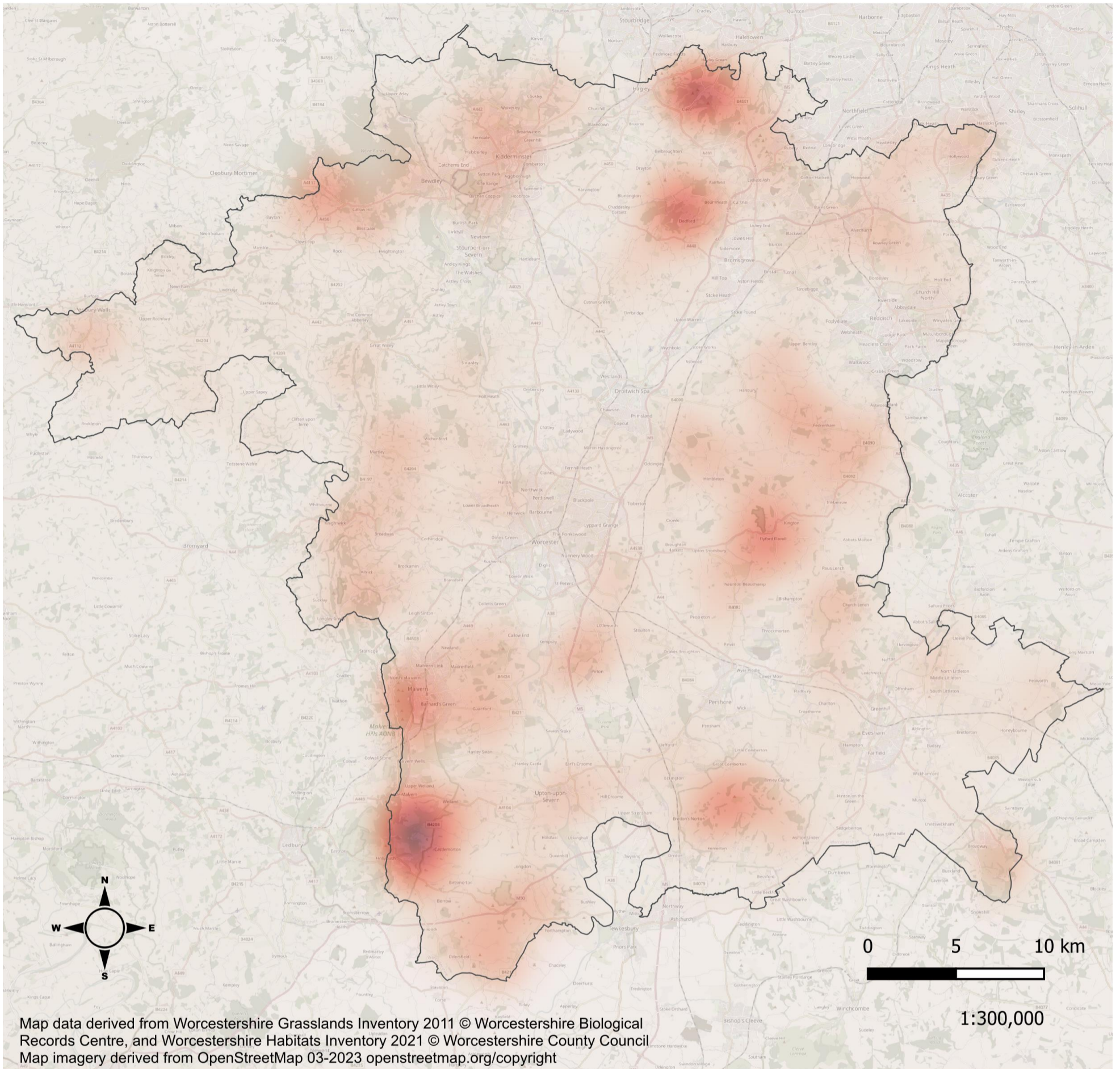
- Moderate reliability (WGI data)
- Low reliability (WGI data)
- Worcestershire County Boundary

8.2. Reliability of Worcestershire Habitats Inventory



- High reliability (WHI2 data)
- Moderate reliability (WHI2 data)
- Low reliability (WHI2 data)
- Worcestershire County Boundary

8.3. Heat map of semi-natural grassland distribution within Worcestershire



Key

-  Worcestershire County Boundary
-  Heat map of 1km squares containing semi-natural grassland on the Worcestershire Grasslands Inventory (2011) and the Worcestershire Habitats Inventory (2021)

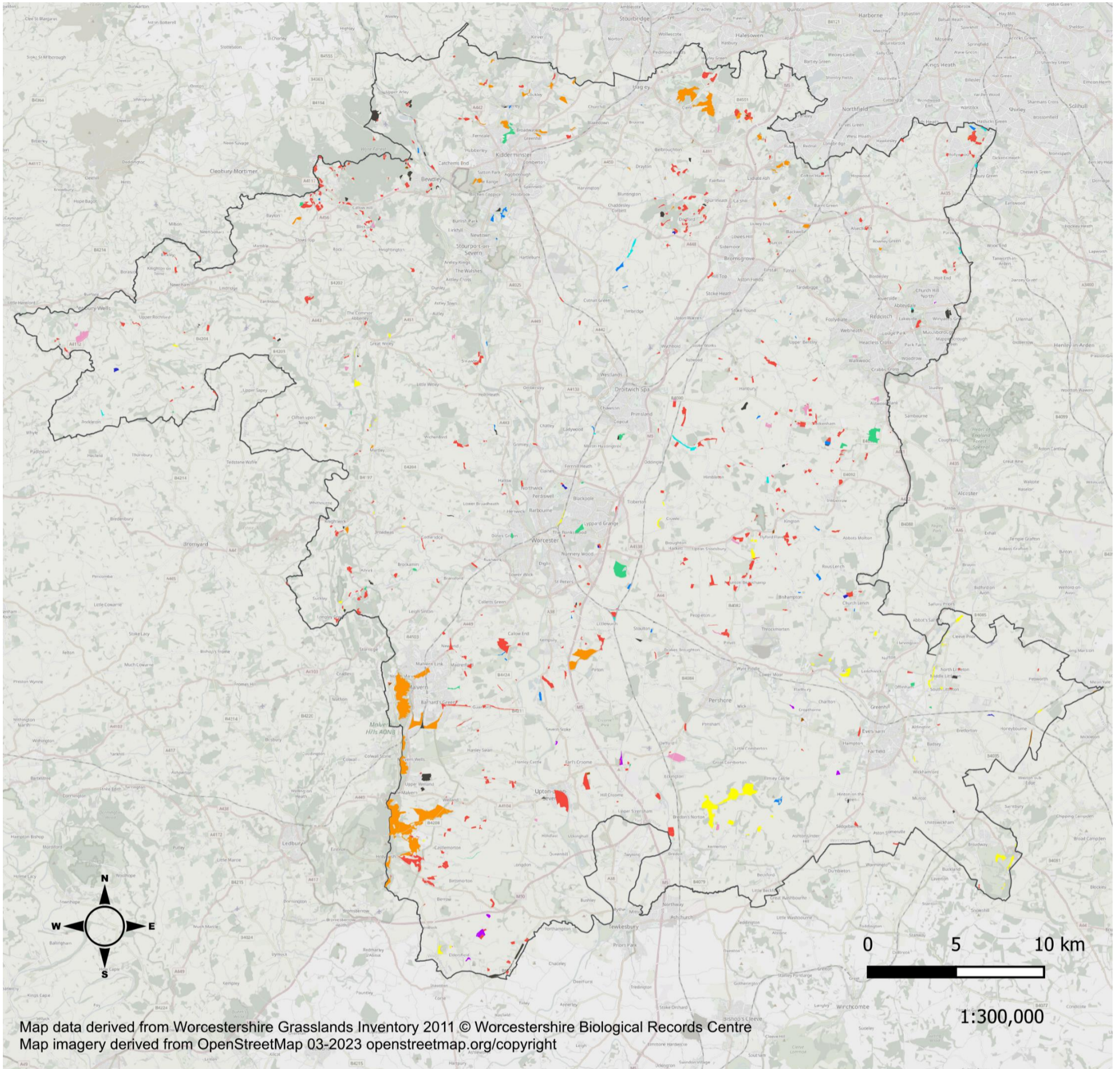
8.4. Indicative distribution of semi-natural grassland within Worcestershire















Key

- Worcestershire County Boundary
- 100m squares intersecting WHI (2021) + WGI (2011)

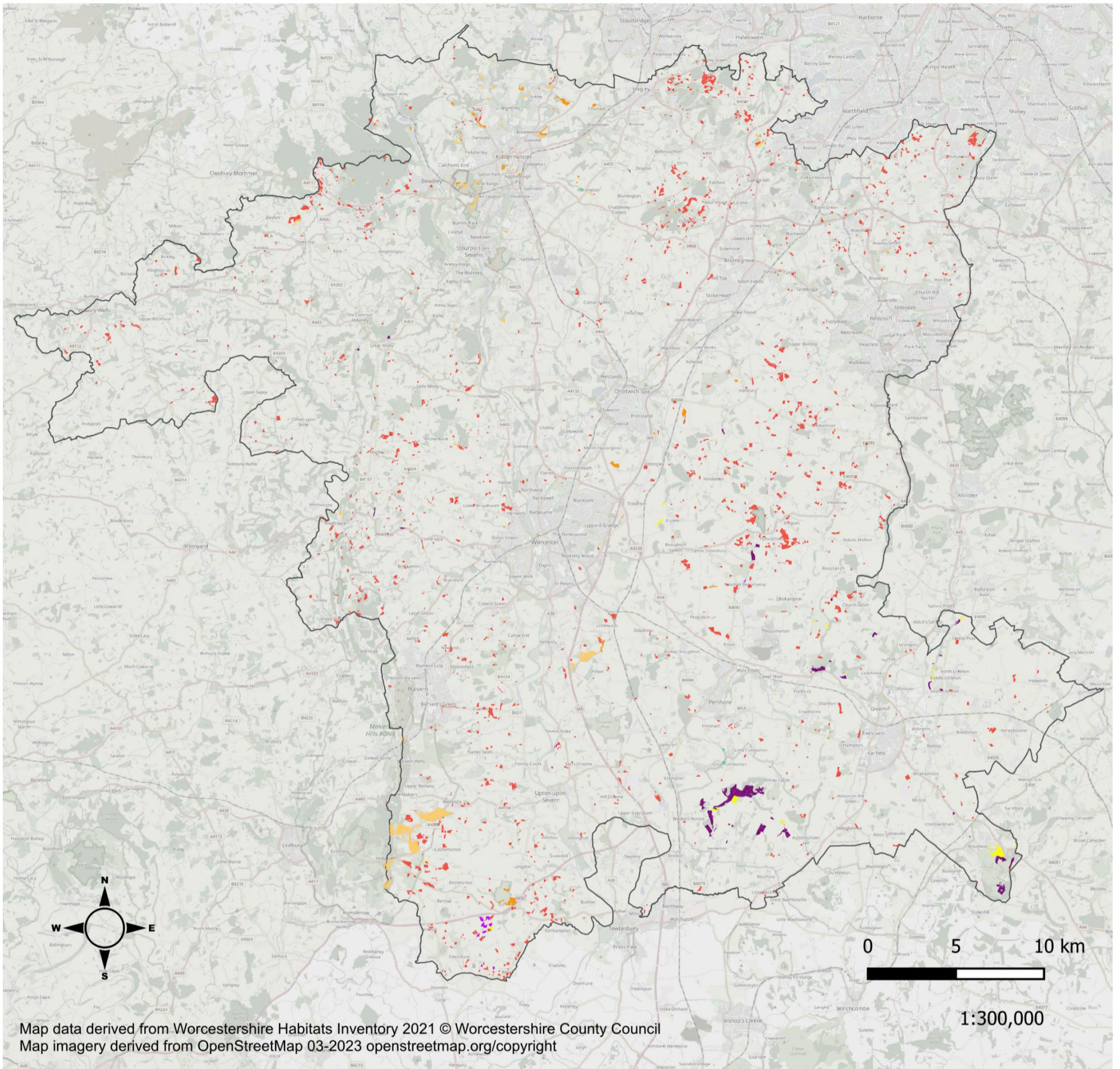
8.5. Semi-natural grassland classes recorded by Worcestershire Grasslands Inventory



WGI (2011) UKHab grasslands

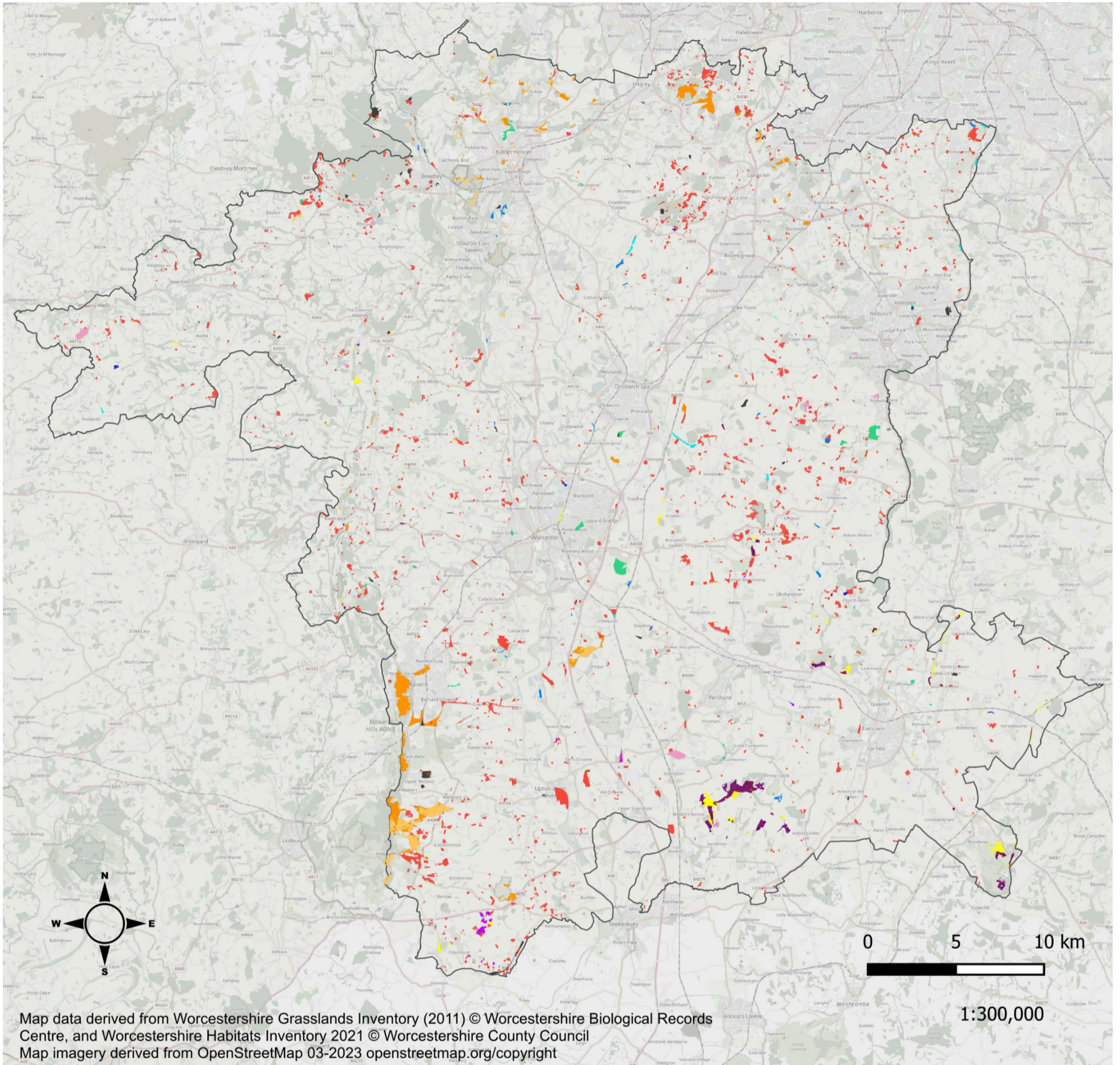
- | | |
|---|---|
|  g - Grassland |  g3c - Other neutral grassland |
|  g1a - Lowland dry acid grassland |  g3c5 - Arrhenatherum neutral grassland |
|  g2a - Lowland calcareous grassland |  g3c6 - Lolium-Cynosurus neutral grassland |
|  g3 - Neutral grassland |  g3c7 - Deschampsia neutral grassland |
|  g3a - Lowland meadows |  g3c8 - Holcus-Juncus neutral grassland |
|  g3a5 - Lowland hay meadows (<i>Alopecurus pratensis</i> - <i>Sanguisorba officinalis</i>) |  Worcestershire County Boundary |

8.6. Semi-natural grassland classes recorded by Worcestershire Habitats Inventory



- WHI2 (2021) UKHab grasslands
- | | | | |
|---|---|---|---|
|  | Worcestershire County Boundary |  | g2a - Lowland calcareous grassland |
|  | g1 - Acid grassland |  | g3 - Neutral grassland |
|  | g1a - Lowland dry acid grassland |  | g3a - Lowland meadows |
|  | g1a6 - Other lowland dry acid grassland |  | g3a5 - Lowland hay meadows (<i>Alopecurus pratensis</i> - <i>Sanguisorba officinalis</i>) |
|  | g2 - Calcareous grassland | | |

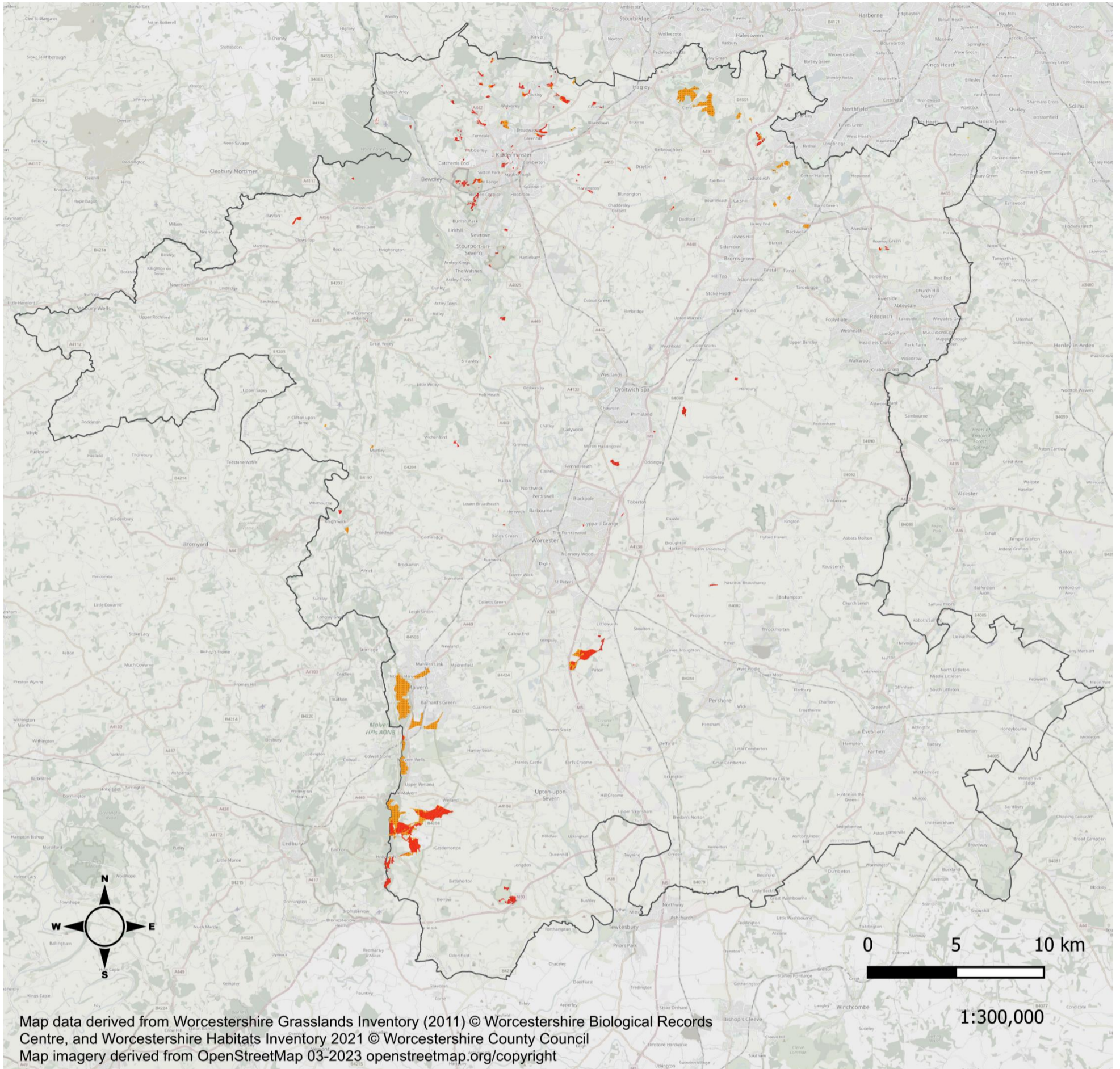
8.7. Semi-natural grassland classes recorded by Worcestershire Grasslands Inventory & Worcestershire Habitats Inventory. NB – datasets overlap.







WGI (2011) & WHI2 (2021) UKHab grasslands

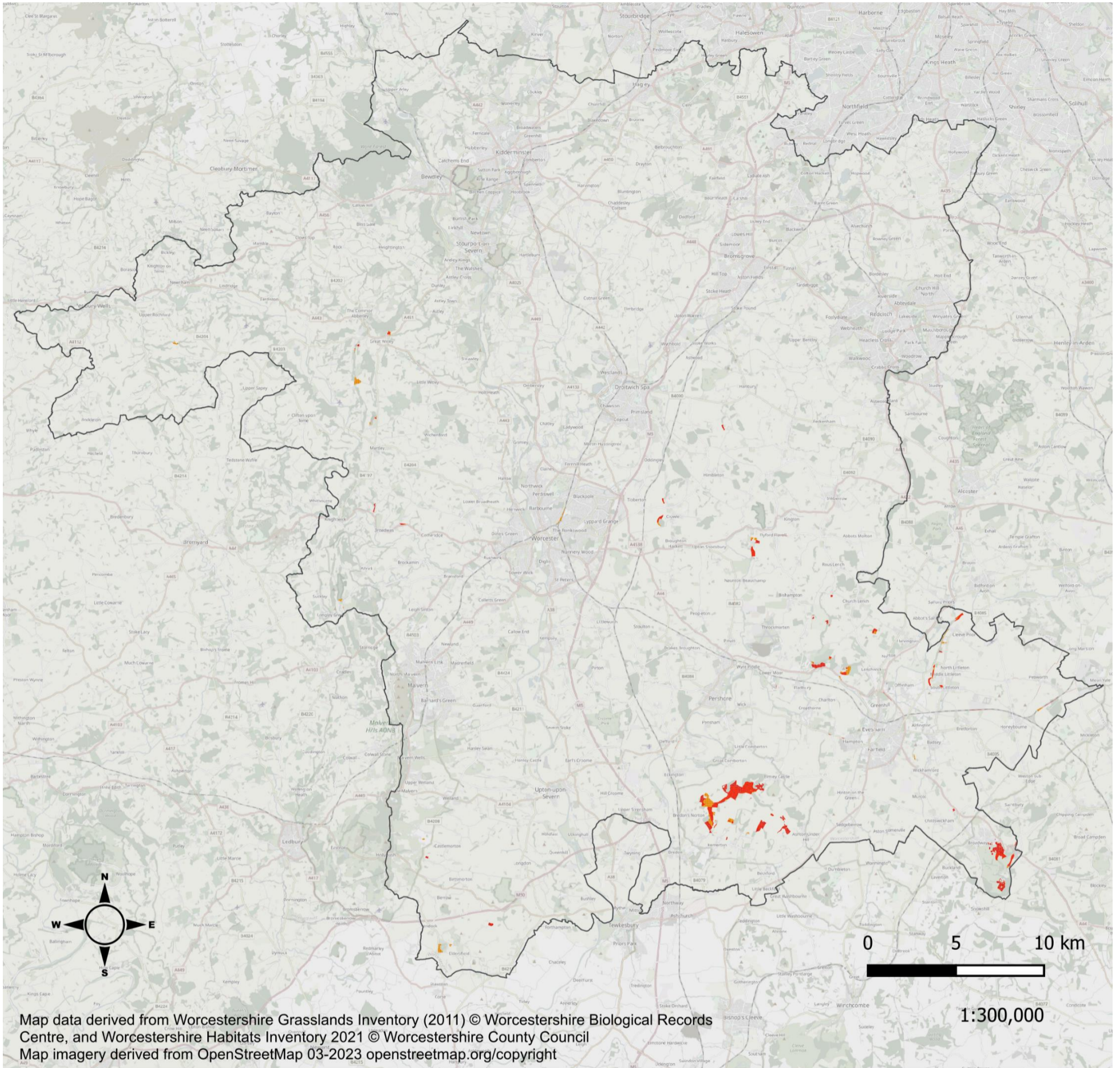
- | | |
|---|---|
| Worcestershire County Boundary | g3a - Lowland meadows |
| g - Grassland | g3a5 - Lowland hay meadows (<i>Alopecurus pratensis</i> - <i>Sanguisorba officinalis</i>) |
| g1 - Acid grassland | g3c - Other neutral grassland |
| g1a - Lowland dry acid grassland | g3c5 - Arrhenatherum neutral grassland |
| g1a6 - Other lowland dry acid grassland | g3c6 - Lolium-Cynosurus neutral grassland |
| g2 - Calcareous grassland | g3c7 - Deschampsia neutral grassland |
| g2a - Lowland calcareous grassland | g3c8 - Holcus-Juncus neutral grassland |
| g3 - Neutral grassland | |





8.8. Acid grassland recorded by the Worcestershire Grasslands Inventory & Worcestershire Habitats Inventory



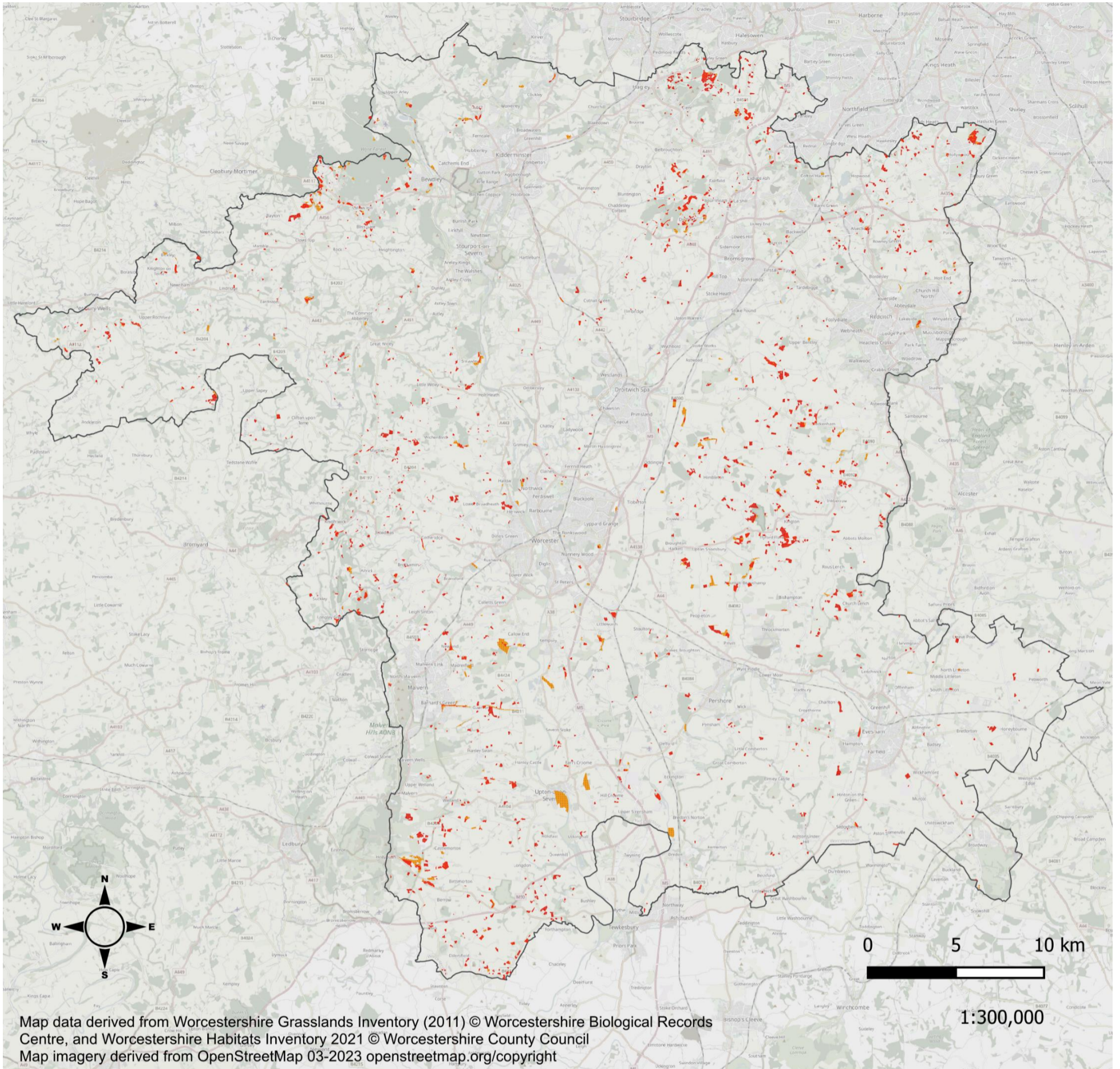
-  Worcestershire County Boundary
-  WHI2 (2021) Acid grassland
-  WGI (2011) Acid grassland
-  Difference in mapped area between WGI and WHI2





8.9. Calcareous grassland recorded by the Worcestershire Grasslands Inventory & Worcestershire Habitats Inventory



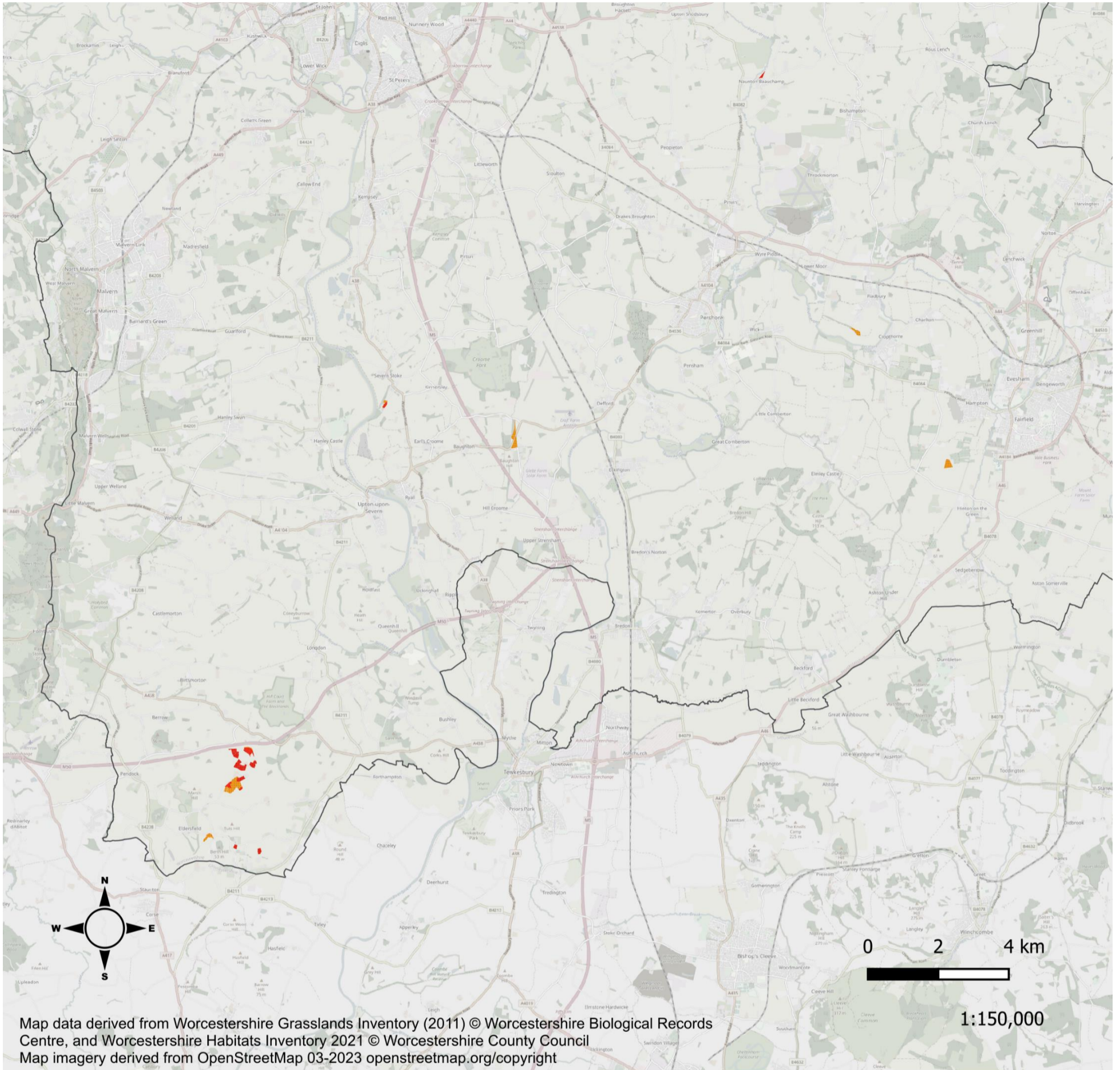
-  Worcestershire County Boundary
-  WGI Calcareous grassland
-  WHI2 Calcareous grassland
-  Difference in mapped area between WGI and WHI2





8.10. Lowland meadows (g3a) recorded by the Worcestershire Grasslands Inventory & Worcestershire Habitats Inventory



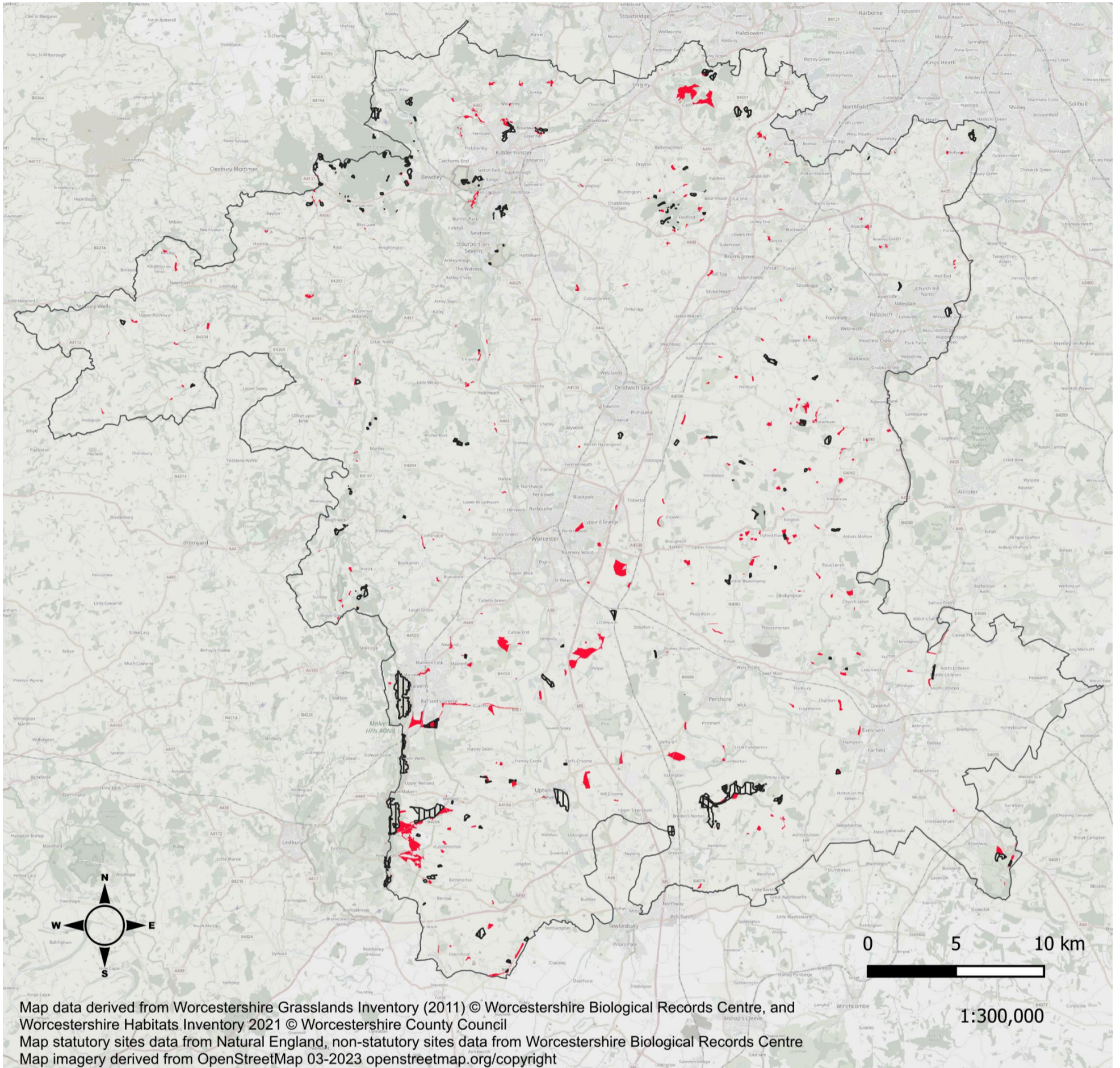
-  Worcestershire County Boundary
-  Difference in mapped area between WGI and WHI2
-  WGI (2011) Lowland meadow g3a
-  WHI2 (2021) Lowland meadow g3a

8.11. Lowland floodplain meadows (g3a5) recorded by the Worcestershire Grasslands Inventory & Worcestershire Habitats Inventory







-  Worcestershire County Boundary
-  Difference in mapped area between WGI and WHI2
-  WGI (2011) Lowland floodplain meadow g3a5
-  WHI2 (2021) Lowland floodplain meadow g3a5

8.12. Protection of semi-natural grassland within Worcestershire



Key

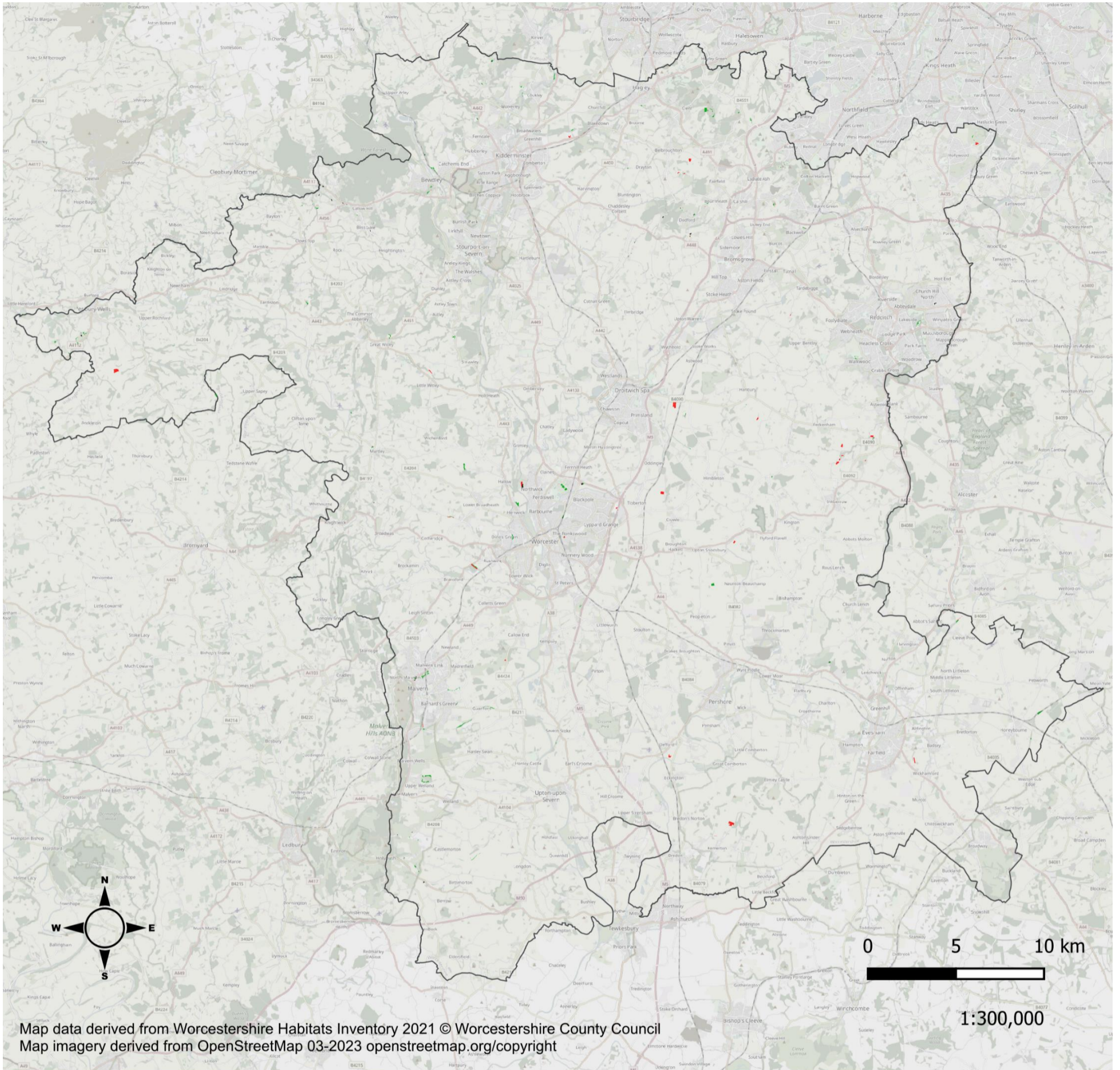
-  Semi-natural grassland occurring within a National Nature Reserve (NNR)
-  Semi-natural grassland occurring within a Site of Special Scientific Interest (SSSI)
-  Semi-natural grassland occurring within a Local Wildlife Site (LWS)
-  Worcestershire County Boundary

8.13.Semi-natural grassland recorded as destroyed by Worcestershire Grasslands Inventory



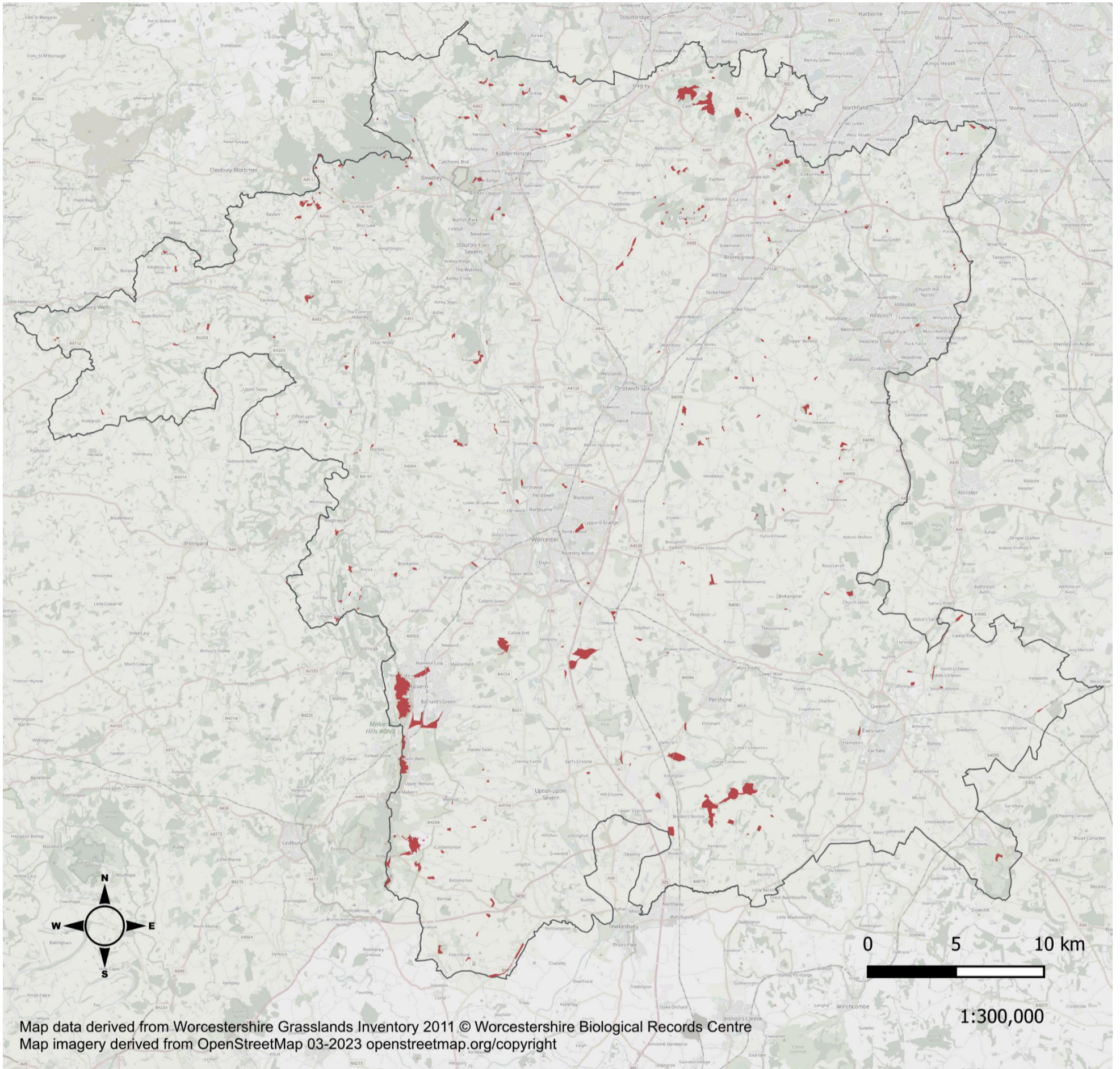
Semi-natural grasslands destroyed pre-2011
 Worcestershire County Boundary

8.14. Semi-natural grassland recorded as lost to woodland, agriculture and development by Worcestershire Habitats Inventory since 2011



- Worcestershire County Boundary
- WHI2 (2021) Agriculture habitat class intersecting WGI (2011) record of surviving semi-natural grassland
- WHI2 (2021) Urban habitat class intersecting WGI (2011) record of surviving semi-natural grassland
- WHI2 (2021) Woodland habitat class intersecting WGI (2011) record of surviving semi-natural grassland

8.15.Semi-natural grassland recorded as damaged by Worcestershire Grasslands Inventory



- Worcestershire County Boundary
- Semi-natural grasslands recorded as damaged by WGI (2011)

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