Nature Peak District

State of Nature in the Peak District

What we know about the key habitats and species of the Peak District

Penny Anderson 2016
On behalf of the Local Nature Partnership

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1.1 The background

The wildlife of the Peak District: the plants and animals and the habitats they live in, are special and diverse. They include many rare and threatened species and habitats, the character of which reflect our unique geographical position at the crossroads between upland and lowland, north and south or east and west.

The wildlife, along with our geological inheritance, provides the fabric for the nationally important landscape that **IS** the Peak District, encapsulated in the National Park status: the core of our Local Nature Partnership[1] area. They are fundamental to all the other features of the area on which our local economy and welfare depend.


Upper Derwent Valley from Bleaklow © Penny Anderson

Nature enriches and inspires the lives of the millions of people who live in and visit the Peak District, whether it is the evocative cry of the curlew, the mass of flowers in the dales or the pink of heather in full bloom on the moors. For many, the Peak District is the ideal place to escape, relax and feel close to nature.

It is important to think of the habitats and species not just in nature conservation terms but also in their role of providing other environmental benefits to people – the so-called ecosystem services. These come in various and sometimes possibly unexpected forms. They affect us all – a sustainably managed and restored landscape with more woodland cover, no heavy grazing, and restored blanket bogs leads to better flood control in the lower areas downstream; the same healthy landscape with pollutant control also contributes to better water quality in our catchments and therefore at the water treatment works. Trees and shrubs trap air pollutants and contribute to improved air quality; the habitats and topography as a whole are the main features contributing to the quality of the landscape and they support our cultural heritage. The habitats and their plants and animals are, in turn, a product of our land use history – the centuries of cultural use for past communities have moulded their character and provide important links with our history and sense of place.

There is increasing value being recognised in the benefits that being out in the natural environment, or even just being able to gaze upon it, can have to human health and wellbeing. Healthy habitats and species populations underpin these services; they indicate when we're getting things right and also where we could be doing more.

The wildlife of the Peak District is also part of the Natural Capital of the region. This is not the same as ecosystem services, but represents the elements of nature that produce value directly or indirectly to people. This might include the forest stock, minerals, fish or energy resources. Our Natural Capital underpins all other types of capital and is the foundation on which our economy, society and prosperity are built[2]. The key elements of our Natural Capital are:

- Minerals
- Subsoils including buried archaeology
- Land, including its topography
- Fresh water – in terms of rivers, water quality, flooding, ponds, reservoirs and mill ponds
- Ecological communities encompassing all the different habitats
- Species – of all kinds in small or large populations
- Atmosphere – reflecting air quality
- Soils – in terms of value for farming or other activities.

In addition to the direct economic and health benefits that a healthy and sustainably managed environment brings, the high quality environment of the Peak District also plays a significant role in the regional economy by attracting businesses and the workforce on which they depend to the area, including the surrounding towns and cities. The importance of this is reflected, for example, in the "Outdoor City" branding of Sheffield.

[1] Nature Peak District is our Local Nature Partnership (LNP)
[2] Natural Capital Initiative 2015

Habitats and species, the soils they sit on/in, the streams that feed from the catchments, and the landform they occupy all play central roles in our Natural Capital. The health of our habitats and species is critically important in supporting both these Natural Capital resources and ecosystem services. This is particularly important in the face of climate change in order to assist species moving to keep within their favourable climate envelope. In addition, it is also especially pertinent in the context of a National Park.

One of the two primary purposes of the National Park is to

'conserve and enhance the natural beauty, wildlife and cultural heritage'.

However, the National Parks were not given powers to achieve this fully and the decline in some habitats and species has been as severe as in many other parts of the country. The consequences for the whole country are reflected in the National Biodiversity 2020 Strategy with its mission to

'halt overall biodiversity loss, support healthy well-functioning ecosystems and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people'.

Nature Peak District's ambition is for

'*a thriving and inspiring landscape richer in bio- and geo-diversity, where a valued natural and cultural environment, central to decision making, is managed for wildlife, promotes healthier lives and benefits the local economy.'*

This ambition embraces the principles set out in the Lawton report[3]: '*Making Space for Nature'* to restore nature conservation value across the country, which are summarised as

'bigger, better, more and joined up'.

This translates into **bigger** areas of habitats to reduce pressure on small areas and to enable some movement with climate change; **better** quality habitats to support more species in viable populations; **more** habitats, particularly priority ones to counterbalance the significant habitat loss that has occurred; **joining** smaller habitats up to provide bigger, more viable areas of habitats and corridors for movement and sustainable populations. These are translated into landscape scale strategies for nature conservation. In turn, such an enhanced biodiversity would support ecosystem services and Natural Capital and therefore underpin the local economy and wellbeing of the local and visiting human population.

Nature Peak District's ambition fits well with the value of the natural world as a central part of Natural Capital and its importance in providing ecosystem services, thus giving emphasis to the importance of the natural environment for associated economic, social and cultural values.


Upper Dove Valley © Penny Anderson

[3] Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J. & Wynne, G.R. *Making Space for Nature: a review of England's wildlife sites and ecological network.* 2010

1.2 The need for a State of Nature Report in the Peak District

The national State of Nature Report[4] (a collaborative report by 25 UK conservation and research organisations produced in 2013) revealed that of the species for which there was sufficient data (3,148), 60% have declined over the last 50 years, and 31% have declined strongly. These totals only represent a small proportion of all species in the country (some 5%) as there are inadequate or no data for the rest. The most affected species are those with specialist rather than general habitat needs and habitat destruction or degradation is blamed for most losses. Climate change is having effects at the same time, adding to the pressure on species.

The Peak District is not immune to these same losses and Nature Peak District LNP is keen to explore the extent to which the findings in the national State of Nature report apply to our area. This report fills that gap.


Monks Dale © Penny Anderson

It follows that, to promote a healthy natural environment, Nature Peak District has a major role in shaping and facilitating the Biodiversity Strategy in the Peak District. In order to be most effective, however, we must take a strategic view and understand the state of nature in the Peak District and the activities that affect species and habitats, both positively and negatively, so that we can identify the future priorities for achieving the Biodiversity Action Plan (BAP), LNP and wider National Park aims.

1.3 Data used

The aim has been to source as much data as possible on how much of different habitats and species are present, but also to detect trends over time where possible so that we are better informed about losses and gains. Such data has not been easy to obtain and tends to be dispersed in a number of locations needing collating to represent our area, which covers parts of several counties.

Various reports have been used and are referenced for many of the habitats and species, but additional information has been gleaned from the Peak District BAP progress reports (annually at first, 2008/9 and 2011-13) and the Peak District BAP pages on the internet. These are not specifically referenced. Some consultees have added further examples.

Trends or signs of change have been derived from a number of sources, some as proxy data, others indicative but not covering the whole area. The main sources are:

- Various habitat- or species-based surveys and reports, including recent books on the birds of different counties;
- National Character Area reports;
- Analysis of GIS data held by the National Park Authority and others; and
- Agri-environment data accessed from Natural England on a park-wide basis.

Unless otherwise stated, data figures have been derived from the BAP GIS database held by the Peak District National Park Authority (NPA). Additional information has been acquired from Natural England's National Character Area (NCA) profiles and the Forestry Commission. The data presented from these sources are not complete or definitive, but provide the best available information at the time of preparation of this report.

[4] RSPB and 25 other UK Conservation and Research Organisations, 2013 State of Nature

1.4 The knowledge gaps

The search for relevant information has revealed that there is limited up-to-date information on the extent of some habitats, their quality and trends of loss or gain across the whole LNP area in recent years. The BAP reporting system has provided some functionality for this in the past, but in many instances there is no updated information available and habitats that are not of sufficiently high quality to be accepted as BAP habitats are generally not included. A large amount of data has been collected over the years through various partnership projects and from individuals with a passion for a particular species. Not all these data are available on a computerised mapping system (GIS), nor has it all been systematically recorded, making it difficult to include and identify trends.

Despite these difficulties, this report sets out our best estimate of the State of Nature in the Peak District. Care must be taken in interpreting the data provided as it has not in general been produced for this purpose. The report identifies the information gaps that need filling as part of the next steps.

1.5 Background to nature in the Peak District

Like the National Park, the LNP area is complex – it spans four geographical regions, lies within six different counties and incorporates three distinctive National Character Areas (NCAs) as well as the National Park boundary. Figure 1 shows the three main NCAs within the LNP boundary: Dark Peak (NCA 51), White Peak (NCA 52) and South West Peak (NCA 53). The darker shades show the small areas from other NCAs that are incorporated into the whole LNP area to include the National Park boundary and the important area around Glossop.

The Dark Peak NCA is 86,604ha, plus outlying areas from NCA 54 Manchester Pennine Fringe (1,955ha), NCA 36 Southern Pennines (12ha), NCA 50 Derbyshire Peak Fringe (724ha), and NCA 37 Yorkshire Southern Pennine Fringe (385ha). For the purposes of this report all these areas are considered together and referred to as 'Dark Peak'.

Similarly, the White Peak NCA is 52,860ha, plus the outlying area around Fenny Bentley from NCA 68 Needwood and South Derbyshire Claylands (578ha). For the purposes of this report again all these areas together are considered and referred to as 'White Peak'.

The South West Peak boundary is unchanged from the original NCA boundary. The whole LNP area is referred to as the 'Peak District' throughout this report.

Table 1 The areas of the different zones that form the LNP

ZONE	AREA (ha)	% of LNP AREA
LNP area ('Peak District')	185,686	
National Park	143,700	77.4
Dark Peak	89,680	48.3
White Peak	53,438	28.8
South West Peak	42,568	22.9

Key to Figure 1

South West Peak NCA

Dark Peak NCA

Dark Peak outlying areas

White Peak NCA

White Peak outlying area

Nature Peak District LNP boundary/ 'Peak District'

Peak District National Park boundary

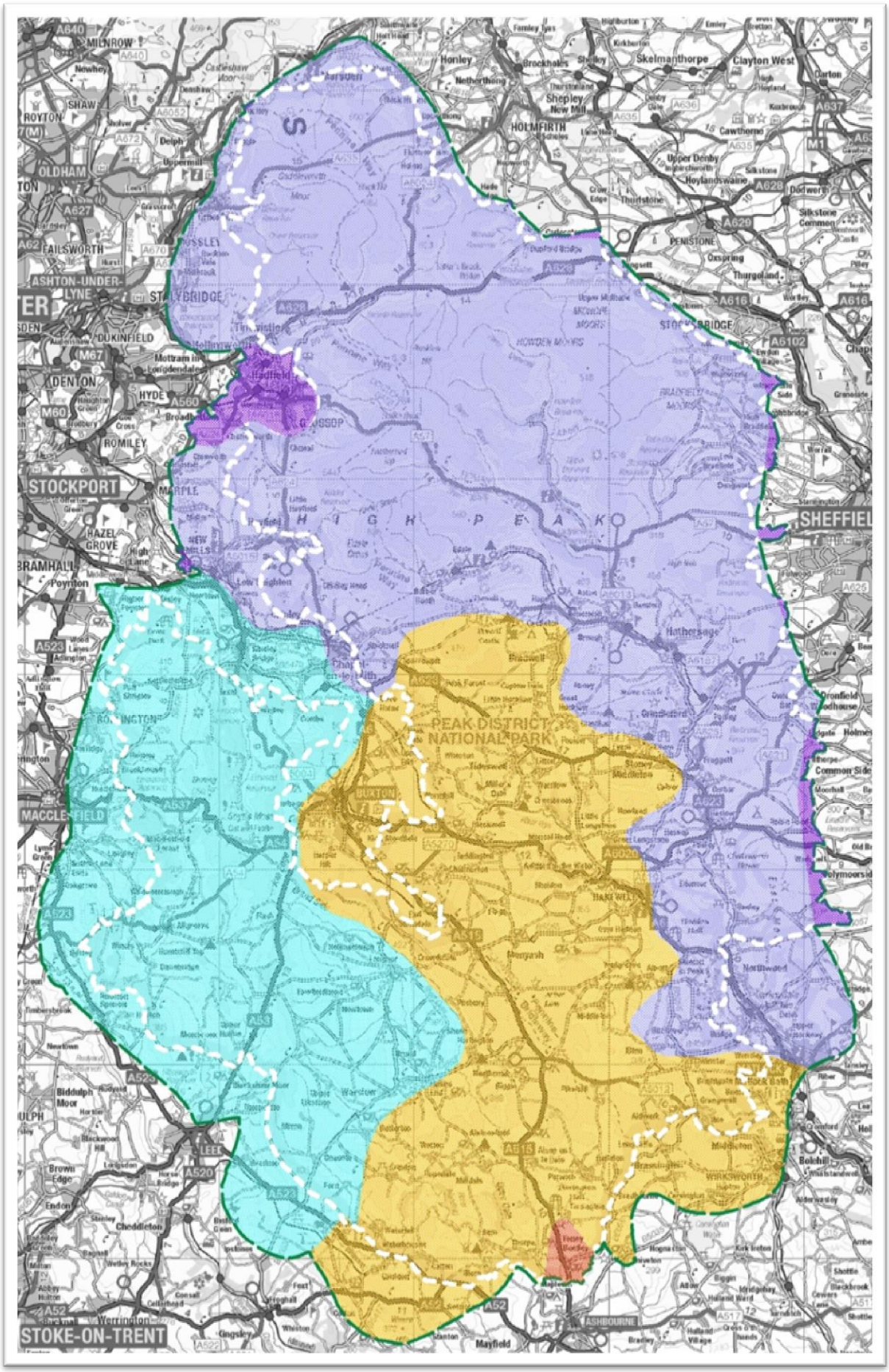


Figure 1 The Nature Peak District area - Dark Peak, White Peak and South West Peak National Character Areas

The value of the special habitats in the Peak District is recognised nationally and internationally[5] by a range of designations as shown on Figures 3-5. The BAP area contains, wholly or partly:

- *1* Special Protection Area (SPA); South Pennine Moors (Phase 1 and 2) which covers much of the Dark Peak Moors (and others to the north), the Leek Moors and those east of and north of Matlock
- *3* National Nature Reserves (NNR); Dovedale, Derbyshire Dales and Kinder Scout
- *4* Special Areas of Conservation (SAC); Bees nest & Green Clay Pits, Gang Mine, Peak District Dales, South Pennine Moors (which includes parts of the Leek Moors and Eastern Moors SSSIs)
- *85* Sites of Special Scientific Interest (SSSI) (of which 29 are Earth Heritage sites)

Table 2 Area of protected habitats within the NCAs of the Peak District in hectares (and % of land in the NCA covered by the designation)

DESIGNATION	PEAK DISTRICT	DARK PEAK	WHITE PEAK	SOUTH WEST PEAK
SPA	45,255 (26%)	39,970 (48%)	8 (<1%)	5277 (12%)
SAC	46,376 (25%)	39,600 (44%)	2339 (4%)	4437 (10%)
NNR	1919 (1%)	853 (1%)	1066 (2%)	0
SSSI*	48,939 (26%)	40,360 (45%)	3086 (6%)	5493 (13%)
Total designated area	49,280 (27%)	40,400 (45%)	3374 (6%)	5506 (13%)

* Not including Earth Heritage units. Note that SPAs and SACs are all SSSIs as well. Most of each NNR is also an SSSI.

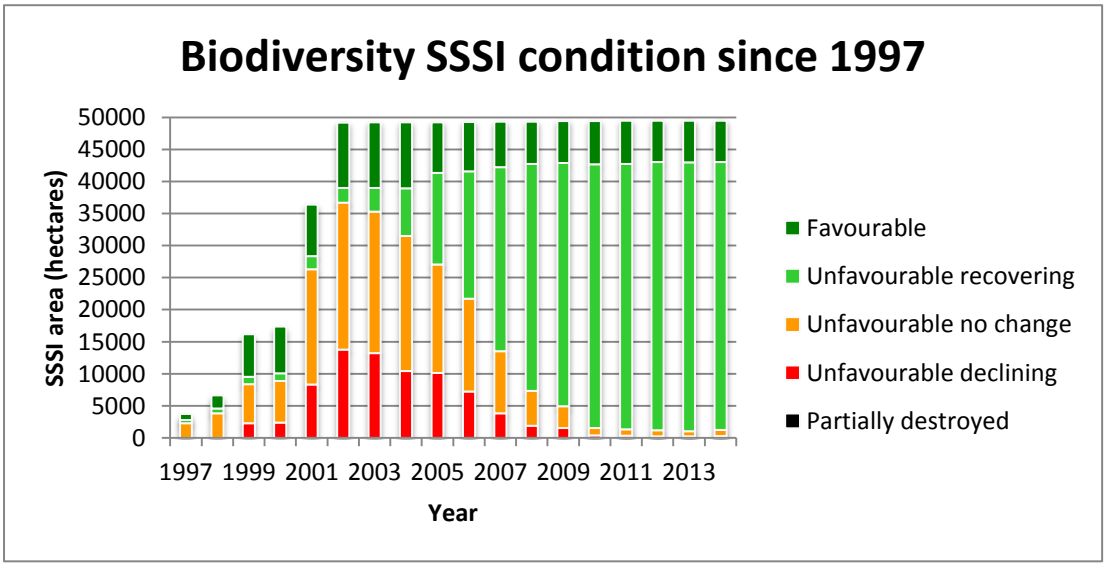


Figure 2 Biodiversity SSSI condition since 1997

Since 2010, over 95% of SSSI units have been in Favourable or Unfavourable Recovering condition[6], with the current figure at 97%, reflecting the considerable effort that has been made in working with land managers to introduce or expand sustainable habitat management and restoration, since 2002 in particular. This collectively has positioned habitats and species on the road to recovery, even if full recovery is still a long way off within some parts of these nationally important sites.

As well as these sites, there are other Local Wildlife Sites, recognised by nature conservation Non-Government Organisations, with protection incorporated into local plans. These second tier sites add to the overall wildlife value of the area. There are the following sites in each NCA:

- Dark Peak: *106* sites covering 7,857ha
- White Peak: *138* sites covering 1,100ha
- South West Peak: *137* sites covering 3,715ha.

[5] Even if with leaving the European Union designations of international importance no longer apply, the relative importance of species and habitats at this level would will still remain

[6] The condition of sites is assessed using standardised sets of criteria for each habitat or species feature of interest

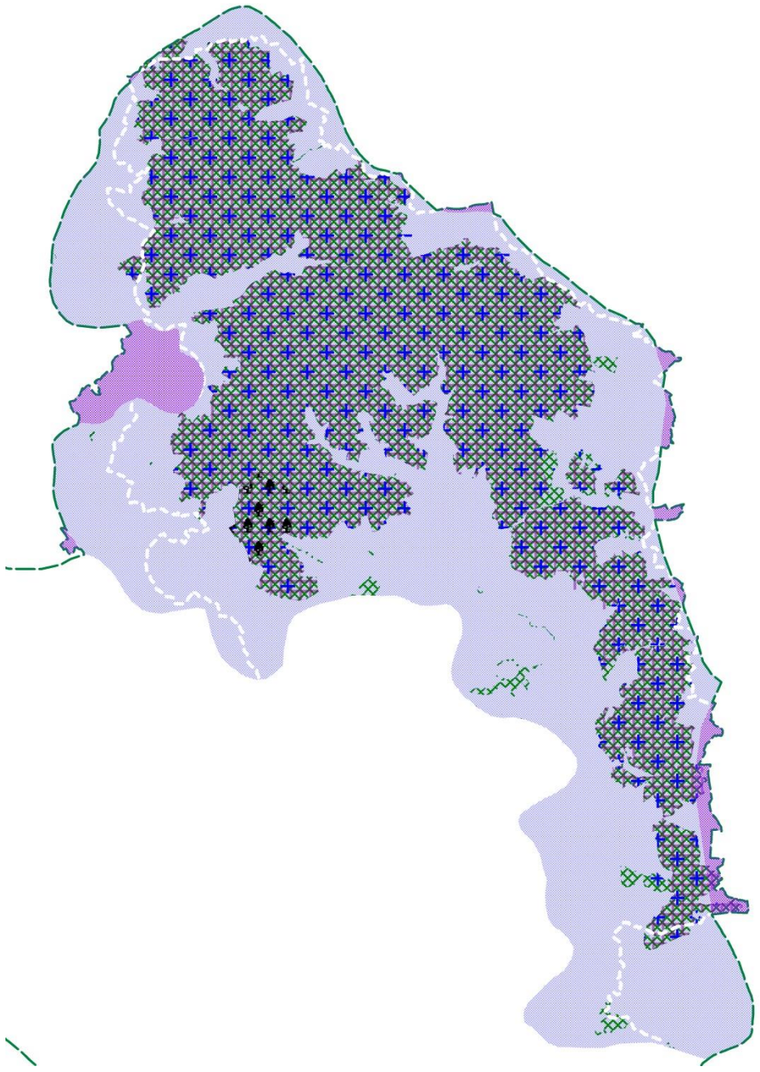


Figure 3 Designated sites in the Dark Peak

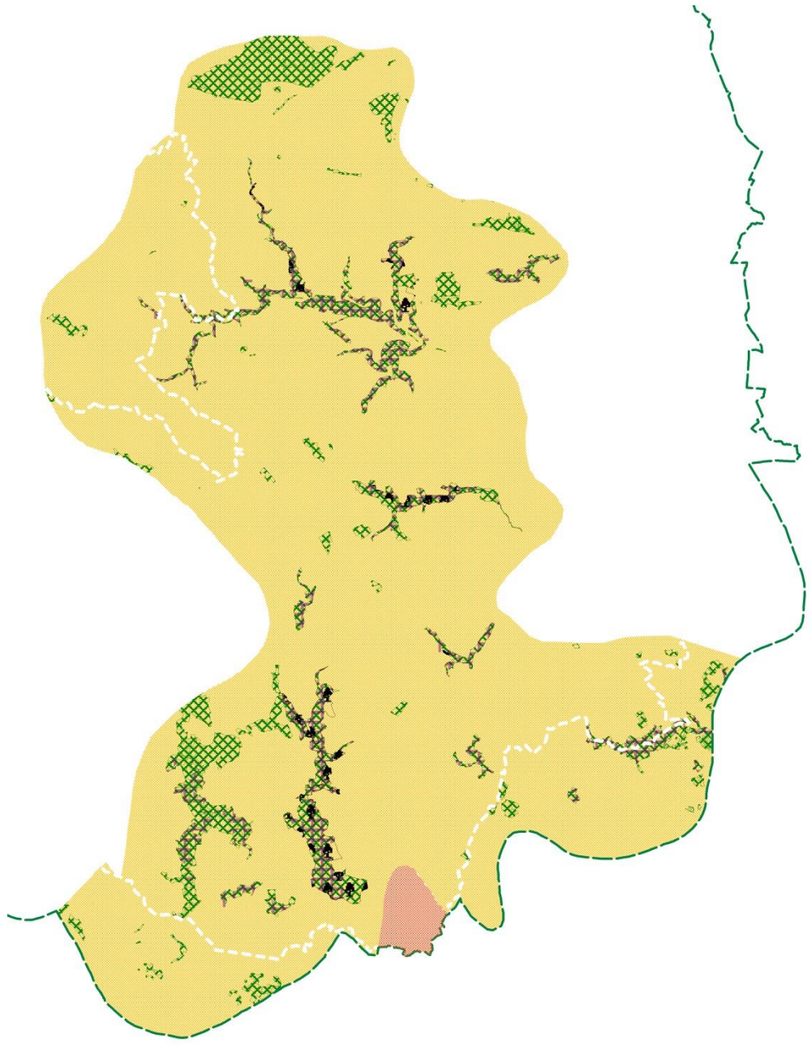


Figure 4 Designated sites in the White Peak

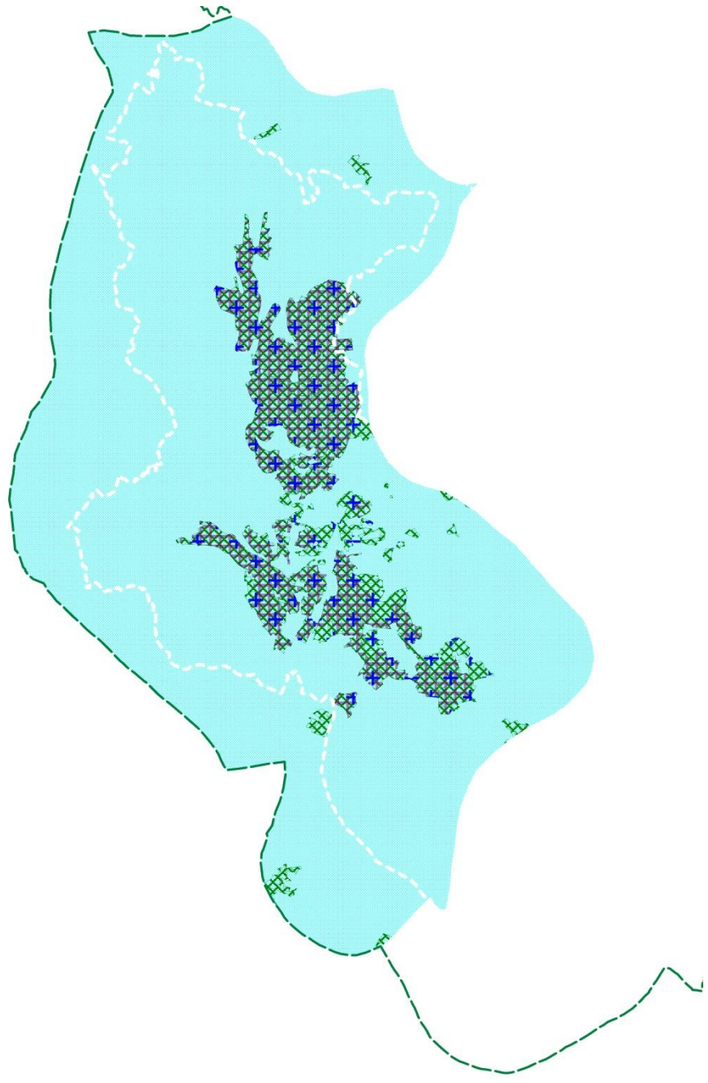


Figure 5 Designated sites in the South West Peak

Special Protection Area

Site of Special Scientific Interest

Special Area of Conservation

National Nature Reserve

Peak District National Park boundary

Nature Peak District LNP boundary (‘Peak District’)

1.6 Habitats in the Peak District

The special qualities of the habitats found in the Peak District lie in their diversity, which is underpinned by the geology, soils and hydrology. The wide open windswept peatland clothing the hill tops in the Dark Peak and South West Peak is the domain of cottongrass and the mountain hare (Dark Peak only), with the haunting calls of golden plover in summer. These and the drier heather moorlands, which support red grouse, skylark and meadow pipit and their predators, including merlin, are the most widespread of our habitats. More limited are flower-rich hay meadows and other grasslands, woodlands and wetlands.

Drystone walls define the fields rather than hedges in most of our area but there are many small patches of scrub (gorse or hawthorn for example) and individual trees woven into the landscape. Streams and rivers feature in most of the valleys, fewer in the White Peak where dry dales are frequent, and one of the Peak District specialities, dew ponds, are an important cultural and habitat feature. Lakes and other ponds are few but reservoirs fringe many of the upland areas, providing drinking water for adjacent populations, and many millponds and leats are associated with former mills and are of historic importance.

The amount of high value habitat within the Dark Peak is striking and covers much of the blanket bog and heathland habitat within this area (Figure 3). The South West Peak moorland is similarly protected (Figure 5), alongside unimproved and semi-improved grassland specifically designated for breeding birds, particularly waders. The area of protected habitat is much more limited in the White Peak (Figure 4), and is largely focussed on the limestone dales where most of the limestone grassland and ash woodland occur. Habitat patches in the White Peak tend to be smaller and more isolated than in the other character areas.

Habitats of importance in the different landscape character areas are:

- Dark Peak; blanket bog, heather moorland, flushes and springs, upland oak woodland, streams and rivers, reservoirs and lakes, waxcap grasslands, which mostly lie within the 40,400ha of protected land;
- White Peak; limestone grassland, ash woodland, ponds and streams, limestone heath, lead rakes, many of which lie within the 3,374ha of protected land; and
- South West Peak; blanket bog, heather moorland, flushes and springs, upland oak woodland, streams, again mostly supported within the 5,506ha of protected land.

Figure 6 clearly shows the very extensive, integral nature of the habitats within the Dark Peak (the purples and pinks in particular) and to a lesser extent in the South West Peak. Habitats of quality are much more restricted in the rest of the area with less connectivity and linkages. Some are also very small.

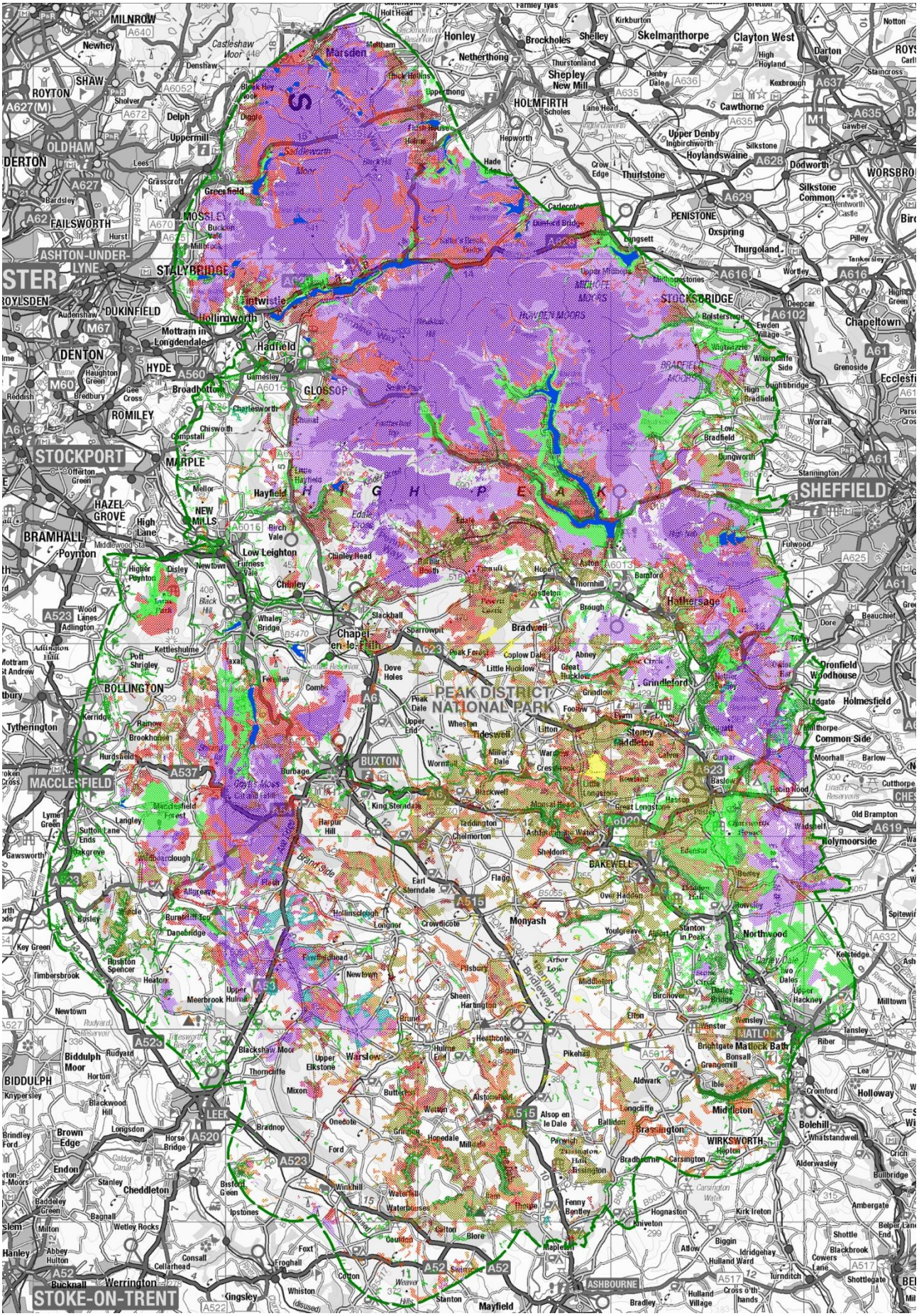
The corollary of these figures in the White Peak, and to a lesser extent in the South West Peak, is the greater dearth of habitats and therefore of the species they support in the rest of the area, replaced largely by more intensively managed and agriculturally improved farmland. The figures may be higher than shown since some of the wildlife sites lie outside the protected areas and there are additional habitats not identified as part of any conservation strategy. Some of the remaining hectarage also consists of the built environment which will be less in the Dark Peak than the other NCAs.

1.7 Outline of the report

The following sections focus in turn on each of the main habitat types and the key species they support, with a separate section for selected other species groups that occupy more than one habitat type and information on populations can be used where this is available.

Although each main habitat type is described separately, it is vital to bear in mind that for many species it is the interrelationship of the habitats spatially, the ability to move from one to another, their need for different habitats in different seasons, and the interdependency of the habitats that is important. Landscapes with the appropriate range of interconnected and interdependent habitats are essential for healthy wildlife.

Figure 6 All habitats* in the Peak District



*Moorland habitats in purples, Grassland habitats in reds/oranges, Woodland habitats in green, Water habitats in blue

2 Moorlands

2.1 Key points

- Most of the blanket bog and dwarf shrub heath lie in the Dark Peak, the remaining is in the South West Peak
- The majority of the blanket bogs and dwarf shrub heath are of high value
- They support internationally important populations of breeding birds
- The moorlands, in particular the blanket peat, have had a long history of being in poor condition, a product of air pollution and wildfires especially, as well as intensively managed burning of deep peat vegetation and (mostly historical) overgrazing
- Extensive erosion of peat and mineral ground has resulted from these pressures, particularly from the drying of peat and wildfires
- Since the 1980s, significant resources have been applied to restore vegetation, rewet drying peatland, reduce grazing and improve the functionality of the moorland habitats, with a wide range of partners involved
- It will take time for the moorland habitats, especially the peatland, to become fully functional again, but there are many ongoing projects with this objective
- Notwithstanding this enormous effort, there are still some issues that need resolution, including managed burning on blanket peat and inappropriate moorland tracks

Moorland is an all-embracing term covering a wide range of habitats that reflect the character of the soils and hydrology, as well as the long term management to which they have been subjected. Moorlands are largely unenclosed (except on a large scale) and encompass:

- peat-based blanket bogs over the higher plateau as well as small valley or basin bogs
- dry dwarf shrub heath mostly characterised by abundant heather on peaty or mineral soils or acid grassland mixed with bilberry on some of the steepest slopes
- wet heath – where cross-leaved heath and bog mosses (*Sphagnum*) are more abundant on shallow peaty soils
- acid grassland that fringes these habitats, often on steep slopes and composed mostly of mat grass on drier soils (covered in Section 4) and purple moor-grass on wetter soils
- small flushes and oozes, springs and streams and other wet areas
- rock screes and outcrops
- bracken.

2.2 Nature and value

Blanket bog and dwarf shrub heath are UK priority habitats (as defined by the National BAP). When active, blanket bog is also an EC Priority habitat – these are bogs that support normally peat-forming vegetation and are actively accumulating peat as plants decay in a waterlogged environment. The other moorland habitats, especially the springs and flushes, form part of the mosaic in the upland environment and add significantly to the plant diversity, all of which in turn supports a range of typical animals.

Table 3 Blanket bog and upland heath in designated habitats in the Peak District

DESIGNATION	PEAK DISTRICT	DARK PEAK	WHITE PEAK	SOUTH WEST PEAK
Blanket bog	25,059 ha	22,784 ha	0	2,275 ha
Upland heath	11,350 ha	10,822 ha	0^	528 ha
Total designated area*	51,344 ha	40,674 ha	5128 ha	5542 ha
% of designated area*	71	83	0	51

* Not including Earth Heritage units
^ dwarf shrub heath on limestone is covered in a separate section below

The extensive area of SSSI covering a very significant part of the blanket bog and dwarf shrub heath reflects the importance of the uplands for nature conservation. They are also part of a much larger South Pennine SPA and SAC. The SPA moorlands are internationally important for their populations of breeding golden plover, dunlin, snipe (South West Peak), merlin, peregrine falcon and short-eared owl.

The species listed in the citation for the Dark Peak SSSI also include meadow pipit, grouse, curlew, twite (regarded potentially as of international importance as the most southern population in Britain at the time of the citation), ring ouzel, wheatear and whinchat. Dipper, grey wagtail and common sandpiper are highlighted as riverside birds, and tree pipit, redstart, green woodpecker, wood warbler and pied flycatcher are listed as characteristic of the woodlands incorporated within the Dark Peak SSSI. The whole breeding assemblage is also of high importance.

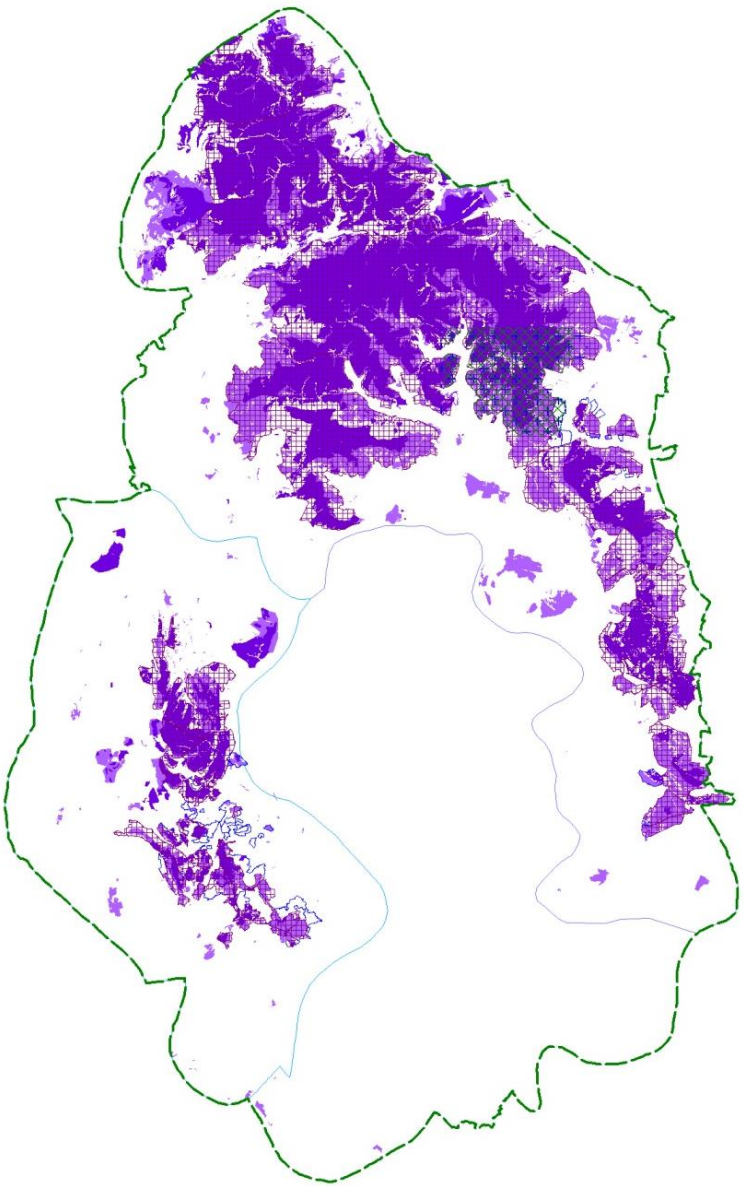


Figure 7 Blanket bog (dark purple) and Upland heath (pale purple) protected by designations (hatched, see key for figures 3-5)

Species of invertebrates of importance within the Dark Peak SSSI are listed in the citation; beetles (of which seven nationally scarce species and several red data book species have been recorded), hoverflies, several moth species and the golden-ringed dragonfly with its only Peak District breeding site within the SSSI.


Mountain hare Paul Hobson ©

Mountain hares are a charismatic species of the heaths and bogs of the Dark Peak and occur nowhere else in England, having been introduced here in the late 1800s. They are a 'species of community interest' in Annex V of the EC Habitats Directive and are a priority species in the UK Biodiversity Action Plan. Their numbers appear to be fairly stable, although populations are affected by severe winter conditions[7].


Adder Penny Anderson ©

The main population of adders occurs on the Eastern Moors, although why they should be so restricted is not clear. Common lizards are also widespread, although at a low density, across many moorland areas.

Geological and geomorphological features are an inherent part of the value of the moorlands in both the Dark Peak and South West Peak, particularly well represented in the Alport Castles land slip, the Alport Valley river landform, the capture of streams by some of the Upper Derwent on Bleaklow, classic erosion features in peat streams on Featherbed Moss, rock outcrops showing important geological sequences in Blackden Clough, as well as several rock sections and landslips in the South West Peak including the vertical open fissure that is Lud's Church.

The national extent of blanket peat soil (>0.5 metres deep) in England is estimated at 215,000ha, which means over 12% of the national resource is found within the Peak District. This demonstrates the high value and importance of our region.

Recent appreciation of the additional values that habitats provide for people (the ecosystem services) has emphasised the importance of peat as a store of carbon. Active peat will also be sequestrating new carbon, so healthy blanket bog is an essential part of climate change debates. However, peat in the Peak District is no longer accumulating as it should and research suggests that the region's peatlands have become a source not sink of carbon, contributing significantly to climate change. When it is appreciated that more carbon is stored in peat in the UK than all the forests of Britain and France together[8], this loss of stored carbon is put into perspective. It has been calculated that if all the Peak District bogs were in prime condition, they could fix around 35 tonnes of carbon/ km^2/ year on average, instead of losing 7+ tonnes carbon/ km^2/ year.

Other important ecosystem services the moorlands provide are drinking water, flood alleviation, agricultural products and game as well as landscapes and perceived 'wildness' that is immensely important to visitors as an amenity and for health and wellbeing values. However, the importance of these services is tempered by the condition of the uplands, with rapid runoff resulting from the heavily gullied blanket bogs contributing to downstream flooding and high colour levels from dissolved organic carbon in the water supplies off peaty habitats, which are expensive and environmentally damaging to treat.

[7] Mallon, D., Alston, D. and Whiteley, D. 2012. *The Mammals of Derbyshire*. Derbyshire Mammal Group and Sorby Natural History Society

[8] Moors for the Future. 2007. *Peak District Moorland Carbon Flux*. Research Note No 12

2.3 Moorland habitats

2.3.1 Blanket bog

The blanket bog and associated peatlands, which are more widespread than any other habitat in the moorlands, are the most important not only as a habitat but also as a store of carbon. They occur on peat generally more than 0.5 metres deep (and sometimes up to 5 metres) which tends to accumulate on gentle slopes and hollows or blanketing flat-topped plateaux. The South Pennine blanket bog is renowned for its dearth of species – a product of severe sulphur dioxide air pollution since the industrial revolution (now thankfully abated to insignificant levels), which saw the demise of bog mosses (*Sphagnum*) and many other species on a large scale. Wildfire, managed burning, high levels of grazing and trampling have all added to the damaging effects over the last couple of hundred years. The combination of these has changed the character of the blanket bog completely, resulting in large areas of drier moorland dominated by cottongrasses intermingled with only a few other species – mostly heather, bilberry and crowberry (the latter a hallmark of the Peak District), as well as less common species such as cloudberry, cranberry, bog asphodel and the very rare bog rosemary.


Cottongrass dominated blanket bog © Penny Anderson

These blanket bogs were described as "*extensive, dreary and monotonous*" in 1913[9], but are gradually accumulating more species again, especially of mosses, including *Sphagnum* bog mosses. The acidity of the peat and streams running off the moors had been reduced to well below pH3[10], but is now gradually recovering.

The combination of damaging factors, especially wildfires over the years, has resulted in blanket bog that is drier than it should be, with high intensity gullying and erosion in many areas. The scale of erosion in the Peak District and South Pennines has probably been higher than anywhere else in the country, with sediment accumulating in reservoirs and feeder channels, and dissolved organic carbon being washed out to form 'beer-colour' problems. These are expensive and environmentally damaging effects that the water companies have to accommodate.


Sphagnum

Drier bog encourages more heathland species to prosper, such as heather, and this has become dominant in some areas of deep peat, encouraged by repeated managed burning, an operation that increased in application with the first North Peak Environmentally Sensitive Area prescription in the 1980s. Heather is adapted to such burning and regrows more strongly, whilst the cottongrasses and *Sphagnum* (although there has been little of this until more recently in such places owing to air pollution) are reduced or disappear. Recent research suggests that such burning on deep peat continues to result in loss of carbon, dries out the peat and reduces its role as a growth medium as well. River water chemistry and aquatic invertebrate life are also compromised[11]. Burning that is too hot on such deep peat can result in small gullies that can enlarge subsequently with heavy rain and runoff.


Small gully in peat Penny Anderson ©

[9] Moss. 1913. Vegetation of the Peak District
[10] pH is a logarithmic scale, with 7 being neutral
[11] Brown, L.E., Holden, J. & Palmer, S.M. 2014. Effects of Moorland Burning on the Ecohydrology of River basins. Key findings from the EMBER project, University of Leeds

2.3.2 Dwarf shrub heathland

Dwarf shrub heathland tends to occur on shallower peats, peaty soils or mineral soils below the peat-clad plateaux. While heather is usually the dominant species, sometimes with variable quantities of wavy hair-grass, this is more a product of management by burning on rotation for grouse productivity than a natural phenomenon. The heather moors were described by Moss[9] in 1913 as co-dominated by heather and its close relative bell heather, but the latter is now restricted to less intensively managed areas (such as some roadside banks). Bilberry and its evergreen relative cowberry, along with crowberry, form mixtures with heather in the richer areas. On the deeper peat, cottongrasses and sometimes bog mosses are often mixed with the heather and are conspicuous for a few years after burning as the heather re-establishes its physical dominance.

Wet heath is distinguished usually by more cross-leaved heath being present, often with more abundant *Sphagnum* as well as other wet ground species such as the common cottongrass. Wet heath is not as extensive as dry heath in our area, but totals are not known. However, it tends to occur in small patches in suitable ground conditions throughout the moorlands.

Some dwarf shrub heath occupies deep peat, where this has dried out through gullying and erosion, and on the steeper slopes where less water is retained on the surface. Through inclusion in the managed burn cycles, these areas have often lost their tussocky cottongrasses and heather has become dominant at their expense. This represents a degraded habitat since the peat cannot be accumulating in such dry conditions, and heather dominates structurally at the expense of other species more typical of wetter conditions.

Grouse is the key bird species on the heather moorlands, for which the managed burning is carried out. Merlin numbers are of international importance on the heathlands and blanket bogs of the Peak District, their main prey being the abundant meadow pipit.

2.3.3 Flushes, springs and other wet patches

These significantly diversify the flora of the moorlands and often support a wide variety of plant species (depending on the acidity and mineral levels), some of which are rare in the area, such as the insectivorous round-leaved sundew, lesser skullcap and ivy-leaved bellflower (at the eastern edge of its national distribution here). The total cover of this habitat is given as 655ha, most likely to occupy valley sides in the Dark and South West Peaks. Each area tends to be very small, so there are many flushes contributing to this total. The nature of the flushes and springs are varied, representing quite different plant communities related to the mineral and hydrological character of each.

Snipe is a key species associated with the wet patches within the moorlands and amongst otherwise fairly improved but wet pasture, particularly in the South West Peak, where their numbers contribute to the international importance of the SPA in the area.

2.3.4 Purple moor-grass and rush pasture

Purple moor-grass occurs in two distinctive communities. The commoner one in our region is where it tends to invade dwarf shrub heath (usually wet heath) or blanket bog in the moorland, as a result of regular burning with or without heavy grazing on shallower flushed soils where water trickles under the main soil profile down slopes. This is a deciduous grass that can form substantial tussocks which dominate over large areas in the right conditions. Where water is more stagnant, the tussocks are smaller and less prominent. The extent of areas dominated by this grass is not as great as further north in the South and West Pennines.

The second community is much more restricted in our area, where rush pastures support purple moor-grass along with sedges and a richer range of broad-leaved plants. These occur more often in the South West Peak than elsewhere. The total cover of purple moor-grass communities is 5,610ha, with more than half in the Dark Peak and most of the rest in the South West Peak.

Cattle readily take new growth and can keep purple moor-grass in check, but the reduction of cattle in the moorland environment and increase in sheep has contributed to its increased dominance, as sheep prefer other finer grasses and do not graze it significantly.

Short-eared owls are key predators on the purple moor-grass grasslands where field voles provide their main food. Many of these grasslands are integral parts of the wider moorland environment and have been included in the Dark Peak and South West Peak SSSIs and European protected sites, recognised for their internationally important bird populations.

2.3.5 Bracken

Bracken is typical of the valleys and cloughs, generally on dry, steep slopes. Where tall and dense, there is little plant cover beneath it, but where shoots are thinner and light can penetrate the ground beneath, acid grassland (usually common bent and wavy hair-grass) with a few broad-leaved plants such as sheep's sorrel and bilberry may be present. The seasonal changes in bracken colour give contrast and diversity to the visual landscape.

Bracken is a major part of the moorland environment, although there seems to be no information on its true extent in any part of the Peak District. The total given has been extrapolated from a sample survey interpreting 2005 aerial photograph cover. It is also estimated that bracken in the sample of the Dark Peak has expanded by some 1% per year since the 1960s. Expansion seems to have been more at higher altitudes than in the past and on north- and east-facing slopes where it had previously been more characteristic of south-facing slopes. Such expansion could relate to climate warming, particularly to a reduction in frost days in winter and a warming of winter minimum temperatures[12].

Many bracken patches occur in unenclosed acid grassland and this mosaic is an important habitat for twite, one of our rarest and declining breeding bird species. Whinchat frequent bracken patches too as the plant provides height to the vegetation to act as perches and cover. Ring ouzel may nest within them as well.

The origin of bracken patches is not clear – some may have been the understory under former woodland (bracken is a regular component in many upland woodlands); its spread is also believed to have been derived from cessation of cutting for animal bedding and the change from more mixed or cattle grazing to predominantly sheep grazing on the moors over the past century. Cattle would have trampled the bracken and thus reduced its biomass, while sheep avoid tall bracken in summer and have little trampling impact. Some bracken patches are being used for new upland woodland planting currently, leading to a reduction in open bracken cover in some places, particularly in the Dark Peak.

2.3.6 Outcrops and screes

The gritstone outcrops and screes are important habitats, although limited in extent. The outcrops in particular are dramatic features in the landscape, but they are also important for a variety of wildlife, including ferns, mosses and lichens and breeding ring ouzels. Larger rock platforms may support nests of raven or peregrine falcons (see Section 6). Rare ferns (in the Peak District) like beech or oak fern occur in a few cloughs associated with outcrops, but most species on the rock ledges are those that also occur in the wider heaths or flushes nearby, depending on whether there is water oozing over them or not. Thus bilberry, heather and wavy hair-grass are all common. Greater woodrush is more restricted but grows best out of reach of grazing animals on rocky ledges, usually by streams, whilst primrose occurs very rarely on rocky ledges near the River Sett near Hayfield. There does not seem to have been any detailed survey of rock and scree plant or animal communities in the gritstone country.

There could have been a greater variety of species and more vegetation on rocky cliffs and outcrops in the past since there are numerous records in old climbing guides on removing or pulling out vegetation to expose climbing routes. This practice is no longer condoned.

[12] McAlpine, J.A.I. 2014. *An Assessment of the Extent, Distribution, and Change of Bracken (Pteridium aquilinum) in the Peak District National Park.* PhD Nottingham Trent University

2.4 Amount

Moorland covers all the upper, open land of the Dark and South West Peaks, but is very restricted, as might be expected, and in the White Peak where some occupies more acidic soils. The totals give an indication of the proportions and relative importance of these habitats in relation to others. No comprehensive information is available for some of the habitats, but the totals for blanket bog and dwarf shrub heath are likely to reflect the areas on the ground relatively well as these are priority habitats.

Table 4 Moorland habitats across the Peak District

HABITAT	DARK PEAK	% of NCA	WHITE PEAK	% of NCA	SOUTH WEST PEAK	% of NCA	TOTAL
Blanket bog	23,723 ha	26	19 ha	<1	2,997 ha	7	26,739 ha
Dwarf shrub heath	16,071 ha	18	149 ha	<1	2,395 ha	6	18,615 ha
Upland flushes, fens and swamps	552.5 ha	<1	0.5 ha	<1	123 ha	<1	676 ha
Purple moor-grass and rush pasture	3,557 ha	4	55 ha	<1	1,998 ha	5	5,610 ha
Bracken	Unknown		Unknown		Unknown		6,200 ha
Outcrops and screes	Unknown		Unknown		Unknown		409 ha

2.5 Conservation

Moorland quality relates to soils, peat, vegetation, hydrology and management (this is a wider view than the standard assessment for SSSI condition). A moorland in good condition would have fully vegetated peat, be wet enough to be actively creating peat and it would not be eroding. *Sphagnum* mosses would be abundant and the water quality emanating from the site would be clear and constant. The dwarf shrub heath would consist of a mixture of species, not significantly suppressed by grazing. Woodland and scrub would reach into the moorlands in the cloughs and be scattered along the edges. Flushes, springs and grasslands would be widespread, support a good range of species and not be overgrazed. Bracken would be present but not invading significantly at the expense of other more valuable communities.

This ideal condition was far from the situation when the Peak District Moorland Management Project (MMP) (1979-98)[13] commenced as a response to the extensive wildfires in 1976. Its key findings were:

- 8% of the National Park moorlands were bare or severely eroding (out of 52,000ha), largely in the Dark Peak;
- there had been large-scale changes in the vegetation over the preceding 70 or so years (assessed only within an area also covered in 1913 by Moss in his vegetation map), with major losses of heather-dominated vegetation (2,000ha) (changing to acid grassland with or without bilberry) and cottongrass communities (6,000ha) lost to a more mixed dwarf shrub vegetation indicating drier conditions, with some additional loss to forestry;
- 74% of the peatland was eroding and 81% of its margins, with more above 550m than below it;
- peat was eroding faster in the past 200 years, but some gullies may be older;
- the loss of *Sphagnum* about 200 years before may have been critical in promoting erosion;
- numbers of sheep had increased three-fold since 1950 in moorland parishes, with evidence of the same increases in pressure occurring on the open moorland;
- accidental uncontrolled moorland wildfires were blamed as a major cause of peatland degradation and initiator of erosion. 54 burns >0.1ha affected 50,000ha between 1887 and 1976 (some on multiple occasions). Bare peat was still exposed after fires in 1947 and in the 19th century;
- such losses and degradation affected grouse populations and sheep numbers, and the economy of both.

[13] Phillips, J., Yalden, D. & Tallis, J. 1981 .Peak District Moorland Erosion Study, Phase 1 Report : Peak District National Park

Further work[14] showed a 33% loss of heather dominated areas, mostly on steep slopes, largely to acid grassland between 1913 (measured from Moss' map) and the equivalent area in 1979 and a 77% loss of heather within acid grassland. At the same time, there were gains in the heather domination within cottongrass areas, suggesting regular burning for grouse and drying of the peat to stimulate this change.

These analyses were the beginning of some very significant and large scale restoration works carried out on the moorlands, particularly on the peatland and still continuing now. The MMP initiated experimental and landscape scale trials to identify the most appropriate means of restoring the moorlands, but focussed on re-vegetating and stabilising bare peat and mineral ground[15].

The first Environmentally Sensitive Area (ESA) in the Peak District (1988) started to have a significant impact through reduced grazing levels and with, at first, small scale restoration works. The scheme continued until 2013, expanded in scope and has contributed to many of the large scale restoration projects that have been implemented since that time, particularly on SSSI land. This work is now supported by the subsequent agri-environmental schemes.


Gully blocking

The Moors for the Future Project, which evolved out of the MMP, initially through HLF funding, and United Utilities' SCaMP[16] have been instrumental in taking the MMP erosion restoration forwards; engineering large scale re-vegetation, drain and gully blocking and the introduction of *Sphagnum* and other blanket bog species to help diversify the newly developing vegetation. The National Trust is applying similar measures within their High Peak Estate. They are also working with United Utilities to restore areas of Kinder Scout which drains into Kinder reservoir, and with Yorkshire Water on Marsden Moor. United Utilities is also working with the RSPB on managing estates in Longdendale,

There are additional projects where more sustainable moorland management and drain blocking have been carried out in the South West Peak and on the Eastern Moors. Some of the moorlands have also benefited from the funding available for and generated by the Nature Improvement Area (NIA), which combined Eastern Moors Partnership sites with United Utilities' land (managed by the RSPB) north of Longdendale and National Trust land in the Peak District and to the north on the Marsden Estate.

In addition, data on the agri-environment schemes from Natural England (2014) show that 55,858ha of moorland have been included in 495 agreements, with restoration of moorland and support of cattle grazing on upland grassland and moorland being the main categories. These will be integrated with the other restoration work, and represent ongoing management rather than capital works.

Between these projects, nearly all the main moorland areas within the Dark Peak and in parts of the South West Peak have undergone treatment. This is a massive achievement over the last 15 years in particular. The scale is exemplified by accounts in the Peak District BAP reports:

- 500ha of bare peat treated in 2012, 100,000 plug plants established, over 2,500 stone dams in gullies on Kinder and Bleaklow by Moors for the Future;
- 112ha of degraded moorland treated with lime and fertiliser, 413 bags of heather brash spread on bare peat with Yorkshire Water 2011/12;
- 900 heather bales plus 800 stone dams installed to manage water, 18ha of bog inoculated with *Sphagnum*, 5ha cut as fire breaks by RSPB on Dove Stone's Estate (in partnership with United Utilities);
- Blocking drains on Big Moor, Leash Fen, and reversion of purple moor-grass dominance on Eastern Moors by the Partnership project.

[14] Anderson, P. & Yalden, D.W. 1981. Increased sheep numbers and the loss of heather moorland in the Peak District. *Biological Conservation*, vol. 10; pp. 195-214

[15] Anderson, P., Tallis, J.H. and Yalden, D.W. 1998. *Restoring Moorland*: *Peak District Moorland Management Project Phase III Report*. Peak Park Joint Planning Board.

[16] SCaMP – United Utilities' Sustainable Catchment Management Programme, started 2005

Although there is regular monitoring of individual areas and actions, showing that progress is towards better functioning habitats, there is no comprehensive mapping of the projects and their success. This means that although the treated areas as a whole or lengths of gullies/drains are mapped, it is not known how much bare ground there might still be throughout the Peak District, nor gullies that have not been blocked. In addition, although huge progress has been made, restoration to fully functioning habitats (particularly bogs) is expected to take time, and some gullies will need more dams in the future as sediments accumulate. Some gullies are too large and deep to be dammed at all.

Monitoring of the SCaMP project and by MfF shows that re-vegetation of bare peat at a landscape scale reduces sediment loading and can increase blanket bog diversity quite rapidly, but colour reduction takes more time in severely damaged catchments. Grip blocking has been shown by the SCaMP project to facilitate increases in *Sphagnum* and there have been signs of increases in other bog species. Reductions in colour in outflowing streams in SCaMP were detected after only two years post damming. Water tables are rising in all these restored peatlands and cranefly survival has increased – a major food source for many of the blanket bog birds[17].

SCaMP Project in Longdendale - Lime, nurse grass seed, fertiliser plot treated with heather brash plus Geojute 2007 (left) and 2012 (right)

Some monitoring by the RSPB on the land they manage on behalf of United Utilities north of Longdendale shows significant benefits for breeding birds such as golden plover, dunlin and to a lesser extent curlew after rewetting and re-vegetating[18], with increased densities and better productivity in the treated areas. Other species such as red grouse and skylark have also increased on the restored areas, despite reduced predator control. Issues related to birds of prey are covered in section 6.

Significant areas of purple moor-grass dominated vegetation have been treated to revert to some form of dwarf shrub heath or blanket bog, or merely to reduce its dominance. Geoff Eyre has undertaken most on the east side of Upper Derwent, other patches have been included in the SCaMP project, Moors for the Future are treating some, the NPA experimented with cutting and grazing on Big Moor and Richard May has undertaken further reversion on Pigford and High Moor in the South West Peak.

Extensive bracken control has taken place on a wide variety of sites, some initiated by the first ESA agreements (although some of this has re-established since). Dwarf shrub heath has been reclaimed from some of the bracken patches. However, in other areas, the fern has re-established itself, seemingly spreading faster than the rate of control.

Purple moor-grass reversion Howden Moors

[17] Carroll, M.J, Dennis, P., Pearce-Higgins, J.W. & Thomas, C.D. 2011. Maintaining northern peatland ecosystems in a changing climate: effects of soil moisture, drainage and drain blocking on craneflies. *Global Change Biology*, **17**, 9, 2991-3001.
[18] Carr, G and O'Hara, D (2015). Breeding Golden Plovers in the Peak District National Park. *British Birds* 108: 245-304.

2.6 The future

Many of the projects listed above are due to continue into the short-term future at least, although the funding for the NIA has ceased. MfF has (October 2015) been awarded major new EU LIFE funding which will be used partly to continue restoration within the Peak District Moors. This will focus especially on re-wetting to enhance prospects for species like *Sphagnum,* which are the life-blood of active peat. The other projects are also continuing. It will take much more time for the blanket peats in particular to recover from past erosion and degradation, but progress is positive so far. This will have significant impacts on the ecosystem services the peatlands provide in terms of carbon storage, water runoff control, sediment loss, carbon sequestration and water quality. Enhanced peatlands are also a much more attractive recreation resource, rather than bare peat and erosion, and provide a better habitat for grouse and other birds as well as many invertebrates and small mammals.

There has also been good progress in developing sustainable grazing regimes on the moorlands, with far less suppression of dwarf shrubs and cottongrasses than in the past, although sheep are still the main grazing animal. There are some cattle on lower lying areas.

Other large-scale projects include the National Trust's 10,000ha High Peak Moors Estate 50 year innovative Vision[19], which is seeking a much more holistic, brighter future for their moorlands. The aim is to take the best from shared inheritance, understanding and skills to create an inspirational 21st century moorland landscape of restored and healthy natural habitats and in so doing, delivering landscape-scale conservation and restoration, rich in wildlife and cultural heritage, with excellent access, sustainable livelihoods and wider public benefits. The management of the area is being based on constructive, forward looking partnerships with tenants, communities, organisations and users. The key five outcomes are for:

- People to be inspired
- People looking after the land
- Secure and healthy blanket bogs
- More trees and shrubs in the valleys and cloughs
- Vibrant wildlife including birds of prey.

The Sheffield Moors Partnership, which covers the 56km^2 of the Eastern Moors as well as Sheffield City Council moorland (Blacka, Hathersage and Burbage Moors), is also set to enhance moorland condition, increasing the cover of species like *Sphagnum*, cottongrass and other characteristic species, reverting conifer plantations to moorland habitats or new broadleaved woodlands, as well as creating new woodland in some bracken patches and improving access.

Other sustainable moorland management is being applied by the NPA and Staffordshire Wildlife Trust on the Warslow and Roaches Estates (both owned by the NPA) as well as other reserves in the area.

Despite this excellent progress to restore moorland that had often been severely degraded, there are still some issues to address. There is some evidence, as described above, that managed burning of blanket peat can be detrimental to its quality and there is pressure from NE, NT and others to reduce or phase this out. This debate will continue into the future and involve moorland owners, managers, grouse shooting interests and others. Furthermore, there is concern about the impact of moorland tracks in some places which can result in further peat erosion and loss of sediment and carbon. They can be significant eyesores as well. The NPA and NE are looking to address this issue.

There are significant issues relating to some birds of prey within the moorland environment. This is considered in Section 6.

It is concluded that the future for the moorlands is generally much brighter than it was 35 years ago, although there are still some issues to resolve and some years to wait until much of the blanket peat is fully in good condition.

[19] https://www.nationaltrust.org.uk/kinder-edale-and-the-dark-peak/documents/the-high-peak-moors-vision.pdf

3 Grassland

Grasslands are the main habitat in the Peak District, but most are improved or partly improved agriculturally, largely in response to Government or European policies and support. The majority of our grasslands are, as a result, of reduced or little value for nature conservation as such management removes most broad-leaved plants, furthers dominance by grasses and concomitantly produces a poor environment for animals.

As agricultural intensification increases, the nature conservation value decreases.

The higher value grasslands for nature conservation are those that incorporate a range of plant species, which will vary with the soil and other environmental conditions (wet, damp or dry; deep or shallow soils; south or north aspect) along with the animals they support. In addition, there are unique grassland communities that have developed on mineral materials abandoned from quarrying – the lead rake specialists are the prime example.

There is no overall figure for the extent of grasslands of all kinds within the Peak District. Due to the fact that the grassland types have been surveyed separately, there is information on these rather than on particular grassland communities. Limestone heath has been added to this chapter since it occurs on limestone, includes considerable amounts of calcareous grassland and lead rakes at times and often merges with dale-side or steep limestone slopes of calcareous grassland.

The vegetation types described in this section are:

- Limestone grassland
- Limestone heath
- Lowland grassland
- Lead rakes
- Acid grasslands
- Waxcap grasslands
- Improved/ semi-improved grasslands

There are also valuable grasslands along a range of road verges, although the extent and character of these are not comprehensively known. Many roads were once compacted with limestone before surfacing became extensive, and lime washed or blown off onto the verges has produced a number of flower-rich swards along mostly minor roads from Leash Fen in the east to Swallow Moss and Black Brook in the west.

3.1 Limestone grassland

3.1.1 Key points

- The calcareous grassland in the Peak District is of international importance, but is fragmented, mostly confined to the Dales and steep-sided slopes.
- Need to ensure it is managed sustainably to maintain an appropriate balance between scrub, woodland and species-rich grassland
- Isolated dales need to be linked together by restoring and creating more flower-rich grassland

3.1.2 Nature and value


Cressbrook Dale Penny Anderson ©

These are the grasslands in the dales and on steep slopes and are confined to the limestone area. They are the most biologically rich habitat in the Peak District, full of colour throughout the seasons and supporting some of the rarest species in the area.

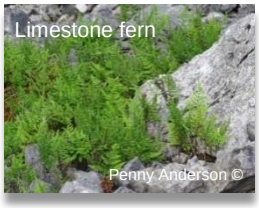
They are characteristically on steep slopes but there is considerable variation in their nature. Different aspects, more leaching of soils on the brows of some of the dales, seepages and springs all result in different communities. There is heathland on the more acidic soils on upper edges and north-facing patches, acid grasslands on a number of dale tops and edges, richly textured and diverse calcareous grasslands that vary with aspect and soil depth and springs and flushes with rare wetland plants. The caves, lead rakes and outcropping rocks all add to the habitats and opportunities for species.


Dwarf thistle Penny Anderson ©

There are long lists of nationally or locally rare species like pyramidal orchid and spring cinquefoil, and species at the southern or northern edges of their geographic distribution like globe flower (northern species) and dwarf thistle (southern species). Skylark nest in the grasslands and they are also important for many species of butterfly, particularly northern brown argus, dingy skipper and dark green fritillary.

The calcareous grasslands are internationally important and most are protected through SSSI or National Nature Reserve status, some managed by NE and others by the County Wildlife Trusts and National Trust. Two mosses, Derbyshire feather moss *Thamnobryum angustifolium* and Appleyard's feather moss *Brachythecium appleyardiae*, are of international importance in the dales. The first represents the world's only known location, whilst the second grows in several sites on shaded limestone cliffs.

Embedded within some of the dales are alkaline fens. Those with a short sedge-rich flora usually with common butterwort, and those marked by an abundance of the moss *Cratoneuron commutatum* occurring with tufa[20] are EU Habitats Directive Priority Habitats. A survey for the former English Nature[21] revealed that most are small and occur where springs emerge either part way up a dale side or near the streams or foot of slopes. Several vegetation communities were associated with these wet areas; the best priority habitat examples being in Monk's Dale and Monsal Dale, with other examples in several dales but all of limited occurrence. Some support uncommon sedges, such as the rare flat sedge and other wetland species like marsh valerian, which is more usually found in wet flushes in the South West Peak.


Limestone fern Penny Anderson ©

Another feature of many dales is rocky outcrops and screes. Rocky habitat assemblages include ferns, some of which, like rusty-back fern and green spleenwort, are rare within the area. There is also a rock ledge community characterised by small early flowering annuals that avoid drought summer conditions. The rarest species is *Hutchinsia*, but a number of other small crucifers, the uncommon rue-leaved saxifrage, geraniums and mouse-eared chickweeds, also feature. More luxuriant rock ledge vegetation includes locally rare species like Jacob's ladder, angular Solomons' seal and orpine in places like Cressbrook Dale, Deep Dale and Winnats Pass. Limestone fern is a specialist on scree slopes, particularly in Monk's Dale.

[20] Tufa is a limestone concretion formed from calcium carbonate deposits in calcareous water. It is associated with springs but also flows over weirs/rocks etc in the dales.

[21] Tratt, R. & Eades, P. 2003. *Peak District Dales cSAC Alkaline Fen Survey 2003*. English Nature

3.1.3 Amount

Although the total seems moderate – ***2,514*** ha (of which there are 8ha in the Dark Peak and 24ha in the South West Peak, since the boundaries include small areas of limestone), this is only 4.7% of the White Peak area, and therefore a rather limited amount. The sites are mostly in the dales, but include some rocky or unimproved calcareous grassland elsewhere as well. There may not have been extensive losses to agricultural intensification within the dales owing to the largely inaccessible slopes, but there are limestone slopes which are more moderate and where slurry spreading from below or above has effectively reduced the floristic interest, as evidenced by their bright green appearance in contrast with the duller hues of unimproved grasslands. A few dale slopes are overgrazed and scree slopes are developing, but the main threat in most dales has been loss of grassland to scrub and woodland.

The agricultural intensification on the plateau above the dales has also resulted in a loss of suitable animals to graze the steep slopes. Since the last World War, there has been significant scrub invasion of many limestone grasslands, which will have been exacerbated by the loss of rabbits to myxomatosis in the 1950s, and scrub control is patchy. Some dales' grassland has been lost to quarrying in the past, but there are few active quarries now extending into high value grasslands.

There would have been more areas of calcareous grassland on the limestone plateau where soils were shallow and rocky outcrops occur, but the majority has been lost. Moss (1913) shows wider areas and a few more than occur now, but their loss has been primarily historical. Most of the limestone plateau does not have calcareous soils owing to leaching and to other geological material overlying the limestone (and may have been limestone heath in the past) and their current grasslands fall into the lowland grassland category.

Figure 8 shows how fragmented and spread out the calcareous grasslands are. Although the series of dales centred on the Wye are interlinked, many are not, and there is no species-rich grassland nearby. Many of the dales are therefore isolated. There is an urgent need to link these to the remaining hay meadows, lead rakes and species-rich pasture to form a more interlinked mosaic across the area. If these were also alongside footpaths, the visiting public could also benefit from the attractive displays of plenty of flowers and insects such as butterflies.

3.1.4 Conservation

Many of the Dale grasslands are included in SSSIs, and a suite of these also fall in the Peak District Dales SAC – the main ones being the Wye Dale complex, Lathkill Dale to Alport, Long Dale (Hartington), Coombs Dale, Dove and Manifold/Hamps Dales, Via Gellia and Long and Gratton Dales. Many of these dales include woodland and scrub as well as, in some, alkaline fens, rock outcrops and screes.


Long Dale (Friden) Penny Anderson ©

3.1.5 The future

The main target is to ensure an appropriate balance between limestone grassland and scrub (a valuable habitat in its own right) or secondary woodland, and to ensure that grasslands are grazed appropriately to further the conservation of the richness of the communities. Much scrub clearance has been undertaken, for example in Miller's Dale, Chee Dale, Priestcliffe Lees, Hopton quarry, Deep Dale and Gang Mine, the Derbyshire Dales NNR, NT land in Dovedale, Manifold/Hamps Valley and in the Wye Valley (Bellamy's Bank) and on Longstone Edge. Scrub clearance on some of the ex-railway trails has also been undertaken including the Tissington, High Peak, Monsal and Thornhill trails. Most areas are in agri-environment schemes to facilitate scrub and grazing management.

The very dispersed occurrence of these grasslands, and the general lack of other species-rich grasslands between the dales on the plateaux, point to the need to establish more linking grasslands that could be critical for adaptation to climate change in enabling less mobile species to migrate as their climate envelope moves. New grasslands, particularly close to footpaths, would also increase the amenity, health and wellbeing values for people, as well as storing more carbon than agriculturally improved grasslands, thus contributing to carbon dioxide reduction targets.

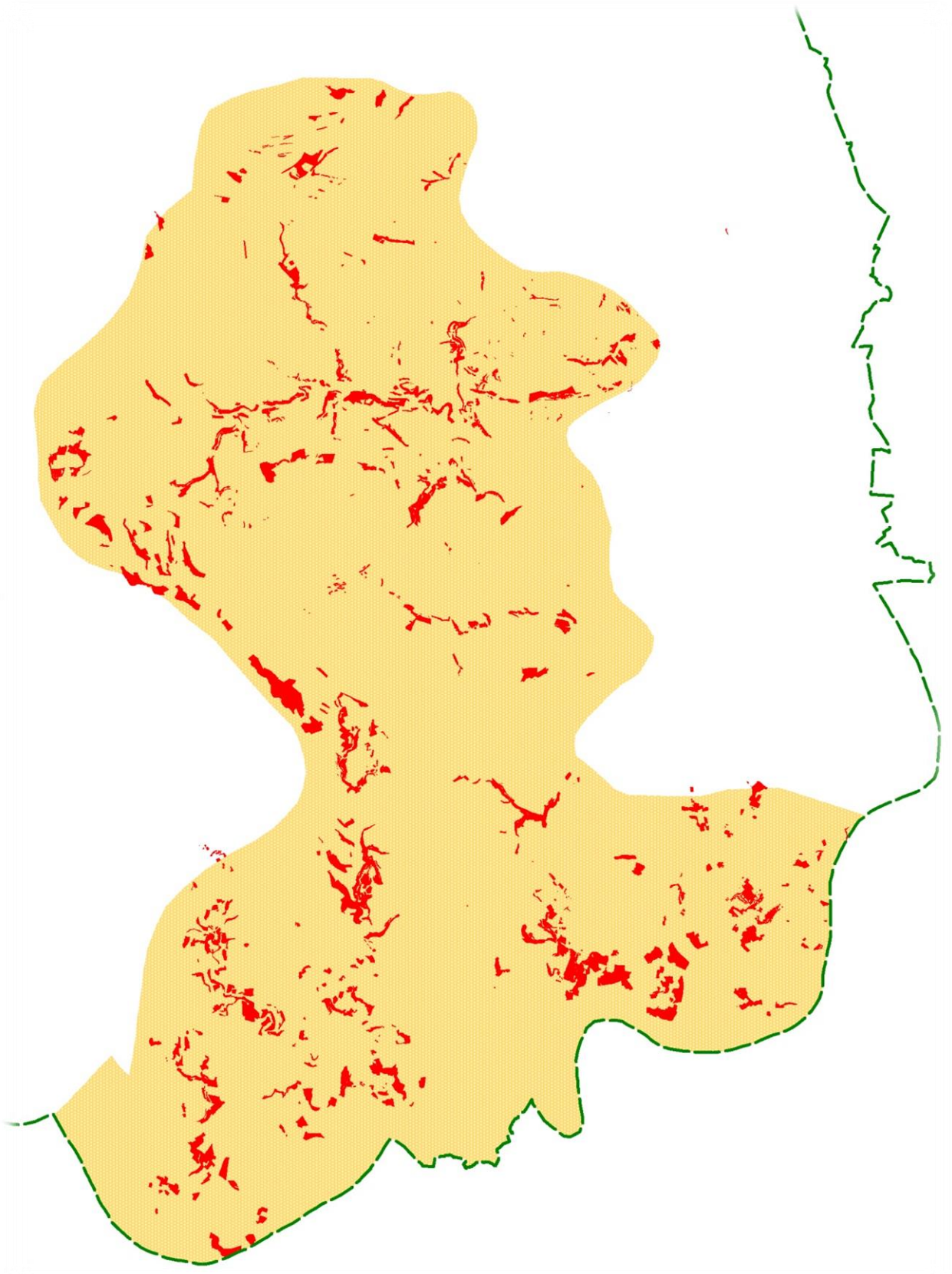


Figure 8 Limestone grasslands in the White Peak

3.2 Limestone heath

3.2.1 Key points

- Limestone heathland was once a widespread habitat, but is now extremely limited
- The majority is protected but not all is being managed appropriately. Unprotected sites are in urgent need of site conservation measures
- Limestone heathland requires urgent consolidation and expansion, although the areas where this could be realistically undertaken will be limited owing to soil changes under more intensive agricultural use

3.2.2 Nature, value and amount

It may seem improbable that we have limestone heath (an acidic based habitat) on limestone (which produces calcareous soils), but this was once a very widespread sight. Heather usually dominates, often with bilberry and various grasses and herbs providing colour and structural variation. Outcrops of limestone within the heaths add to the richness of the scene, with old lead rakes furthering this on some sites. Such sites tend to be much richer in plants than dwarf shrub heath on the gritstones.

The limestone heaths are usually either directly on limestone, but where leaching over millennia has resulted in acidification of the soils, or on glacial or weathered materials lying on top of the rock. Pre-enclosure, they covered much of the wastes, commons and moors in medieval times. Writing in 1811-15, Farey[22] was critical of the limestone heaths:

"There is no necessity to suffer the reappearance of the native heaths and mosses, which were so much the disgrace of these districts a few years ago".

With enclosure and soil improvements for agriculture, the limestone heaths all but disappeared. Moss' map of 1913 showed only 12 patches (his map did not cover all our area). A survey in 1984[23] suggested that 75% of Moss' sites had been lost and many of the remaining ones reduced in size, but also found several other sites not previously mapped (outside Moss' mapped area). The total mapped was 269ha, but this included other acidic vegetation, meaning that the extent of true heath was more limited than this. Without GIS then, it was difficult to measure the area accurately.

The National Park Authority[24] carried out further surveys revealing only about 100ha of limestone heath remained at that time in 34 locations, totalling a minute 0.002% of the National Park area. None of the surveys have extended into the wider Peak District, so there may be other sites not included in the data available. Some of the 34 sites identified are extremely small – 14 have only a handful of heather plants covering a few square metres. The sites are fragile, spread out, fragmented and vulnerable to changes or damage. Other sites that have been surveyed and mapped total 150ha (93ha of this is on Longstone Moor).

The total area currently mapped as BAP habitats includes limestone heathland along with intermixed grasslands and other associated communities, and is around ***216*** ha, all sites being found in the White Peak. Most sites are restricted to road verges and along trails and footpaths. Figure 9 highlights the fragmented and small scale of the limestone heath.

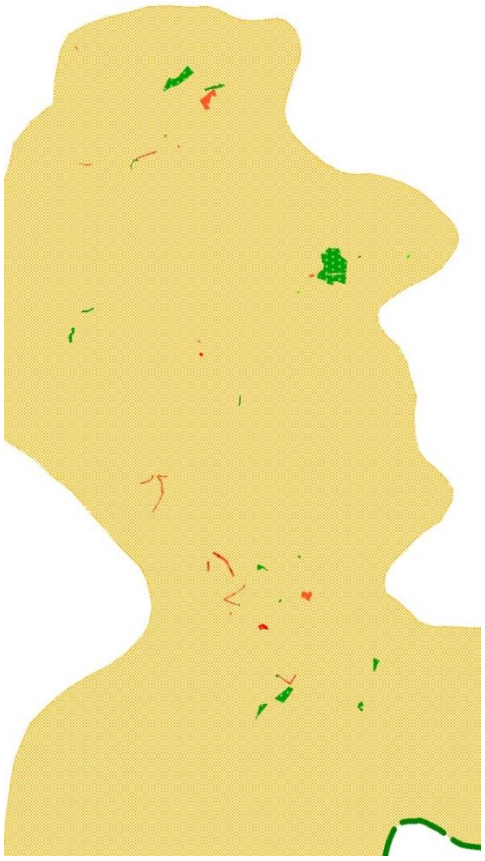


Figure 9 Distribution and condition of limestone heath
Green – good condition A or A/B, Orange – B, Red – poor condition C

[22] Farey, J. *A general view of the agriculture and minerals of Derbyshire.* 1811-15
[23] Penny Anderson. 1984. The limestone heaths of the Peak District. Their ecology, decline and willdife value. Peak Park Joint Planning Board unpublished report
[24] Buckingham, H. and Chapman. J. 1999. Hidden Heaths: *A portrait of Limestone Heaths in the Peak District National Park*. Peak District National Park Authority

3.2.3 Conservation

Although significantly reduced in overall area, there are measures in place to safeguard a range of sites covering 91ha of heathland. These include a group of Dales ponies introduced in 2012 at Alsop Moor north of Ashbourne. Tree clearance and grazing has more than doubled the area of heathland within four years on this site.

Table 5 Main limestone heathlands with associated habitats

SITE	AREA (ha)	AREA OF HEATH ha (%)	PROTECTION
Longstone Moor	107	93 (87%)	SSSI
Parwich Moor	16	1.6 (10%)	SSSI
Coombs Dale	86	0.5 (<1%)	SSSI
Alsop Moor	6.1	1.5 (25%)	National Trust management
Bradwell Moor (Berrystall Lodge)	16	4 (28%)	National Park Authority management agreement
Newhaven railway cutting	-	6.4	National Park Authority High Peak Trail
Tissington trail	-	2.4	National Park Authority
Green Lane pits	2.9	0.3 (10%)	National Park Authority
Cardelmere quarry	0.42	10 sq m	Voluntary agreement
Friden sites	4.3	0.3 (8%)	Voluntary agreement

The condition of the remaining limestone heath is very variable. Longstone Moor was assessed as recovering to favourable condition by Natural England in 2014 with the appropriate management in place, but needing some diversification of the structure of the dominating heather. The same assessment result was given to the associated calcareous/acid grassland adjoining the heath where scrub and bracken invasion or insufficient plant indicators were noted. Parwich Moor, in contrast, is considered to be in unfavourable declining condition, which does not bode well for its longer term conservation.

3.2.4 The future

The future of limestone heathland is assured on those sites that are protected, but only where suitable management is in place. These are small and vulnerable habitats though and urgently require expansion and consolidation in line with the '*bigger, better, more and joined up*' principles.

The White Peak NCA profile, in its statements of environmental opportunity, includes '*conserving, restoring and, where appropriate, creating limestone heath*' under the 'plateau farming' heading. The options for implementing this are likely to be through agri-environment schemes, National Park Authority land management agreements and encouragement. There are difficulties, notwithstanding competition with other more profitable land-uses. Heathland creation is not straightforward on land that has been fertilised and limed and where the seed bank contains more vigorous competitive species. The best limestone heathlands are a mixture of heath with some limestone grassland outcrops and possibly lead rake remains as well. Locations for creating and extending limestone heathlands would have to be carefully selected and may be limited in extent.

3.3 Lowland grassland

3.3.1 Key points

- There is very little grassland (meadows and pastures) across the area that is of high value for wildlife, cultural history and amenity, although surveys are not comprehensive
- Of the hay meadows, there are very few of the two highest grades across the Peak District
- The rate of loss of flower-rich meadows nationally has been rapid, even in recent decades, and the Peak District is no exception, despite National Park status
- Many hay meadows are protected in agri-environment schemes and significant areas are being restored or enhanced
- As a minor habitat in terms of area, there is an urgent need to further protect and enhance the resource in accordance with the '*bigger, better, more and joined up'* principles

3.3.2 Nature and value

The National BAP definition of lowland meadows includes enclosed pastures and meadows. Pastures are generally used for grazing whilst meadows have been traditionally associated with hay or now more often silage cutting. The grasslands in these differently managed swards differ in species and structure.

Species-rich hay meadow on the National Trust's Longshaw Estate

Lowland grasslands are usually neutral in reaction, but some may be more calcareous where limestone outcrops are closer to the surface. The grassland sites of value are the traditionally managed ones, rich in wildflowers, which are an important asset to our wildlife, culture and landscape. These are the grasslands that support a variety of bees, butterflies and many other invertebrates. They are beautiful to look at, with varied colour and structure that changes through the months of flowering, much to the enjoyment of people passing by. Experiencing such masses of flowers has been shown to benefit mental and physical health.

The meadows can be of cultural interest, celebrated in folklore, customs and literature; they represent the essence of the traditional farming cycle, evolved over many years, and are historic habitats. They are an example of a truly sustainable approach towards environmental management[25].

The NPA has surveyed and assessed the amount and character of the hay meadows in the National Park, but there have been no systematic surveys of flower-rich pastures. The data have been amalgamated from a variety of sources such as Farm Environment Plans, pastures noted during other surveys etc.

The best hay meadows will hold more than 50 different plant species, with distinctive communities on wet, dry, alkaline or more acidic soils,[23] and a similar situation occurs in the best pastures, although the species will not always be the same. Those with the main species represented in good, well dispersed populations are better than where a few are dominant.

The Peak District hay meadow survey found six different community types and there may be more as few meadows were surveyed in the South West and Dark Peaks. Some communities were represented in only a handful of fields, making them a very rare type in the Peak District. The commonest found was the crested dog's tail/ common knapweed grassland, meadow vetchling sub-community, which is typical of neutral soils. The rarest were the wet crested dog's-tail/ marsh marigold community found in 13 fields; a version with affinities to the upland hay meadows of the Northern Pennines (four fields) and a further four with affinities to the lowland alluvial meadow community.

In present day farming, meadows tend to be uneconomic unless agriculturally improved using herbicides to remove broadleaved plants, fertilisers to increase grass growth and modern grass strains to replace the old less vigorous types. Hay-making has largely changed to silage-making - the crop is cut earlier before plants flower and set seed, then the fields are coated with slurry or fertiliser before a second (or further) cut. This effectively promotes the more vigorous grasses and reduces or eliminates the wide range of broadleaved plants that provide the colour and diversity in the unimproved hay meadows.

[25] Buckingham, H. & Chapman, J. 1997. *Meadows Beyond the Millennium. The Future for hay meadows in the Peak District National Park*. Peak District National Park

3.3.3 Amount

Of the lowland grassland priority BAP habitat that is mapped on the National Park database (Figure 9), there is a rather limited total area of ***2,511*** ha, a very small 1.6% of the whole of the Peak District. Those noted specifically as hay meadows in the database constitute about 47% of this area, and 47% of these (by area) are Grade A, A/B, or in favourable condition. There may be more since the NPA's database on grasslands has not been systematically completed, meaning that some hay meadows may not have been identified. The numbers are therefore a minimum both for grasslands as a whole and for hay meadows.

Table 6 Lowland grassland

	WHOLE (ha)	DARK PEAK (ha)	WHITE PEAK (ha)	SOUTH WEST PEAK (ha)
Lowland priority BAP grassland (% area)	2,511 (1.6%)	286 (<1%)	1,792 (3%)	433 (1%)
Hay meadows (% of lowland grassland)	1,178.5 (47%)	149 (52%)	705.5 (39%)	324 (79%)
Hay meadows Grade A, A/B or Favourable (% hay meadows)	554.5(47%)	85.7 (57.5%)	267 (38%)	201 (62%)

Note A and A/B grades are from the hay meadow surveys, favourable condition derived from other sources

In the NPA's hay meadows survey, a total of 959 individual meadows (the area has not been calculated) were recorded between 1995 and 1997. More were identified by scouring records from a wide range of organisations and sources, but only 959 were identified as worthy of survey, so there are many more hay meadows now treated as silage fields and agriculturally improved to increase productivity with the resultant loss of species. Of the 959, only 125 (15%) were found to be of the highest value and labelled Grade A. A further 285 (30%) qualified as a slightly lower Grade B (usually showing some signs of agricultural improvement and not as rich or diverse as Grade A). 366 meadows were classed as Grade C sites which showed limited value at the time of survey but were considered to have potential to be restored to a higher value. 24 rich meadows were known to have been lost during the time scale of the 1990s survey.

The survey found concentrations of the better meadows around Bonsall, Bradwell and Sheldon (Figure 9). More occur within the South West Peak, particularly on the Warslow Estate. 35 meadows classed Grade A, 50 Grade B plus 49 Grade A/B in the Warslow Estate are known from other surveys, sites in National Park Authority ownership, or already safeguarded through agreements or SSSI designation.

An analysis of data available from the 1980s in the National Park shows a 50% loss of flower-rich meadows between the mid-1980s and 1995-97. Taking 56 meadows for which there was adequate data from the 1980s and comparing them with the situation in the mid-1990s showed a decline from around 10.4 old meadow indicator species to 1.7 – a dramatic loss illustrating well the outcome of increasing agricultural intensification.

A further analysis of data for selected species mirrors these losses. Taking just lady's bedstraw, cowslip and hoary plantain, the number of meadows in which these occurred declined sharply in just 10 or so years from 5-17% of fields down to just 1% of 436 meadows for which there were adequate data. These species are typical of calcareous meadows which would appear to have lost more value than some other types. Other specialist plant species show similar declines, including field scabious, great burnet and rough hawkbit being lost from 70% of the 1980s sites. Even the commoner ox-eye daisy and common knapweed have been lost from 54% and 62% respectively of meadows, suggesting wide scale agricultural intensification and earlier silage cutting dates which prevent later flowering plants from seeding successfully[25].

These losses are not unique in our area. They are occurring, often at a higher rate, nationally. The total amount of lowland species-rich grassland (meadows and pastures) has declined by 97% between the 1930s and 1984 according to the national State of Nature report (2013). Closer to home, the Derbyshire Wildlife Trust's[26] survey of semi-natural grassland (meadows and pastures) in lowland Derbyshire between 1983 and 1999 showed a huge 91% loss from an already low base. In 1983, 6,044ha (13% of the land area) in 14 study areas was classed as semi-natural grassland, with only 1.1% left by 1999, with more in the White Peak and Peak fringe outside the National Park than in the rest of the area. The report

[26] Derbyshire Wildlife Trust (2001) Changes in the extent of semi-natural grassland in lowland Derbyshire between 1983 and 1999 and recommendations for future conservation action

quotes a similar decline in valuable grasslands across the Sheffield Wildlife Trust area of 89% over 15-20 years as well. The Derbyshire Wildlife Trust annual Biodiversity Monitoring Report[27] shows losses, but in all lowland grassland types for the Derbyshire Dales outside the National Park of 11.79ha, but no significant change in other fringe areas over the previous year.

The losses are not just flower-rich meadows, but also of the animals associated with them – invertebrates such as bees (already under threat from loss of habitat nationwide) and butterflies, and a wide range of other insects and breeding birds such as meadow pipits and skylarks that depend on the range of invertebrates.

For local people, the meadows might represent the last links a village might have with the past and their ancestors' way of managing the land. For visitors to the Peak District coming for our distinctive landscape, some elements are now largely missing.

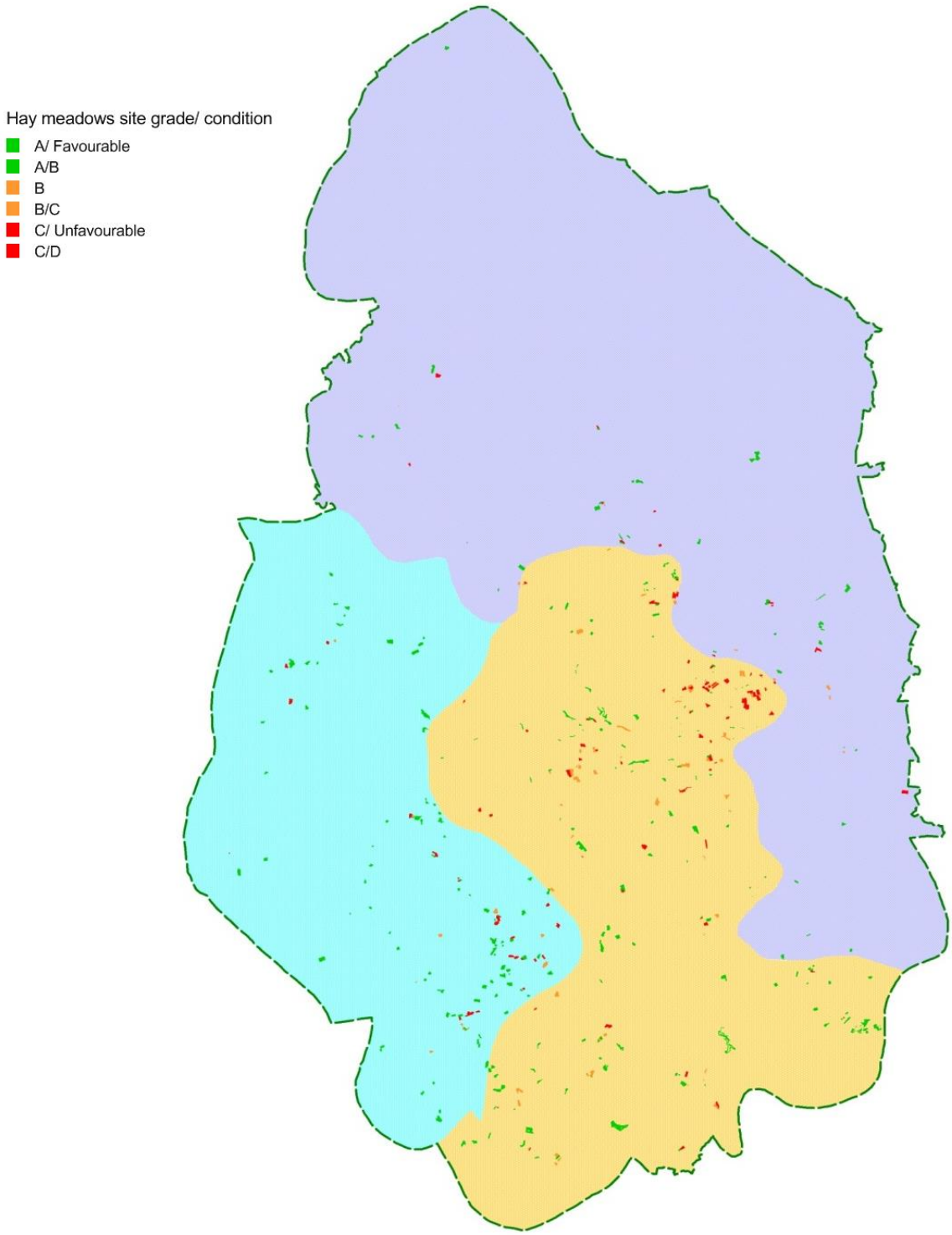


Figure 10 Condition of lowland grassland (amalgamated over time, some have since been lost)

[27] Derbyshire Wildlife Trust (2015) *Biodiversity Monitoring Report April 2014 to March 2015*

3.3.4 Conservation

Examples of all lowland meadow communities are protected through agri-environment agreements, but the total number is only 151 hay meadows in the Grade A and B classes that have resulted from the hay meadows project, plus a further 17 that were protected in the former Environmentally Sensitive Areas (ESA) scheme and 119 grasslands of lower calibre protected from deteriorating further with some potential for enhancement. The North Lees and Warslow Estates' meadows are largely conserved in agri-environment schemes and tenant agreements and many of the latter lie within the Leek Moors SSSI. There are at least a further 85 other Grade A and B meadows that were already protected prior to the 1990s surveys. The grand total from this is only some 285 meadows (some could have been double counted in this estimate) out of a potential 440 higher grade sites.

The Peak District BAP Report for 2008/09 notes that 59% (878ha) of hay meadows outside SSSIs were in agri-environment schemes. This total includes lower grade as well as higher value hay meadows. In addition, 18.65ha of hay meadow restoration had been initiated, totalling 99ha to that date. A further 8ha were being restored in the Derbyshire Dales NNR, and Derbyshire Wildlife Trust were restoring the Hartington Meadows reserve by removing invasive 'weed' species.

More recently there are some areas where hay meadow restoration and creation is ongoing – the BAP Report 2011-13 reported eight on the Warslow Estate where flowering plant species are being added and a few others are being treated similarly by private individuals. NE enhanced a range of meadows adjacent to Lathkill Dale around 2004, and has designated 44ha of species-rich hay meadows as SSSIs in the same period – these had been classed as Grade A sites in the National Park 1990s survey.

The NPA obtained SITA Enriching Nature grant awards in 2011 and 2012 to restore grasslands on the trails through scrub/tree removal and grassland management through cutting or grazing. This was the first time some of the grasslands had been managed at this scale and is needed to maintain some very special species such as orpine and common wintergreen.

Some of the grasslands being protected or enhanced will be part of agri-environment schemes. Data from NE for 2014 for all National Parks shows that, within the Peak District National Park, 21,199ha are in 780 agreements. The majority of the grasslands were included in the low or very low inputs options, but these may not already be of high value. There were also 1,424ha identified for the maintenance of and 2,257ha for restoration of species-rich grassland. Only 8ha were identified for creation of species-rich grassland. 1,044ha had been entered into hay making rather than silage making, which could benefit breeding birds, flower and seed production and therefore animals dependent on these. It is assumed that most of the grassland in these schemes will fall within this lowland grassland category, but some may be acid or waxcap grassland (see sections below).

The end of the HLS agri-environment scheme and conversion to the new Countryside Stewardship scheme over time may jeopardise the long term protection of these lowland meadows if farmers are disinclined or not able to join the new scheme (which is competitive and with a lower budget than previous schemes), or if there are negative changes to the agricultural support system following Britain leaving the European Union.

3.3.5 The future

Only relatively small areas of the lowland grasslands in the Peak District are known to be of high value as species-rich hay meadows or pastures. Not all grasslands have been surveyed and there is a need for additional survey to fill the gaps, both within the National Park and in the fringes that are included in the Peak District LNP area. There is an urgent need to protect the remaining high value (Grade A and B) grasslands that are not already included in agri-environment schemes and/or SSSIs, as well as any found in any subsequent surveys.

The fast rate of decline hay meadows have suffered also points to the need to restore all those that have the potential (they have to be on soils low in nutrients and without vigorous grasses outcompeting the smaller species) and to establish more in a meaningful way that support Lawton's *bigger, better, more and joined up* approach. The South West Peak HLF Landscape Partnership project will contribute to this aim in its 'Glorious Grasslands' project which aims to restore or enhance over 100ha of grasslands and will survey more in the area. Many sites will be in agri-environment schemes, but more effort is needed.

There is no equivalent level of information for other lowland grassland types in the Peak District – essentially flower-rich pastures. This is a major data gap.

3.4 Lead rakes (including Calaminarian grasslands)

3.4.1 Key points

- There is a miniscule amount of this habitat of value remaining with under half protected; the rest urgently needs conservation with appropriate management
- The remaining sites need to be re-connected with other flower-rich grasslands where appropriate through habitat restoration and creation, with the potential to trial re-establishment of rake grassland conditions
- The highest value metalliferous grasslands are not considered re-creatable – they are a product of a complex history associated with mining at least back to Roman times and need better protection

3.4.2 Nature and value

Lead rakes, where lead was mined and waste materials left abandoned on the surface, occur as lines or masses of hummocks and hollows set across plateau fields, dale slopes, in dale bottoms or around lead mines. The rake grasslands consist mostly of limestone grassland, plus particularly special communities where metal levels are higher at the surface and a unique range of metal-tolerant plants occur. These latter grasslands are highly adapted to growing on heavy metal waste, such as lead, chromium and copper. They are associated with outcrops of serpentine and river gravels rich in heavy metals as well as with the artificial mine workings and spoil heaps. Their technical name is calaminarian grasslands, and they are typical of parts of lead rakes, with their variable heavy metal waste concentrations and species. The toxic nature of many of the rakes limits the flora to those species adapted to these conditions.


Spring sandwort Penny Anderson ©

The plant communities tend to be sparse, allowing space for slow growing lichens and mosses as well as small specialist broadleaved plants such as spring sandwort (often called leadwort) and alpine pennycress (also sometimes called leadwort!). There are also some genetically adapted races of plants like thrift (rare in the Peak District and more often a coastal plant of rocky places) and bladder campion. There is a range of plant communities from acid to calcareous grasslands, as well as the most sparsely vegetated toxic materials. Specialities include the little fern, moonwort, and frog and fragrant orchids. The toxic nature of some of the lead rake material in distinct areas with its specialist vegetation tolerant to heavy metals is considered to be of international importance. Each rake tends to be unique – a reflection of its detailed history.

The wealth of flowers attracts a range of invertebrates as well as providing seed and forage for many other animals. The sparse vegetation patches are literally 'hotspots' for insects, and associated mine shafts provide safety for many bats and hibernation sites for amphibians and other animals. As well as their unique flora, these grasslands are closely associated with our cultural and mining history – lead mining in the Peak District having been practised since Roman times[28].

This type of grassland is listed in the Habitats Directive and Habitats Regulations; they are of very restricted occurrence in Europe and therefore these sites are considered to be of international importance.

[28] Barnatt, J. & Smith, K. (1997) *The Peak District: Landscapes through Time.* London : Batsford/ English Heritage

3.4.3 Amount

When the Biodiversity Action Plan for these grasslands was first produced in 2011, the area of lead rakes (not clearly defined, but assumed to be the areas with the richest vegetation) was estimated at ***41*** ha and surveys had shown already that losses to agricultural reclamation and new quarrying was threatening much of the archaeological and ecological resource. The Derbyshire ore-field[29]; surveyed in 2011-12, revealed a miniscule 14ha of the specialist Calaminarian grassland remaining, all but 1ha in the National Park. The overall area of lead rakes is larger (about 203ha, nearly all in the White Peak), but without the highest value plant communities on the remaining area.

Key results from the 2011-12 surveys are:

- The extent of the grasslands is very limited and localised, with continuous declines evident
- The condition of the grasslands is very variable, particularly poor where not protected and where agricultural improvements have been attempted
- The connectivity of the sites is very poor, with fragmented interest along a rake. Some areas are well-connected to other grasslands where rakes are within the dales or in some areas of the limestone plateau.

There is a concentration of sites in Bonsall, Castleton, Bradwell, Elton, Winster, Monyash, Middleton-by-Youlgreave and Brassington parishes. Of the 14ha recorded, 6ha lies within SSSIs and is therefore protected. Habitat and restoration works have been undertaken on 12 sites, two of which are outside the National Park and three of which are in SSSIs[30]. There is believed to be only about 100ha of Calaminarian grasslands nationally (National BAP), showing how important the small amount in our region is in this wider context.

3.4.4 The future

A priority is to secure the conservation and appropriate management of the remaining sites as soon as possible. Calaminarian grasslands are not considered to be re-creatable – they are a product of a complex history which cannot be emulated easily, and current extraction does not result in new metal-rich subsoils or waste on which the unique vegetation community can establish. It may be possible to undertake trials to rejuvenate some rakes and expose old metal-rich materials where these have been lost through natural succession or covered with other materials. In general, however, conserving those left is more urgent and important. Equally urgent is the need to re-connect these fragmented and very small areas of grassland with other flower-rich grasslands through habitat creation, enhancement and management where they do not lie within existing flower-rich areas (as in some of the Dales).


Tansley Dale Penny Anderson ©

[29] One of the richest ore-fields in Britain where centuries of mining has resulted in a landscape of hillocks and hollows and ruined mining structures important for wildlife, archaeology, cultural history and geology.
[30] Peak District National Park. Biodiversity Action Plan Report 2011-2013

3.5 Acid grasslands

3.5.1 Key points

- Acid grasslands are more extensive than all other priority grassland types, although the grassland types offer degraded versions of what might have been more diverse swards in the past
- They are important for breeding meadow pipits and skylarks in particular
- Many lie within protected areas or are under sympathetic ownership or management
- More information is needed on the location and area of the better quality acid grasslands

3.5.2 Nature and value

Acid grassland dominated by plants like mat grass with abundant wavy hair-grass, some common bent and sheep's fescue and a limited range of broadleaved species like heath bedstraw and tormentil fringe many of the heathlands and blanket bogs, often clinging to the clough sides or below the edges. They generally lie on the Millstone grits and shales but extend onto the limestone where the surface of the soils has been leached and acidified. These grasslands are more extensive than other semi-natural grasslands, but this includes a wide range of type, condition and therefore value (purple moor-grass communities are covered under the moorland heading).


Mountain pansy

All acid grasslands are generally poor in species as a response to the acidic conditions compared with the calcareous grasslands, but some types are much richer and support Peak District specialities such as mountain pansy. There are five main types of acid grassland: two are dominated by fine-leaved grasses, sheep's fescue or wavy hair-grass, which may support a reasonably wide range of broadleaved species. It is possible that the richer acid grassland swards have been affected by acid rain from sulphur dioxide pollution in the past, as they are generally much reduced in species compared with a list provided by Moss in 1913. The acid rain could have increased soil acidity to the point that species were less able to survive in the grassland swards. Particular losses/reductions seem to be species that are normally seen in more base-rich soils like bird's-foot trefoil, the little fern moonwort, red clover, purging flax and common dog violet.

Where sheep grazing has been at high levels over many decades, flower-rich grasslands can also lose species and on thin, dry mineral soils can change into mat grass-dominated grasslands. The mat grass is wiry and contains high levels of silica, resulting in its avoidance by sheep – thus if the more desirable forage is eaten first, mat grass gradually spreads into the sward displacing the tastier species. This is an extensive grassland type reflecting centuries of sheep grazing on our moorland fringes.

Some grasslands on damper soils support more heath rush with sheep's fescue. This too is a response to high levels of sheep grazing, as heath rush, although not as unpalatable as mat grass, also invades as other species are reduced by persistent grazing by sheep. The tussocky purple moor-grass dominated acid grassland is usually on more flushed soils where water drains through near the top of the soil profile (see Section 2).

Acid grasslands are one of the strongholds for breeding skylark and meadow pipits. Many bracken patches occur in acid grassland and these, plus the grasslands themselves are important habitats for twite, one of our rarest declining breeding bird species (see Section 6).

Many of the acid grasslands are integral parts of the wider moorland environment and have been included in the Dark Peak and South West Peak SSSIs/European protected sites recognised for their internationally important bird populations.

3.5.3 Amount

Acid grassland covers by far the largest area of the BAP grasslands, with ***8,611*** ha mapped. Most is in the Dark Peak (62%) and South West Peak (31%), and is unenclosed; 73% is found within the Natural Zone Section 3 Moorland (in the National Park). 42% of the acid grassland mapped is protected under SSSI designation, with 2,179ha (25%) lying within the Dark Peak SSSI.

In 1979-80 there would seem to have been in the order of ***15,805*** ha of acid grasslands across the National Park moorland areas, most of this being unenclosed, although some enclosed grasslands are included in this total[31]. This is a higher total than that quoted above, as the acid grassland priority habitat is more restricted, reflecting the higher value grassland areas.

The area of unenclosed acid grassland has increased owing to bracken control to the tune of some 533ha in the North Peak ESA up to 1997. Some areas have been lost to newly planted upland oak woodland (e.g. some National Trust valleys on the Upper Howden Estate, patches in Longdendale under the SCaMP project[32], although these projects have mostly utilised bracken patches for new woodland).

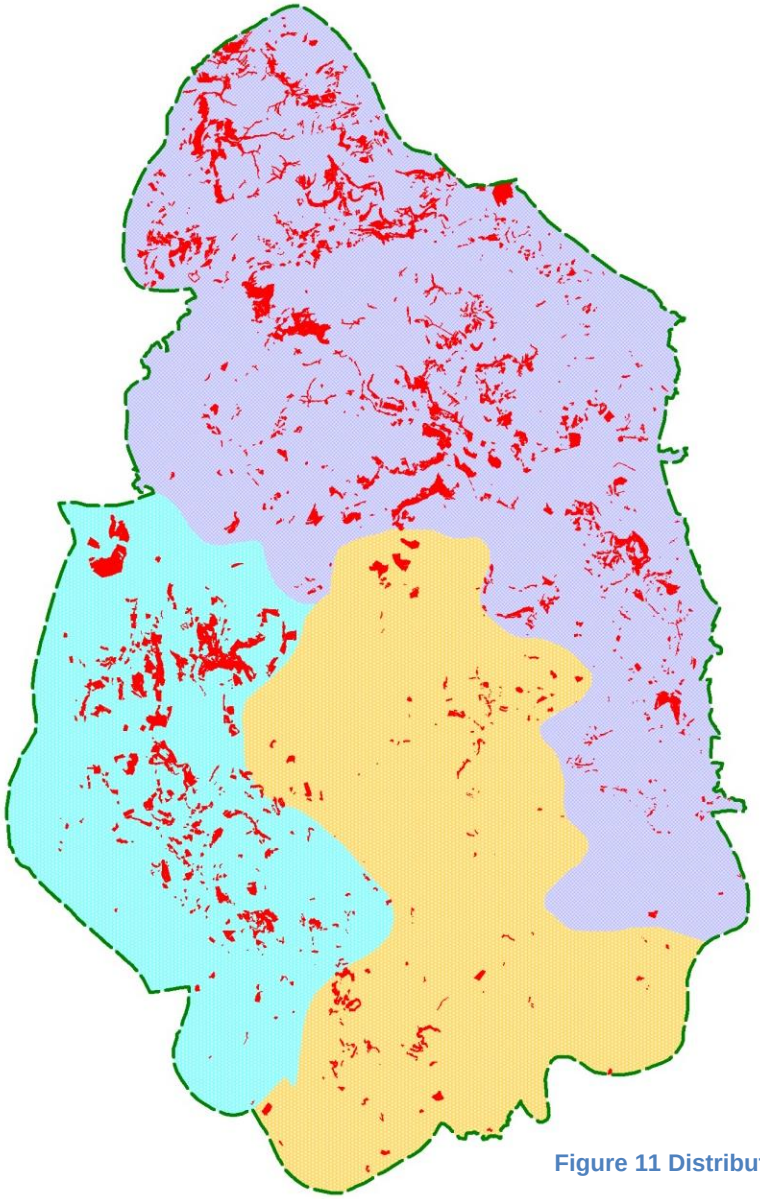


Figure 11 Distribution of acid grassland

3.5.4 The future

There is a general lack of surveys outside the SSSIs to find the most species-rich sites where protection is needed. Such sites could also be important for fungi (see 3.6 Waxcap grassland).

[31] Phillips, J., Yalden, D. & Tallis, J. Peak District Moorland Erosion Study, Phase 1 Report. Bakewell : Peak District National Park, 1981

[32] SCaMP is the Sustainable Catchment Management Programme run by United Utilities since 2005.

3.6 Waxcap grassland

3.6.1 Key points

- The Peak District has internationally important sites for grassland fungi assemblages, including a site (Longshaw) amongst those of highest value in the whole country
- Good sites are very vulnerable to even quite small changes in management
- Some are being sensitively managed by owners where there is some protection
- More systematic surveys are needed to identify the best waxcap grasslands in the rest of the Peak District
- The best sites need to be protected where they are not already

3.6.2 Nature, value and amount

Waxcap grasslands are a feature that seems to have escaped attention from mainstream nature conservation activities for too long. They are generally agriculturally unimproved, with undisturbed soils, moss-rich short vegetation, managed usually through fairly close sheep grazing, or mowing plus grazing, and support a wide range of small, often brightly coloured fungi in the waxcap group. There are also other species characteristic of the assemblage such as fairy clubs and earth tongues. Different species are adapted to acidic, neutral or calcareous conditions and are sensitive to any changes in acidity, for example by liming. They are therefore very vulnerable to losses through changes in agricultural management.


Waxcaps Penny Anderson ©

The general dearth of information is linked to the often poor species complement of higher plants at the sites, meaning that they may have been dismissed as of low value. However, more recent fungi surveys, often by volunteers and partly collated by the NPA, are starting to rectify the situation. National research has suggested criteria for identifying grasslands of different value, with 22+ waxcaps in the family *Hygrocybe* found over several surveys being recognised as of international importance. 17-21 different species present show national importance and 9-16 regional importance. Similar criteria are included for the associated fungal groups. Comparison of sites is often difficult as data collection has not always been systematic, but this is also starting to be addressed.

The results show that the Peak District excels for waxcap grasslands. Amongst the top sites in the whole of England are some of the grasslands on the Longshaw Estate with 26 *Hygrocybe* species found recently. Other internationally important sites are in grassland west of Buxton, in Ashop Valley, Coombes Dale, Chatsworth House lawns, Hucklow Edge, the Woodlands Valley, Kirk Dale, and a site close to the Roaches. The numbers could increase with time as new species are separated taxonomically and more surveys are carried out.

There are also several sites of national importance with over 17 species of *Hygrocybe*, spread around the central part of the Peak District, including Chatsworth Estate, sites in Edale, Bretton Clough, Ladybower Valley and Baslow. A further 12 sites are defined as of regional importance associated mostly with or not far from the best sites already listed, but also including Thorpe Pastures (Dove Dale).

The BAP habitat map shows a total of ***1,081.5*** ha of waxcap grassland across the Peak District, divided between the Dark Peak (253.7ha), White Peak (562.6ha) and South West Peak (265.2ha). Not all of these are of high value, but the majority lie within enclosed grasslands, and the totals will overlap with other grassland categories described in this Section.


Pink waxcap Steve Clements ©

The sites are not only important for the assemblage of waxcaps and associated species, but also due to the rarity of some species. Examples include the pink waxcap, *Hygrocybe calyptriformis*, which is very localised in Britain and Ireland and very rare in Northern Europe. It has been found on at least 12 waxcap sites in the Peak District. Other notable species include butter waxcap, limestone waxcap and date waxcap.

3.6.3 The future

The map demonstrates more the origin of the main surveyors who are largely based in Sheffield than the distribution of important sites. There is the potential for other high value waxcap grasslands to occur on the east side such as in the Goyt Valley, Lyme Park and other unimproved grassland areas in the South West Peak. The priority should be to identify other grasslands of potentially high value. This can take time as not all waxcaps and their allies appear in any one year and surveys need to be undertaken in different seasons as well, but by using indicator species such as the crimson waxcap, then new sites should be able to be identified. Finding new sites is a potential citizen science project, although detailed surveys require specialist input.

Once found and surveyed in more depth, steps will need to be taken with the landowners to protect these sites for the future. The Peak District should continue to be the prime location for waxcap grasslands, but this will only happen if the public begin to appreciate the beauty and importance of these grasslands and land owners/managers help protect them. Those on land owned by conservation bodies should be safe, but still need to be protected from other habitat creation such as expansion of woodland or changes in pasture management. Few lie within SSSIs or European designated sites.

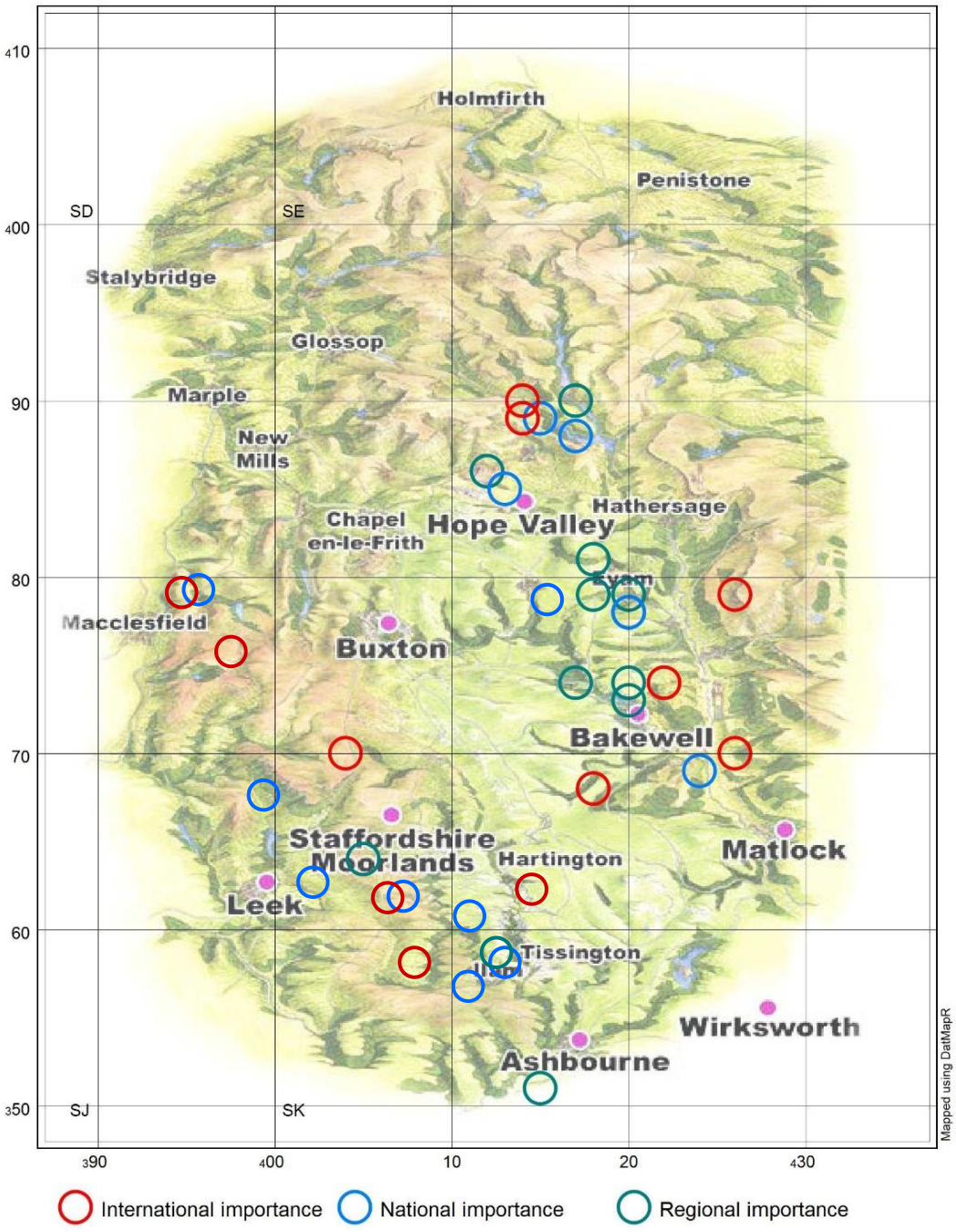


Figure 12 Important waxcap grasslands in the Peak District (kindly provided by fungi specialist Rob Foster, adapted)

3.7 Improved/ semi-improved grassland

3.7.1 Key points

- There is considerable variation in the range and amount of wildflowers in agriculturally improved grassland, but in general the more agricultural improvement there has been, the less nature conservation value remains
- Although generally of low value, many partly or improved grasslands support some of the commoner and widespread species, including those under some threat such as skylark and meadow pipit, but often in low densities
- There are probably more of these types of grassland than any other in the Peak District
- There is a great potential to enhance some of these grasslands to support more plants and animals of conservation importance with landowner involvement and to contribute more to ecosystem services

3.7.2 Nature and value

Improved grassland is essentially poor in plant species and a low quality habitat for animals. The grasslands have either been re-seeded with rye grass or other agriculturally improved species, sometimes with clovers as well, and/or broadleaved herbicides have been applied, thus just leaving grasses to dominate. Irrespective of origin, all the improved or semi-improved grasslands will have been fertilised using slurry, farmyard manure and/or chemical fertilisers.

Other common and widespread species like creeping thistle, spear thistle, broadleaved dock, meadow and creeping buttercups and/or, in wetter situations, soft rush may be present. Semi-improved grassland may have vestiges of the more diverse wildflower grassland persisting on banks or around edges or possibly within the sward. Those fields that have been treated with a broad-leaved herbicide late in the summer may still support lesser celandine and pignut which would have died back underground prior to such treatment. Fields that have not been ploughed and re-seeded may still support some of the previous meadow plants. Those that have been fertilised rather than ploughed still support more grass species, although broadleaved herbs may be at a premium. Fields that have been treated many years ago may have accrued some of the more common and widespread species again and irregular surfaces may preserve some species while the flatter areas may have been improved within an enclosure.

Thus, there is a great deal of variation in the richness and diversity of grasslands that have been subject to varying amounts of agricultural enhancement and their value for nature conservation interest will generally be the inverse of the amount of agricultural improvement that has been carried out.

Although not of high priority within BAP targets or habitats, these grasslands do provide for some of the common and widespread species. Their intensity of use will determine their value for birds like skylark, meadow pipit and curlew.

3.7.3 Amount

This habitat has not been systematically mapped, but is likely to be the largest area of grassland in the Peak District, more particularly in the White Peak where more intensive farming is prevalent on the better soils of the limestone plateaux. The main relevance of this grassland type to nature conservation is its predominance at the expense of the more valuable grassland communities and the extent of the semi-natural fragments and vestiges that still remain. It still provides the most extensive areas for birds like skylark and meadow pipit that breed in the less intensively managed fields.

3.7.4 The future


Seed spreading to restore grassland

The main value of the improved and semi-improved grasslands is to provide the potential for reversion to wildflower-rich sites where the more common and widespread plants and animals can find a new home and expand their ranges and populations.

There is also the potential for some of these grasslands to support ecosystem services in a more sustainable way in the future. This might include reduced grazing levels to reduce compaction and allow for more water penetration, reduced drainage to hold water in the fields longer and produce better quality water supplies, and to provide much more attractive amenity to support health and wellbeing for the visitors and local people who see and walk through these areas. Any such changes would be dependent on the land managers and owners being interested in enhancing the sites for wildlife and other benefits to people, linked to suitable financial support being available.

4 Woodlands

4.1 Woodland character

The National Park is notable for the general scarcity of woodlands, and is low in the table of wooded areas compared with other areas. This is partly owing to the amount of high ground and peat-covered areas where trees would not grow well, but also to the high levels of sulphur dioxide pollution over the last two hundred years or more which rendered the area unsuitable for commercial afforestation on any significant scale.

There are six main types of wooded habitats in the Peak District:

- Upland mixed ash woods
- Upland oak/ birch woods
- Wet woodland
- Veteran trees and wood pasture
- Plantations – conifer, broadleaved and mixed
- Scrub and hedges.

Ancient woodland is land that is thought to have been wooded when the first maps were produced around 1600. They are identified by a suite of indicator species when there is little or no map evidence. Ancient woodland is embedded in the other categories in the table below and cannot be added to the total cover. Re-planted ancient woodland sites (PAWS) are likely to still support some of the ground flora and animals but will have different and possibly non-native tree cover so are not usually as valued as the ancient sites. There are also quite a few small, relict ancient sites that are too small to have been included in the Forestry Commission inventory.

4.2 Amount

There are a variety of ways that woodland cover has been measured, all of which overlap with each other. According to the Forestry Commission as used in the NCA profiles, woodland cover is about ***15,271*** ha (patches over 2ha), of which only 9,574ha is broadleaved, including coppiced woods. This constitutes 63% of all wooded cover, but includes broadleaved plantations as well as semi-natural woodland of greater wildlife value.

Table 7 Woodlands across the Peak District

WOODLAND TYPE	DARK PEAK (ha)	WHITE PEAK (ha)	SOUTH WEST PEAK (ha)	TOTAL (ha)
Broadleaved	4,821 (5%)	2,809 (5%)	1,944 (5%)	9,574 (5%)
Coniferous	3,697 (4%)	136 (<1%)	1,096 (3%)	4,929 (3%)
Mixed	156 (<1%)	71 (<1%)	92 (<1%)	319 (<1%)
Other	254 (<1%)	80 (<1%)	115 (<1%)	449 (<1%)
Total	8,928 (10%)	3,096 (6%)	3,247 (8%)	15,271 (8%)

The habitat inventory given in the NCA profiles shows that there is a total of 6,016ha of broadleaved woodland that is generally of higher nature conservation interest across the area, with slightly more in the Dark Peak than the White Peak, but more by percentage cover in the latter where the limestone woodlands are found. Woodland is under-represented in the South West Peak. This woodland will be a subset of the Forestry Commission's broadleaved woodland that will also include plantations. Not all of this broadleaved woodland will be of highest calibre – this would be ancient woodland in good condition. The NPA does not have all woodlands mapped and therefore does not hold more useful data, but the totals for ancient woodland and planted ancient sites does come from their Priority Habitats database.

Table 8 Ancient woodland in the Peak District (% of total woodland cover)

WOODLAND TYPE	DARK PEAK (ha)	WHITE PEAK (ha)	SOUTH WEST PEAK (ha)	TOTAL (ha)
Broadleaved	2,964 (3%)	2,064 (4%)	988 (2%)	6,016 (6.4%)
Ancient woodland	850 (<1%)	812 (2.6%)	412 (1.3%)	2,074 (1.4%)
Planted ancient sites	573 (<1%)	262 (<1%)	84 (<1%)	919 (<1%)
Ancient sites	1,423	1,074	496	2,993

NE agri-environment data show that 562ha of woodland is included in 115 agreements, 213ha of which is under an option to maintain the wood, whilst 340ha is for restoring the sites and only 9ha for creating new woodland. The type of woodland is not given, so cannot be allocated to any of the woodland types now described.

4.3 Upland mixed ash woodlands

4.3.1 Key points

- Upland mixed ash woods are mostly dominated by ash and occur largely in the dales or on steep limestone slopes
- They are of international importance for their flora and fauna
- They are very limited in their extent and are mostly fragmented and isolated from other woodlands, but are slowly expanding
- They are at great risk from ash dieback disease
- New woodlands are needed, with the tree and shrub community reflecting the ambient soils, to link ash woodlands with other types across the area and facilitate better species movement

4.3.2 Nature and value

Ash is the dominant tree in the mixed upland ash woodlands in the Peak District, providing a very distinctive structure, light regime and excellent thin canopy for a well-developed ground cover with many important species. Sites in the Peak District are the largest examples of this important habitat in Great Britain and are of international significance under the European Habitats Directive. They support a wide range of wildlife of national importance including small- and large-leaved lime, the pink-flowered bush mezereon (a national red data book species), lily-of-the-valley, fingered sedge, and many invertebrates of distinction such as the white-spotted pinion moth, barred toothed-strip moth and lemon slugs.

Particularly fine examples of ash woodland occur in the main dales – Cressbrook, Lathkill, Dove, Hamps and Manifold valleys, Wye valley, Matlock woods and the Via Gellia woods – all in the White Peak. Figure 13 indicates the mixed ash woodlands running along the main dales.

The woodlands often incorporate small outcrops, grassy mounds and edges and other habitats such as streams with wet alder wood fringing them within their boundaries. This diversity of habitats contributes to their landscape and visual value.

4.3.3 Amount

There are ***1041*** ha of this woodland mapped, all in the White Peak both inside and outside the National Park (except 6ha in the Dark Peak and 5ha in the South West Peak on sites smaller than 2ha). This is a small proportion of what might once have been present, but which has long been removed. The woodland is well connected along the dales in which it occurs and some also links with plantation woodland, but there are very few connections over the dale tops across the plateau to adjacent dales or other woodland types elsewhere.

84% of the upland ash woods are protected within SSSIs (Figure 13) and some are county Wildlife Trust wildlife sites – providing some protection under local planning policies.

Owing to the loss or reduction of grazing in the recent past in many of the dales, upland ash woodland has spread over the last 200 years, but this has sometimes been at the expense of scrub habitat and species-rich grassland – thus there has been considerable work to reverse this natural process by conservation organisations in recent years to reclaim the valuable grasslands.

Small areas of new ash woodland have been established, mostly through re-structuring existing plantations using Forestry Commission support. The NT has just completed a Woodland Plan of Operations using a woodland grant as part of enhancement work for birds in its 292ha of woodlands in the White Peak, including thinning sycamore.

There is some potential to expand ash woodland into limestone quarries when they become available for restoration.

4.3.4 The future

Wych elm was a characteristic species of the ash woods but many were lost in the Dutch elm disease epidemic in the 1980s, although some are still thriving and regenerating. Now the biggest risk is from ash dieback disease. This could radically change the nature of these woodlands if it were to result in the death of many or most ash trees. Already there are invasive species like beech and sycamore that if they became dominant would alter the ground flora negatively owing to their heavier and longer-lasting shade.

The threat of ash dieback disease is being addressed through a partnership project between the Forestry Commission, National Park Authority, Natural England, National Trust and others to monitor, raise public awareness, share information and develop strategies for the future management of these invaluable woodlands. None of this is likely to alter the very significant changes in these woodlands should the predicted impacts of ash die-back be realised. The National Trust is assessing the vulnerability of its ash woodlands to dieback in its White Peak Estate as part of a future new woodland enhancement and management scheme.

Many of the woodlands are fragmented and isolated in the dales with little connecting woody habitat between them and other woodland types. New woodland habitat – of oak and other species depending on the soils - would be appropriate to connect the woodlands better and enable freer movement of species across the plateaux.

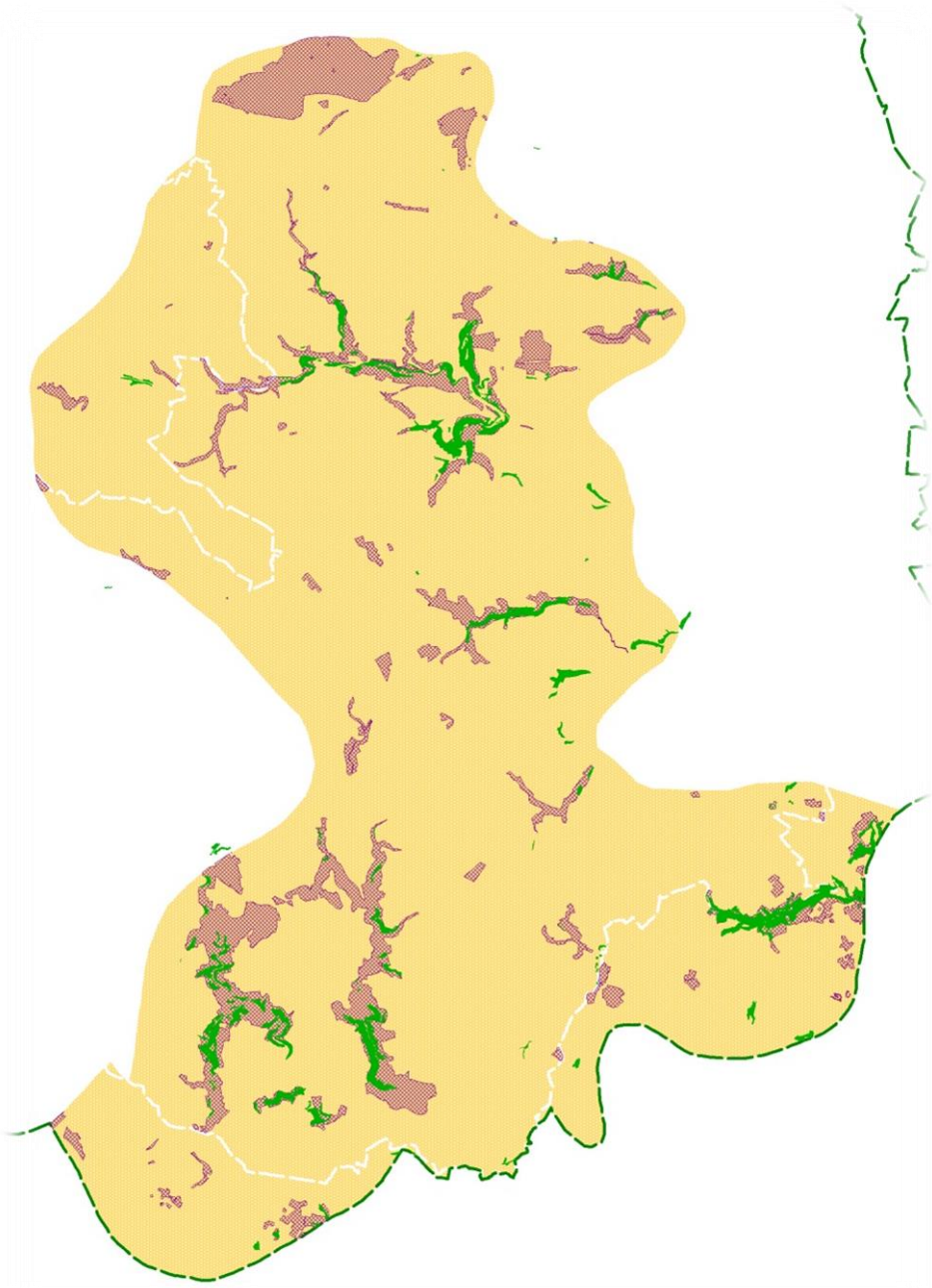


Figure 13 Upland ash woodlands in the White Peak
Green – upland mixed ash woodland, Red hatch - SSSI

4.4 Upland oak/ birch woodlands

4.4.1 Key points

- Upland oak/birch woodlands are more widespread than upland ash woodlands, but often small and isolated
- There is a greater impetus on re-creation and enhancement in a number of current and recent projects
- Effort is still required to increase size, improve structure and link to other sites to support species movement in the face of climate change

4.4.2 Nature and value

This was probably the commonest type of woodland in the past, including on the limestone plateau on leached soils, but now is largely confined to Dark Peak cloughs and valley sides, with less in the South West Peak and only tiny fragments adorning the top of some dale sides in the White Peak. There are often minor assemblages including ash or wet woodland close to the streams on more base-rich or wet soils within some of the cloughs, which contribute significantly to enhancing the overall diversity of the upland oak woodland sites.

The main species in the upland oak woodlands is sessile oak (the upland rather than the lowland English oak), along with rowan, birches and, depending on the soils, holly, hawthorn, hazel and aspen, although these are rare in most sites. The ground flora is not generally as rich as in the ash woodlands, but bluebells, wood anemone, wood sorrel, common cow-wheat in the richer woods or bilberry, cowberry, wavy hair-grass and bracken in the more acidic sites are familiar associates.

Good examples of this woodland type occur in Padley, Hayfield, Abney and Bretton Clough and in Shell Brook Valley (Wincle). Some of the best examples are incorporated into SSSIs, some focussed on the woodland (Padley Gorge), some within the larger upland habitat blocks such as Brockholes Derbyshire Wildlife Trust reserve and the woodland at Woodhead. Upland oak woodland is also one of the internationally important features for which the South Pennine SAC was designated.

The woodlands are very important for their bird assemblages – the upland wood warbler, redstart, pied flycatcher group are particularly important and in decline elsewhere. The invertebrate fauna is distinctive – the hairy-eyed wood ant in Padley for example, but this species is at its southern limit here. There are also a number of moths, a slug, and the purple hair-streak butterfly that are important in this woodland type.

Upland oak woodlands are of high landscape importance and are often highly significant for their cultural history. Many show examples of archaeological significance such as charcoal pits, or were stripped of their bark to supply the tanning industry such as at Kinder Bank wood in the 18th century[33].

4.4.3 Amount

Altogether there are an estimated ***1,962*** ha of this woodland type in the Peak District. The Peak District BAP Report in 2002 noted that there had been between an 8 and 68% loss of upland oak woodland in different parts of the area from 1909 to 1974. This is in line with national losses. Much was replanted with plantation forestry, but some has declined owing to continuous grazing which has prevented regeneration. Sporadic trees in many cloughs are now all that remain of once more widespread woodland.

[33] Farey, J. *A general view of the agriculture and minerals of Derbyshire.* 1811-15

4.4.4 Conservation

Several projects are focusing on clough woodlands. The Dane Woodland project (Cheshire/ Staffordshire border) has helped to enhance and extend the network of woodlands flanking the River Dane and its tributaries. The partnership project, using SITA Trust and HLF funding, focussed on woodland in one of the largest concentrations of semi-natural woodlands in the Peak District, especially important for its breeding redstarts, pied flycatcher and woodpeckers. 30ha of new woodland creation schemes were devised, other sites were merged on eight holdings (66ha) through stock exclusion or selective thinning to stimulate shrub growth, and more than 20 landowners were involved.

Chatsworth Estate developed a Diamond Jubilee oak woodland on East Moor in 2012.

In 2008-09 the Woodlands Bird Project (RSPB and Forestry Commission) offered financial support to landowners and managers to improve habitat for 16 vulnerable species in key target areas. The bird species it was designed to support included lesser redpoll, lesser spotted woodpecker, marsh and willow tits and nightjar. Proposals included ride widening, thinning and restructuring, and grants were available for woodland improvement, management and creation that support the target species.

4.4.5 The future

The Clough Woodland project, part of Moors for the Future, aims to develop 800ha of native clough woodland in the upper Derwent catchment and is working closely with landowners using Forestry Commission and Natural England funding. The National Trust, as part of its High Peak Vision, is expanding the upland oak woodland within its landholding. A further 150ha of upland oak woodland is being established as part of United Utilities SCaMP in the Dark Peak as well as conversion of conifer plantations to upland oak woods in some areas.

The South West Peak HLF Landscape Partnership will be planting new woodland as part of its 'Slowing the Flow' project, both to create new habitat and to slow runoff into streams. The Churnet Valley Landscape Partnership project links into the South West corner of the Peak District. It was set up to conserve and enhance the region's unique landscape and heritage for all to enjoy. It lies in deeply incised wooded valleys of the River Churnet and its tributaries.

Despite the extensive programme of woodland creation that is ongoing, there are still clough woodlands that are isolated, small and sometimes with few trees left. A priority is to extend, protect and refurbish these, as well as linking them up within the wider landscape. In many cases, the woodlands merit a scrub edge and some feathering into the moorland landscape above them to remove abrupt edges and provide a longer edge favoured by many birds and some invertebrates. There are further opportunities to restore plantations to upland oak woods as well as to enhance their role in the woodland network, which would provide further links in the face of climate change squeezing the natural ranges of species.

4.5 Wet woodlands

4.5.1 Key Points

- Wet woodlands are extremely limited in extent and generally in small patches within other habitats
- They are vulnerable to loss and not sufficiently valued
- They need additional habitat protection and creation within new woodland schemes

4.5.2 Nature and value

Wet woodland consists of a range of willows, alder or downy birch in wet soils, and is most frequent in the Dark Peak and South West Peak, with fragments only associated with the few streams and flushes in the White Peak. Wet woodland favours flushed slopes, valley sides and cloughs where soils are permanently waterlogged. They sometimes occur as part of larger oak woodlands such as in Long Clough near Glossop and in Clough Wood, Darley Dale, or may be within conifer plantations. There is wet woodland associated with some of the moorland environment where low grazing pressures have allowed willows in particular to spread into areas like the Triangle at the top of Swallow Moss, Alverhill Side adjacent to this and in patches on the Eastern Moors such as at Ramsley and on Big Moor. They are more frequent outside the highest Dark Peak areas.

Wet woodland may support a rich ground flora and invertebrate assemblage not found widely elsewhere, including species such as greater tussock sedge (although this can remain in open rushy pasture as well) and kingcup, various hoverflies, moths and craneflies. The rare and declining marsh tit is particularly associated with wet woodland.

4.5.3 Amount

There are only ***117*** ha of wet woodland recorded in the Peak District. Some has been lost to agriculture or intensive forestry. However, opportunities for this type of habitat are also fairly restricted in this area.

4.5.4 The future

Wet woodland may still be under-recorded and often occurs as a mosaic within other habitats. Their full value for wildlife may still be under-rated as well. They could be at risk from grazing and poaching. They occur typically in very small patches and suffer from a lack of connectivity between rivers and their flood plains. They are also very vulnerable to invasion by non-native stream-side species like Himalayan balsam. The priority is to protect and enhance existing sites and reduce fragmentation by expanding wet woodland in association with other woodland types. The South West Peak HLF Landscape Partnership is seeking to develop new woodland that could include some wet wood, to assist in flood control.

4.6 Veteran/ancient trees and wood pasture

4.6.1 Key points

- The amount of parkland with important veteran trees is limited but generally well protected
- Other areas need evaluation and possible enhancement
- Future veteran trees need to be managed and new trees planted to supplement the old ones
- Veteran ash trees could be lost in the future to ash dieback

4.6.2 Nature and value

Veteran oak tree

An ancient tree is one which is distinguished by its great age – this being related to the natural life-span and varies with species size. A veteran tree may be ancient as well and shows ancient characteristics but these are more likely to be related to natural damage or management. A heritage tree is one that is significant in our culture and history, connected to past events, often large and old, but not necessarily in the extreme category of ancient trees.

All these trees are of exceptional cultural, landscape and/or nature conservation value. These trees often have important associations with historical features (such as boundary trees); they are old, gnarled, venerable to look at and are very important for a wide range of invertebrates and fungi that are restricted to such trees. These special trees can occur singly, but are often important elements in an historic landscape.

Wood pasture is found where scattered trees occur in parkland and are often remnants of historic land management systems or designs. They represent a particular structure rather than a species assemblage. The best wood pastures in our area are remnants of formerly extensive areas of forest with ancient trees at Chatsworth Old Park. This has the greatest interest owing to its long history of sensitive management. The invertebrate list includes four red data book species, 13 nationally scarce species and a number of regionally significant ones too. Only a small part of Lyme Park (50ha out of the 526ha) qualifies as parkland and wood pasture and has fewer veteran trees. A larger concentration occurs at Ilam Park.

4.6.3 Amount

The extent of parkland and wood pasture of high value (BAP quality) is about ***743*** ha, with 667ha of this in A, A/B, B Grade or favourable condition, but individual trees are also of value outside this area. Ancient and veteran trees occur in the wider countryside as concentrations of trees or as isolated individuals, often in hedges, woodland edges, churchyards and other parklands or along walls. Derbyshire Wildlife Trust mapped ***1,277*** veteran trees in 2008 in the Peak District, but it is apparent that there is a lack of information for the Staffordshire Moorlands, Cheshire and Yorkshire parts of the LNP area.

4.6.4 The future

Chatsworth Old Park is protected through SSSI designation. The National Trust owns and manages Lyme Park and Ilam Park, the latter having a particularly high concentration of ancient trees. Ancient trees in the Goyt Valley are protected by the Forestry Commission on behalf of United Utilities.

The parklands and veteran trees have reasonable connectivity with other woodland and hedgerows, but many single specimens are isolated. If ash is lost to ash dieback disease, many of the old ash trees could be lost and this would be deleterious to many walled landscapes such as in the upper Manifold Valley where mature or old ash are characteristic.

Data for 2014 from Natural England on agri-environment schemes in all National Parks shows that in the Peak District National Park there are 266ha of wood pasture and parkland in agreements for maintenance purposes and 240ha for restoration. This is the majority of all the areas within the Peak District BAP area. There may be more in agreements outside the National Park boundary. The agri-environment schemes can also protect field trees. NE data for 2014 showed that across 114 agreements, 2,075 trees were included in options where they would be protected within fields, mostly within grasslands, and of these 21 were ancient trees. This, though, is a very small proportion of the total.

Data collation from any surveys undertaken outside Derbyshire is needed so that the full extent of the resource can be assessed and any protection, management or replacement needs identified. If the surveys are lacking, then new veteran/ancient tree surveys and assessments are warranted.

More saplings need to be planted to provide the old trees of the future. They need to be close enough to existing trees to help invertebrates and fungi on the old trees to colonise the new ones as they mature. There are some potential conflicts with this as some of the historic parklands are designed landscapes where other interests are also of importance. At Ilam Park, the National Trust has just completed a 6-year conservation plan that has enabled planting of some replacement trees, although more are needed.

4.7 Plantation woodlands

4.7.1 Key points

- Further enhancement of conifer plantations to better quality broadleaved or mixed woodlands with an improved structure and function should be supported
- Convert conifer plantations to other higher value habitats where appropriate

4.7.2 Nature, value and amount

Most plantations are not regarded as of high value for nature conservation (unless on ancient woodland sites), although they can contribute, if sensitively managed, to the range of woodland ground flora and animal life in the area. However, some species specialise in conifer habitats such as the crossbill and nightjar. Crossbills are dependent on the cones for its main food supply and nest in the conifers as well, with around 20 to 40 pairs recorded in the eastern valleys of the Peak District[31]. Nightjar (which is still rare in our area) utilises more open ground during the felling cycle although it shows a preference for the moorland fringe with scattered birch trees[34].

According to the Forestry Commission's forest inventory, there are 3,710ha of conifer plantation in the National Park, plus 141ha of mixed but mostly conifer plantation and 83ha of mixed but mostly broadleaved plantation. The total plantation cover in the National Park is therefore 3,934ha, but there was also a further 154ha of land ready for planting or just felled at the time of survey in 2011. The three National Character Area profiles show just under ***5,000*** ha of conifer woodland and ***319*** ha of mixed plantations in the wider Peak District (although there could be some discrepancy between the figures).

4.7.3 Conservation

The importance of plantations lies in the potential for restoring better habitats more akin to semi-natural woodlands. United Utilities are involved in some under the SCaMP project in the Goyt, near Lamaload Reservoir and in Longdendale. The National Trust has plans to remove a large area of conifer plantation in Alport Dale with the aim of converting much of it to broadleaved woodland and open moorland habitats, whilst the Forestry Commission and Severn Trent in Upper Derwent Dale are also restoring conifer plantings in places to broadleaved sites. Similarly, Sheffield City Council, as part of the wider Eastern Moors partnership, restructured most of its plantations around Bradfield, Ewden and Redmires over 2010-15 as well as plantations in the Burbage Brook valley. Lady Canning's Plantation will be similarly treated after this to convert it to upland oak woodland. The Staffordshire Wildlife Trust is converting Black Brook plantation near the A53 Leek to Buxton road to a mixture of upland habitats and new broadleaved woodland.

4.7.4 The future

Further conversion to broadleaved woodland and to other more valuable habitats warrants support. There are opportunities to tie this in with cultural heritage and interpretation, such as the restoration and display of former charcoal burning and smelting sites, as well as better woodland management and improvement of the value of woods for a range of ecosystem services such as water filtration and runoff control.

[34] Wood, D. and Hill, R. eds 2013 Breeding Birds of the Sheffield Area. Sheffield Bird Study Group

4.8 Scrub and hedges

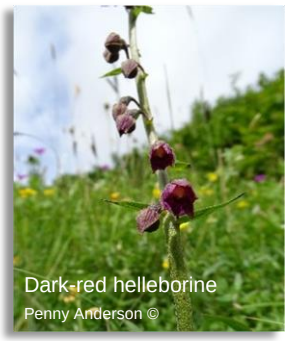
4.8.1 Key points

- Scrub and hedges are generally undervalued and have not been mapped or surveyed adequately
- More scrub needs to be protected and planted, but not at the expense of more valuable habitats
- Many hedges need better management to increase their biodiversity value

4.8.2 Nature and value

There is little information on scrub, even though it is an important habitat, particularly for a range of breeding birds. It is not separated out as a habitat in the NCAs, nor in the Forestry Commission data. Scrub occurs within a variety of habitats already described, for example as scattered hawthorn, some of which are reputed to be very old, below the edges within the moorlands, or as gorse in more acid grasslands. It has invaded after the removal of grazing or loss of rabbits in many of the limestone dale grasslands. It also appears as small patches in heathland, on peatland (in the South West Peak particularly), around farmsteads, alongside streams and rivers and within grasslands (as in the Wye Valley and Derbyshire Dales NNR).


Gorse scrub Manifold Valley Penny Anderson ©


Dark-red helleborine
Penny Anderson ©

There is one special scrub habitat within the limestone dales consisting mostly of hazel. This is widely distributed in the dales, mostly on north and west-facing slopes, for example in Chee Dale, Cressbrook Dale, Deep Dale, Via Gellia and Biggin Dale. The scrub is generally not tall, sometimes interspersed with ash poles, and contains mixtures of limestone grassland, screes and woodland ground cover. This makes them especially rich in plants. Several rare or uncommon species are associated with these patches such as dark-red helleborine and bloody cranesbill.

Hedges are far less common than walls as field boundaries in the Peak District and most are in the lower areas such as in the south and far west. Holly hedges are a feature in the Charlesworth area for example, and a number of hollins, or groups of holly planted for winter fodder in fields, can still be seen. Several place names in the area reflect a long history of association with holly (Hollingsworth, Hollinwood).

Hedges in the southern Peaks tend to be fairly recent and hawthorn dominated, although there is more variation along stream sides where scattered shrubs and trees decorate the landscape, particularly in spring when bird cherry and others are in flower.

4.8.3 The future

There is a need to recognise scrub and hedges as useful habitats. They provide support for a range of birds like garden warbler, willow warbler, reed bunting and a variety of common garden birds, some of which are on the red list of conservation concern (such as song thrush). Gorse patches are favoured by breeding linnets and Dartford warblers if they stay to breed on the moors. Scrub flowers and fruits are important for wintering birds like fieldfare and redwing, but also for a variety of other animals, and their flowering and fruiting brighten the countryside for local people and visitors alike.

It would be useful to collate and develop a database for hedges and identify those that are in agri-environment schemes, where they might be encouraged to be taller and thicker, and thus be more useful habitats (compared, for example with those in the photo).

Scrub should also be incorporated into woodland planting, providing some patches within the new wood and along edges as well, provided this does not replace existing important habitats.


Warslow Brook area Penny Anderson ©

5 Wetlands

Wetlands here include still water in ponds and reservoirs as well as streams and rivers. Springs and flushes are covered within the Moorland or Grasslands sections where they occur within these habitats. Most wetlands form part of an integrated and complex suite of habitats including stream-side woodlands, tall herbs, marsh and fringing trees and shrubs. Ponds may sit within marshy ground, in grasslands or woodland. Many will be in gardens or school grounds, but these have not been counted.

5.1 Ponds

5.1.1 Key points

- Most ponds are of historical value and lie in the White Peak, with few occurring elsewhere
- Only 297 or 9-15% of ponds are known to be of high conservation value
- There is insufficient information on the rest of the ponds
- Many ponds have been lost
- A citizen science project is suggested to find out more about pond numbers and quality, including domestic ones, which would help raise the profile of ponds in the landscape
- More ponds could then be restored and maintained to increase the pond network

5.1.2 Nature, value and amount

Ponds are defined in the National BAP as permanent or seasonal standing water bodies up to 2ha (which would be a very large pond) in extent. Larger than this they are lakes. The Priority BAP data held by the National Park suggests there are around 2,000 BAP-quality ponds. Three quarters of these are in the White Peak, mostly represented by dew ponds dating from the 19th century and largely associated with the limestone plateau, although there are a few in the dales. These are an important part of our cultural heritage.

Attempts to provide an estimate of the total number of ponds and lakes has also been made using GIS OS mapping to count the polygons shown as water, but will need some ground-truthing as not all will be water bodies. On the other hand, garden ponds and some more recent ponds as in school grounds are not included. The new figures (in Figure 14) show the same sort of distribution as the BAP data, with the White Peak holding more than the other NCAs. The total area covered on the OS maps enables average pond sizes to be calculated – revealing an interestingly smaller average (23m^2) for White Peak ponds compared with 32-35m^2 in the other NCAs, reflecting clearly the preponderance of small dewponds in the White Peak.

The new GIS data identifies all open water shown on the OS maps, which does not mean that such ponds are functional. Many ponds, particularly dewponds that are no longer needed as a source of drinking water for stock, have been abandoned or filled in, even though they may be still visible on maps. The actual number of functional ponds will lie somewhere between the figures presented.

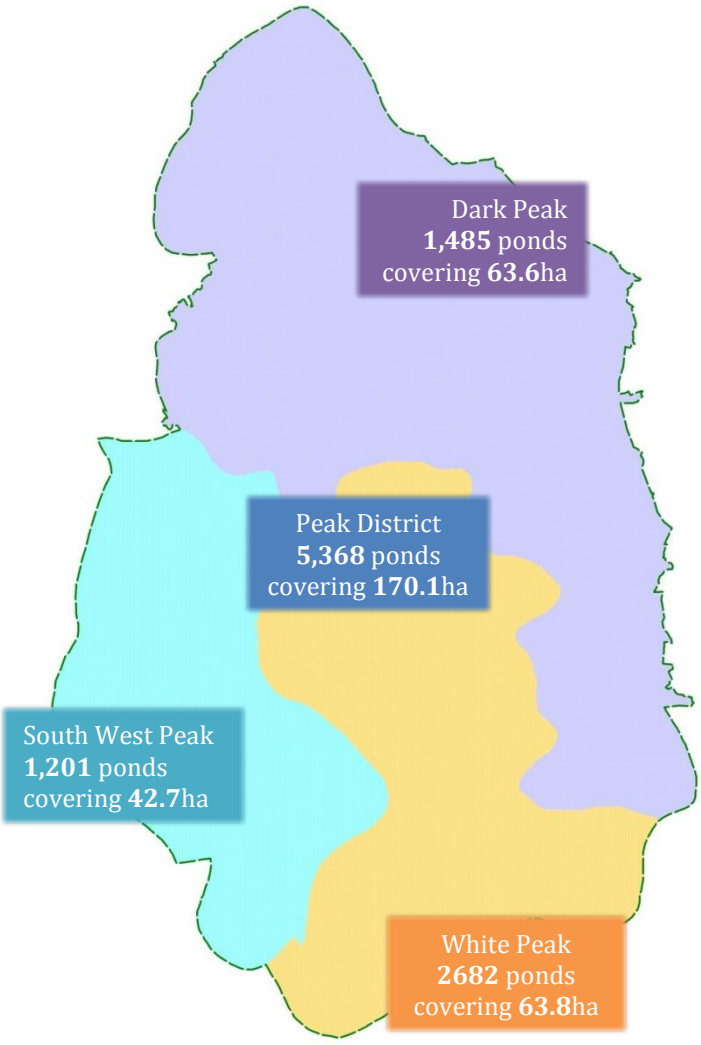


Figure 14 Ponds in the Peak District

In addition to the dewponds, there are fish ponds, millponds, ponds associated with former coal workings, well known moorland ponds such as the mermaid's pools, and ponds associated with old mineral workings such as the silica sand pits and limestone quarries. Domestic garden ponds and those developed in school grounds add significantly to the overall total but may not be included within the GIS total.

The pond as a habitat is very variable, with water quality, depth and chemistry dictating the plant community that establishes. This can be a mixture of fringing marsh and reed bed species, emergent plants that grow out of the water such as yellow iris and some rushes, and submerged species such as crowfoots and starworts. There are several locally rare plants associated with some ponds, such as common and pond water crowfoots and marsh cinquefoil. The structure and cover of vegetation in turn determines the range of aquatic invertebrates that frequent the ponds. Aquatic beetles and bugs, including several nationally scarce water beetles, make ponds in the Peak District particularly important.

Breeding amphibians are perhaps the most familiar animal life associated with the Peak District ponds, the most iconic of which is the European and UK protected great crested newt. Although few ponds support large numbers, the total population across the White Peak pond network is considered to be of high importance. ***131*** ponds have records of great crested newt, with 72 of these being dewponds, although some of these have not been resurveyed in many years. In a 2008 survey 170 ponds were surveyed for great crested newt; they were found in 70 of them. There are therefore likely to be more in as yet unsurveyed ponds.

Of 767 ponds that are mapped, ***296*** have been identified as of high nature conservation value, but none are individually more important than others. The key feature is that there are many ponds close enough together to facilitate movement of species between them, which is especially important for great crested newts that generally do not travel more than about 250-500 metres from their birth pond. The integrity of the network is therefore the more important parameter.

As in other parts of the country, there have been significant losses of ponds particularly in the 1970s and 1980s, with possibly up to 50% having been lost. Losses seem to have reduced in recent decades, partly compensated by new ponds developed in conservation schemes. The main loss has been in dewponds – both from infilling and from lack of maintenance (as their function is no longer needed with piped water available instead), resulting in loss of water-holding capacity.


Dewpond in Long Dale Penny Anderson ©

The threats to ponds relate principally to livestock trampling of sensitive pond linings, neglect, cracking and the resultant loss of water holding capacity, as well as the spread of non-native plants like Australian stonecrop. Intensive agricultural use close to the ponds reduces the value of the surrounding habitat for amphibians, including great crested newt, and has the potential for more nutrients to reach the water after heavy rain which reduces water quality.

5.1.3 Conservation and the future

Funding to restore and maintain ponds has been negotiated through agri-environment schemes in recent years as well as special projects funded by the Aggregates Levy Sustainability Fund and SITA Trust. The latter has targeted dewponds for maintenance, restoration and creation in the White Peak, focusing on increasing the network of ponds for great crested newt. A number of ponds have been restored as part of the BAP programme up to 2013, with five being restored as part of the Vision Project. By 2013 there were 82 restored ponds, as well as management work on 24 others and 74 newly created ponds. There will be more ponds in gardens as these have not been comprehensively recorded. More effort is required to add to, restore and maintain further ponds out of the total present to increase the relatively small number that are recognised as of nature conservation value and to protect the historic heritage.

The discrepancy between the figures obtained on pond numbers and the seeming lack of information on garden and other domestic ponds points to the need for a major pond survey. This could be a significant citizen science project if the funding to support it were found. By involving schools and local communities, information on ponds could be collected and collated, for example on basic features such as size, water holding capacity, presence of vegetation or amphibians using selected indicators. Better quality ponds could then be surveyed by experts together with local champions from the communities. This would raise the profile of ponds as valuable assets and habitats within the landscape and identify the key ones in need of further management and conservation.

5.2 Rivers and streams

5.2.1 Key points

- The character of watercourses in the Peak District vary with the geology
- The White Peak streams and rivers in particular are important for a wide range of species including white-clawed crayfish, bullhead, brook lamprey, trout and salmon
- Water voles (a protected British species) are now mostly restricted to small head-waters, especially in the moorland zones
- There are a number of non-native invasive species associated with water which are being controlled where possible. Crayfish plague is particularly damaging and the native white-clawed crayfish is in grave danger of extinction
- The water quality was deemed by the Environment Agency to be mostly good or moderate in 2009, but will have improved through implementation of River Basin Management Plans
- The 2015 River Basin Management Plans and the Catchment Based Approach being advocated by Defra and being developed through partnerships will deliver more measures to improve water quality and habitat throughout our area
- The priorities for control of diffuse pollution, especially phosphorus and pesticides, is reflected in the new Countryside Stewardship priority maps
- A variety of measures are being applied to improve water quality and river flows; re-wetting peatlands in the upper catchments, introducing woody materials, woodland planting to slow flows and weir removal to improve geomorphological functionality
- Flood control is identified as priority over most of our area, with further work needed to cope with climate change

5.2.2 Nature and value


Warslow Brook Penny Anderson ©

Rivers and streams vary significantly in the Peak District dependent on the geology of the ground over or through which they flow. Small upland streams start mostly in the Dark and South West Peaks, from the blanket bogs or starting in small springs and flushes on valley sides. These are more acidic than those with sources within the limestone area, although the Wye and Dove streams move quickly into the White Peak having originated within the gritstone moors. Limestone streams (e.g. Lathkill Dale, Monks Dale, Cressbrook Dale) often emerge from caves or on the dale floor as the water table rises after wet seasons. Some stretches are seasonal.

The lower reaches of the rivers tend to be wider, slower flowing and in broader valleys, and are commonly tree-lined. Many have been engineered in the past, being straightened, deepened, disconnected from their flood plain (such as parts of the Manifold) and controlled through weirs, associated with leats or old mills.

The more acidic waters support few higher plants, but a cover of mosses and liverworts may be present, along with a typical invertebrate fauna. In the lower reaches brook lamprey, bullhead (both EC Annex II Habitats Directive species and important within the European context) and birds such as goosander and common sandpipers are important.


Dipper

White Peak river water is more calcareous and often supports blankets of aquatic plants such as river crowfoots or watercress. The animal life is more diverse, and includes white-clawed crayfish, brook lamprey, brown trout, grayling and bullheads. Dippers, kingfisher, grey wagtails, feeding herons and little grebes are characteristic bird life on these rivers. Juvenile salmon have been re-introduced into the Dove and Churnet leading to adults now naturally spawning in the River Dove. Non-stocking policies by fishing clubs and an appreciation of the need for healthy habitats rather than artificial stocking are increasingly promoting healthy native fish assemblages as well. The River Derwent, especially from Chatsworth to Bakewell, is the most important river for breeding goosander, although there are a few elsewhere such as associated with the Rivers Etherow, Wye, Dove and Noe. Birds tend to remain in the area during winter as well. Numbers have generally increased since 1982.

Mandarin duck, originally from China have increased in number over the last 25 years, particularly along the Dove and Manifold, and can now sometimes be found on the Wye and Derwent Rivers and in some of the dales. Although introduced, they do not seem to be competing with native species significantly.

The Peak District Dales and Woodlands SAC is partly designated for its populations of white-clawed crayfish, bullhead and lamprey. From the perspective of water quality, the Peak District Dales is also an existing priority catchment under the England Catchment Sensitive Farming Delivery Initiative, which was extended in 2008 to include the River Churnet[35].

Several White Peak rivers were once major habitats for the white-clawed crayfish (EC Habitats Directive Annex II species) but the invasive American signal crayfish has spread crayfish plague to which the native species has no resistance and is wiped out. Numbers of white-clawed crayfish have plummeted in the Peak District as a result and only a few sites remain as sanctuaries for the dwindling populations. The Dove and Manifold rivers are now devoid of native crayfish. The species is now listed on the IUCN Red List of Endangered Species, meaning that it is considered to be facing a high risk of extinction in the wild. Surveys in 2011 discovered a healthy population on the River Bradford that then survived droughted conditions. There could be more populations, but they are now very rare.

Water voles (UK protected and a UK and local BAP species) are an important species associated with streams in all the NCAs. They have declined in line with the very significant national losses owing largely to habitat loss and mink predation. Upland populations have been discovered, often among rushes with limited banks for burrowing and only shallow water to provide cover. However, these are generally out of reach of mink. The most important rivers in the Derbyshire Peak District for water voles are the Wye-Derwent, Upper Derwent-Etherow moors and Eastern Moors[36]. Populations have recently been recorded on the upper reaches of flushes and streams north of Longdendale as well[37]. The Cheshire fringes have not been surveyed or assessed for suitability for water voles, and no information is available from other counties.

Otters (a European Protected Species and BAP species) are mainly associated with rivers. Owing to the countrywide reduction in damaging pollutants and to widespread enhancement of stream habitats for otters, they have shown a range and population expansion throughout the country, recorded since 2011 in every county. Records for the Peak District are still very sparse and rare. They have been recorded since 1992 in the Dove and Derwent catchments and on the Wye-Derwent by 1998, but their main strongholds are in the lower-lying river valleys south of the Peak District in Derbyshire[36].

A feature of rivers more than any other habitat is the number of non-native invasive species which are in need of control. Himalayan balsam is the main plant culprit on river sides, and is particularly abundant along the Manifold and in many of the north-west stream sides, and is also a major problem along the Derwent. Although an annual, the vigorous growth swamps out the native species beneath it, reducing the diversity along the bank sides, as well as causing erosion when it dies back leaving bare ground. Another non-native invasive plant species is giant hogweed. This lives alongside rivers, on waste ground and waysides, but is not common or widespread in our area. As it can result in dermatitis if touched, it has to be removed. It has been recorded in the Chapel-en-le-Frith and Castleton areas.

American mink, established after escapes, are now widespread across our area associated with all the main rivers, especially the Dove, Goyt, lower Wye, Derwent and many of their tributaries, including small streams on the moors up to 500m[36]. They are responsible for the loss of water voles and nesting birds.

Assessment of the ecological status[38] of the rivers in 2009 in the Peak District can be summarised from the River Catchment Management Plans and from data supplied directly by the Environment Agency. Equivalent data have not been sourced to update these figures, but the work on the Plans will show improvements overall. The conditions were:

- mostly good or moderate in the River Dove (including the Churnet, Manifold and Hamps);
- mostly moderate (Wye) with some good stretches on the Derwent within the Peak District;
- mostly good or moderate status for the Etherow and its headwaters, although poor stretches are found where the streams/rivers pass through more urban areas such as New Mills and Glossop;
- mostly good in the upper reaches of the Don and Rother in the Peak District.

[35] *https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297488/gene0910bsqr-e-e.pdf*
[36] Mallon, D., Alston, D. and Whiteley, D. 2012. *The Mammals of Derbyshire*. Derbyshire Mammal Group and Sorby Natural Society
[37] O'Hara, D. 2015 Effect of blanket bog restoration on breeding birds, Moors for the Future MoorLIFE conference, Halifax
[38] Classified as of high, good, moderate or poor quality dependent on biological elements, the concentrations of physical-chemical elements such as oxygen and ammonia, pollutant levels such as copper, and the degree of disturbance of the stream morphology

No rivers showed high ecological status associated with natural beds and features. However, it is not surprising that the upper reaches of rivers are generally of better quality than the lower stretches where there is a greater impact of nonpoint pollution such as fertilisers from farmland, more defined discharges from industry and sewage works and additional physical structures, e.g. for flood control, that change the river morphology. Even so, the Peak District waters are not immune from such effects. Buxton's sewage works contribute to a moderate rather than good status of the Wye to its confluence with the Derwent and the many weirs on the Dove and Dane detract from the morphological integrity of the river and may obstruct fish movements.

There was a total of 171.8km of rivers in good quality, 270.1km with moderate status and 4.7km with poor quality out of a total of 446.5km assessed. This gave a percentage of rivers with good value at 38.5%, which is quite good compared with other National Parks. The Framework Directive objective is for this figure to increase to 60.2%. These data are not yet updated and available for this report to reflect progress since 2009, although they are summarised in the 2015 River Basin Management Plans.

5.2.3 Amount

There are just over 600km of waterways mapped by the Environment Agency Waterbodies Cycle 2 dataset in the whole of the Peak District BAP area. Of this, 317km lie within the Dark Peak, 114km in the White Peak reflecting the number of dry valleys with underground water, and 173km in the smaller South West Peak. The figures below are as shown on the OS map (streams taken as linear features, rivers as polygons with two banks).

Table 9 Stream and river lengths (km) in the Peak District

	PEAK DISTRICT	DARK PEAK	WHITE PEAK	SOUTH WEST PEAK
Streams	3,361.5	2,342.8	160.6	858.1
Rivers	757.2	408.9	134.5	213.8

5.2.4 Conservation

Ark sites for the white-clawed crayfish have been established in ponds distant from the invasive signal crayfish and new populations established from the National Trust's Calke Abbey Estate. In 2009, crayfish were rescued from the Porter Brook in Sheffield and re-located into a head-water stream where there were no crayfish.

The peatland restoration work described in Chapter 3 will contribute to the reduction in colour and sediment in upland streams (thus improving water quality) and therefore the aquatic invertebrates that have been shown to be affected by colour and sediment from eroding peatlands[39]. Rewetting the peatland will also increase resilience to downstream flooding.

Other river works have included installing woody debris (Staffordshire and Derbyshire Wildlife Trusts and Trent Rivers Trust) in the Dove, Manifold and Churnet Rivers near Tittesworth Reservoir. This enhances habitat quality as well as increasing resilience to downstream flooding. The National Park's Vision Project has delivered conservation and restoration work on 16ha of river corridor habitats. Altogether 15km of rivers and streams have been restored.

The Environment Agency has completed most of the measures for the area's rivers as set out in the 2009-2015 River Catchment Management Plans. Examples include habitat improvements that have been carried out on the River Dove in a joint project with Natural England's Catchment Sensitive Farming project, supported by the Trent Rivers Trust.

The control of non-native invasive species, particularly of Himalayan balsam is based on whole catchments, focussed on controlling species in the upper reaches before moving downstream. Control of Himalayan balsam has been carried out along the Manifold and its tributaries, and on the Derwent.

5.2.5 The future

Because of the Water Framework Directive, rivers receive much attention and funding is available to restore function and quality, although the future of this is unclear after we leave the European Union. Thus conservation work is ongoing and widespread. There is always room for improvement though - more weirs need to be removed. Control of pesticides and/or fertilisers is a high priority.

[39] Ramchunder S.J., Brown, L. & Holden, J. 2012. Catchment-scale peatland restoration benefits stream, ecosystem biodiversity. *Journal of Applied Ecology* 49, 182-191

The Environment Agency has objectives in the 2015 updated River Basin Management Plans (RBMP) to enhance rivers/streams with the aim to improve the number at good status by 2021 and 2027. Key measures within our part of the Humber Plan include reducing diffuse pollution, tackling impoverished biodiversity and barriers to fish movements, and balancing high visitor numbers and recreational use with wildlife protection. DEFRA is now advocating a Catchment Based Approach (CaBA) to achieve joined up multi-agency action for multi-functional gains, which are being developed by the Rivers Trust or Derbyshire Wildlife Trust for different sub-catchments in the Peak District. In the Dove Catchment CaBA in our area, for example, the objectives reflect those in the RBMP to reduce pollution and sediment loading, improve habitats, control invasive species, work with the local community, engagement to provide amenity and contact with nature, to protect and enhance the landscape character and control abstraction and mitigate its effects. Other CaBA are being developed for the other river catchments in the Peak District.

As part of the River Dove improvements Natural England, Environment Agency and partners have recently published a new River Dove Restoration Plan[40] for the SAC lying within Wolfscote, Biggin, Mill and Dove Dales. This sets out plans to remove weirs, improve bank management and add large woody debris, supported by information and interpretation where necessary, with the objective of letting the river recover its own natural processes.

The recently published priorities maps for the new Countryside Stewardship[41] reflect the priorities in the RBMPs and shows phosphorus as being of high level concern over the western half of the White Peak and eastern part of the South West Peak, and of moderate importance over much of the rest of the area. Pesticides in river water is of high concern in parts of the southern South West Peak, in the Tittesworth Reservoir catchment in particular. Other water quality parameters are generally of moderate or lower concern, apart from some smaller hotspots on the edges of our area. Work is already in progress through water companies, which are generally taking a more pro-active approach to managing these issues by working with farmers and landowners, particularly in Drinking Water Protected Areas, e.g. upstream of Tittesworth Reservoir.

Control of colour and sediment in the upland reservoirs is continuing and is an essential service to the water industry and ultimately to their customers as well as the wildlife it affects. There are still areas where invasive non-native species need controlling, and the plight of the white-clawed crayfish and water voles is still in need of urgent attention. The South West Peak HLF Landscape Project includes a scheme to search for further white-clawed crayfish ark sites, prepare management plans and to train people in survey and conservation techniques.

One particularly important role of habitats associated with rivers and streams is flood prevention or control, not so much for those living in the Peak District where flood risk is comparatively low, but for downstream communities like Derby and Sheffield. The Countryside Stewardship scheme prioritises a large part of the White Peak, all but the western margins of the South West Peak and much of the Dark Peak as a high priority for flood control measures.

The Peak District is playing its role in terms of re-wetting the blanket peats and reducing rapid runoff from the uplands, but there is more that could be done on the high moors and within some of the flood plains, some of which are no longer connected to the watercourses. A number of projects have been delivered in the Derwent, adopting the ‘Making Space for Water’ approach trialled by DEFRA, which includes creating woodland (Clough Woodland Project etc.), planting of buffer strips, and creation of woody debris dams. The ‘Slowing the Flow’ project within the South West Peak HLF Landscape Partnership project will also contribute to this overall objective. More integrated planning for the wider provision of a range of ecosystem services is needed through more joined up thinking, planning, investments and outcomes.

Natural flood risk management techniques such as the blanket bog restoration, woodland creation and woody debris dams have a key role to play in reducing flood risk during smaller storm events, but also for small communities in the upper catchments which are prone to rapid run-off from the moors and where traditional flood defences are not cost beneficial (there is greater benefit from this approach in the Peak District, than in cities like Derby).

As well as managing existing flooding, the predictions for climate change are for more extreme flow regimes and increased water temperatures which could have an adverse effect on some aquatic ecology. Further restoration and management works will be needed to keep rivers cool enough for salmonid fish and the associated variety of invertebrates. This would involve more riparian shading, especially in the upper reaches (tying in with the Clough Woodlands Project) and in the light of tree diseases like the *Phytophthora* that is currently affecting alder.

[40] Natural England 2015 *River Dove Restoration Plan* JP013
[41] https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management

5.3 Reservoirs and lakes

5.3.1 Key points

- Generally the reservoirs and lakes are of modest value for nature conservation, but some have important cultural and historic associations
- The exceptions are reservoirs which support rare mosses, Middleton Top lagoon for bird life, and reservoir edges (and upland streams) for breeding common sandpiper
- Control of invasive non-native species is important
- Promotion of new water bodies of value for wildlife in quarries etc. would be of benefit

5.3.2 Nature, value and amount

Lakes in the Peak District are rare, found mostly in large parks (Lyme, Chatsworth), whereas reservoirs are frequent, especially within the Dark and South West Peak. There are 15 lakes altogether, with four in the Dark Peak, more (11) in the White Peak (some associated with quarry floors for example) but none in the South West Peak. The total area they cover is quite limited at ***70.88*** ha. There are many more reservoirs (78), with the largest sequences being those in Longdendale (United Utilities) and the Upper Derwent and Ladybower (Severn Trent). As might be expected, most of the reservoirs lie in the Dark Peak (63), with only 14 in the South West Peak and one in the White Peak. Altogether, the reservoirs cover ***1466.14*** ha, which is significantly more than some other habitats.

Many of the reservoirs have cultural and historic interest, including the dambusters dam on Howden Reservoir. Some are run as fisheries, such as Tittesworth and Ladybower, and several are owned/used by the Canal and River Trust to top up the canal system, particularly in the west of the region (Combs, Todbrook, March Haigh reservoirs). The redundant reservoirs on the Eastern Moors have been restored to a series of ponds and marshy areas and rush beds have developed. The ponds support good numbers of dragonflies and breeding amphibians (particularly toads), while water voles have colonised the rushy stream edges. Ramshaw Reservoir ponds support a good population of shoreweed (*Littorella uniflora*); a very rare species found in shallow water, which survived the drawdown of the water when the pond sequence was created. It has also been recorded at Combs, Dunford Bridge, Errwood and Ladybower Reservoirs.

There is little information in general on the quality and value of the reservoirs. Few are renowned for their animal or plant life, although there are high quality marshes at the inlet ends of some sites (e.g. Torside) and wintering and breeding birds are important in the Peak District context. 14 reservoirs support a tiny, ephemeral moss, *Physcomitrium sphaericum*, which appears in carpets on the exposed muds when the water levels are drawn down for prolonged periods in droughted summers. It was first recorded in 1893 and has reappeared several times since. It forms part of a community of other short-lived mosses. The rare mudwort, *Limosella aquatica* (a Nationally Scarce species), also occurs along the margins of Combs, Todbrook and Ladybower reservoirs.

Common sandpiper is one of the more important breeding birds around reservoir margins (and along some upland rivers), with little ringed plover on some sites, particularly when water levels are reduced. Water birds include breeding great crested grebe and red-breasted mergansers, while snipe and lapwing can be found in adjacent marshes and wet grasslands. These are more characteristic of the lower-lying reservoirs rather than those at higher altitudes. Breeding pied wagtails and mallard are typical reservoir species as well. Woodhead Reservoir has a re-established black-headed gull colony[42]. The Upper Derwent/Ladybower reservoirs supported up to 19 pairs of red-breasted mergansers between 1980 and 2005, but breeding has since ceased for no obvious reason.


Common sandpiper Penny Anderson ©

A variety of waders drop into the reservoirs on passage in autumn and spring, but numbers and diversity are not usually notable. This is probably related to the upland location of most reservoirs and limited feeding opportunities compared with coastal and lowland sites, which tend to have more exposed mud and invertebrates. Redmires, Tittesworth and Combs Reservoirs all support a variety of passage migrants.

[42] Frost, R. and Shaw, S. ed. 2013. *Birds of Derbyshire 2013* Liverpool University Press

One of the more valued artificial wetland sites for waders is the settling lagoons on Middleton Moor. These silt up as they mature and become reed covered, but new ones are established. These lagoons are the main site for visiting waders and duck including rarely seen species. Ducks are usually present with over 100 teal at times and shelduck have attempted to breed. Various gulls use the site for loafing and breeding, while lapwings and little ringed plovers also breed there. 35 wader species have been recorded up to May 2013, a number only exceeded in Derbyshire by Ogston Reservoir (outside the Peak District)[42]. Tittesworth Reservoir is probably of equal value for its bird life, especially for passage, breeding and wintering birds.

In winter, a variety of ducks utilise some of the reservoirs and lakes with tufted duck, mallard, goldeneyes as well as goosanders recorded at times. The introduced Canada geese, which have increased significantly in their breeding numbers on the moorlands in recent years, also utilise the reservoirs regularly.

A possibly unlikely habitat of value for birds is found in the lakes that have been created or establish within quarries. The water bodies and the often wet areas around them such as in Doveholes and others around Buxton support little ringed plover, black-headed gulls, shelduck (a rare breeder in our area) and one of the few sand martin colonies in Derbyshire.

Environment Agency data for 2010-12[43] for protected landscapes assessed against Water Framework Directive objectives show that of 43 water bodies assessed in the Peak District National Park, six are considered to be of good quality, 35 only moderate and two are poor, giving 14% with good status. This is the lowest overall quality compared with other National Parks (although some have only a very few water bodies that have been assessed).

5.3.3 Conservation

The numbers and range of reservoirs are not under threat where they are part of water supply, and maintaining their water quality is important for the water companies. However, much of the re-wetting of the peatlands in the uplands focuses on reducing the peaty colour (dissolved organic carbon) in the water draining into the reservoirs since treating this is expensive and generates other environmental problems for the water companies at the treatment works.

There have been a number of projects associated with reservoirs under the aegis of the BAP to create new ponds or manage the sites to support more wildlife. New ponds have been created, for example at Tittesworth and Woodhead Reservoirs for amphibians and dragonflies.

Some quarry companies now have BAP management plans and ponds and wetland areas will form part of their continuing commitment to nature conservation, but quarry developments may also mean wet areas are lost and redeveloped elsewhere over time.

Invasive non-native species can affect reservoirs and lakes as well. The Australian stonecrop has been recorded in Errwood and Ladybower Reservoirs. It is not common in the Peak District and it has been illegal to sell since 2013 as it is so invasive.


Australian stonecrop Penny Anderson ©

[43] *By using this data, we are accepting the terms of the Environment Agency Standard Notice. Contains Environment Agency information © Environment Agency and database right. In addition, you are accepting the terms of use of the Natural England Open Government Licence, as published at http://www.naturalengland.org.uk/Images/open-government-licence-NE_tcm6-30744.pdf © Natural England copyright 2013*

6 Birds

6.1 Key points

- Many of the birds special to the Peak District do not occur, or are rarely found, in the surrounding lowlands, making the region a destination many to see these species
- There are mixed fortunes for many of the Peak District birds - some species are responding well to peatland restoration (golden plover, dunlin, curlew), others are holding their own (other moorland and some woodland species), whilst some are increasing in our area despite a national or regional decline
- Farmland birds in particular seem to be declining (lapwing, snipe, skylark when out of the moorlands)
- There are some critical situations as for twite and black grouse, which are in danger of disappearing from the area
- More research and habitat management to cater for the species of highest concern such as snipe and lapwing are needed, but there are major projects for twite to try to reverse downward trends
- Some birds of prey plus ravens have shown substantial expansion in range in the Peak District over recent decades, but several have shown marked declines, some to near extinction, in parts of the Dark Peak in particular. Several confirmed instances of illegal persecution suggest that this is a factor. The Birds of Prey Initiative is working to address the issues with estate managers and keepers, but with limited success so far
- Habitat restoration, like re-wetting peatlands and new habitat creation, such as new woodlands and restored grasslands will, over time help contribute to new sites or better conditions for some species, but others will need more targeted solutions, particularly on intensively managed farmland

6.2 The species and habitats

Although some typical birds have been described under the different habitats to illustrate some of the inter-relationships, consideration of birds as a whole and their population trends are treated separately here owing to the greater amount of information available on them compared with other species. The species included are restricted to those that are a particular feature of a habitat type or are regarded as of conservation concern nationally. Thus the common and widespread species for which there is little concern currently are not considered further, even though some are highly typical of particular habitats. For ease of presentation, the species are considered in groups, particularly where they face similar pressures. Much of the information presented has been extracted from the Birds of Sheffield[44], the Birds of Derbyshire[45], the Birds of Cheshire and Wirral[46] and the Staffordshire Ecological Record for the Birds of Staffordshire (online) with additional information from the Peak District NPA. In addition, Moors for the Future's 2004[47] survey (which compared numbers against those for 1990) of most of the Peak District moors (503km^2), further analysed by Pearce-Higgins *et al*.[48], plus some hot spot surveys in the South West Peak[49] have been accessed.

[44] Wood, D. and Hill, R. eds 2013 Breeding Birds of the Sheffield Area. Sheffield Bird Study Group
[45] Frost, R. and Shaw, S. ed. 2013. *Birds of Derbyshire 2013* Liverpool University Press
[46] Norman, D. 2008. *Birds in Cheshire and Wirral. A breeding and wintering Atlas,* on behalf of the Cheshire and Wirral Ornithological Society
[47] Carr, G. 2004. *Breeding Bird Survey of the Peak District Moors.* Moors for the Future
[48] Pearce-Higgins, J.W., Beale, C.M., Wilson, J. and Bonn, A. 2006. *Analysis of Moorland Breeding Bird Distribution and Change in the Peak District.* Moors for the Future Report no 11.
[49] Penny Anderson Associates, 2014. *South West Peak Breeding Wader Recovery Project, 2013 Monitoring Report.* Unpublished report for the Peak District NPA

6.2.1 Moorland assemblage

The importance of this group of species is reflected in their absence largely from lowland areas around the Peak District, making our region special for anyone wanting to see them on our moorlands.

Since the group of waders including golden plover, dunlin, snipe, lapwing and curlew feature in the SSSIs and/or SPAs for birds in the Dark and South West Peaks, this is taken as a group as all share some of their habitat requirements and most are of concern.

A number of surveys spread over some 40+ years provide some reasonable data from which trends can be determined for some species, although there is quite a lot of variation. The following table takes only those parts of each area that lie in the Peak District and shows abbreviated data for each species. The dates for the surveys differ, but are all in this century and sometimes are averages over a few years, so data are not entirely comparable. The national context is provided, taken from the Bird Atlas 2007-2011[50].

Table 10 Breeding waders as recorded in the county and national bird atlases and other surveys

Species (breeding)	Sheffield Area 2003-08	Derbyshire 2013	Moors for the Future 2004	South West Peak hotspot survey 2013	Cheshire 2008	National Atlas 2007-11
Golden plover *	Fairly stable, changes in occupancy	Similar since 1970-72, some change in occupancy	Occupancy increase 3%, abundance increase 4%	Increase 22 to 40	Range reduced, 6prs	Range loss 20% Britain over 40yrs
Lapwing *	22% decline in occupancy, mostly limestone uplands, smaller post-breeding flocks	50% decline in breeding pairs 2002 to 2007, low productivity	Abundance increase 115%, occupancy increase 48%	N/A	Lower densities in hills	Range loss 17% Britain over 40yrs, densities also declined
Dunlin *	>50% decline, in range & number	Decline 58% no. pairs since 1970, 24% from 1990	Declines 26% in abundance, 39% in occupancy	N/A	Only in 3 tetrads	18% loss in occupancy over 40yrs
Snipe *	44% decline in occupancy, lower densities	Reduced range	141% abundance increase, 95% occupancy increase	25% loss of pairs, (25-44% varies with method of counting)	Lost most tetrads in East hills since last atlas	31% loss of occupancy in Britain over 40yrs, but increases in Scotland
Curlew *	3.6% decline in occupancy, significant losses in limestone uplands & dales, slight increases moorland, post breeding flocks much reduced	Increase 264 to 335 2002 to 2007	75% abundance increase, 52% occupancy increase	Increase 25% (160 to 199)	Concentrated on East hills, mostly on unimproved grass	17% loss of occupancy over 40yrs Britain

Decline probable, stable or increasing
Birds of Conservation Concern[51] *red listed *amber listed *green listed

[50] Balmer, D., Gillings, S., Caffrey, B., Swann, B., Downie, I. & Fuller, R. 2013. *Bird Atlas 2007-11. The breeding and wintering birds of Britain and Ireland.* British Trust for Ornithology

[51] Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. & Gregory, R. 2007 *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man* British Birds 108 708-746

Additional findings by RSPB on the moors north of Longdendale (Dove Stones Estate, managed on behalf of United Utilities), which have been further enhanced additional to United Utilities' SCaMP restoration works, show some very revealing results. Golden plover were found to have increased threefold on areas where blanket bog had been rewetted and dunlin doubled in number per kilometre square, but up to three fold in rewetted areas, whilst curlew showed a small but upward trend. Numbers of golden plover and dunlin were more stable on intact cottongrass where no restoration had been carried out, but sheep had been removed, demonstrating the importance of the relationship with rewetting the blanket bog though rill and gully blocking, *Sphagnum* addition and revegetating bare peat. More important was the finding that golden plover chick survival and breeding success were significantly higher on the restored peatland, which would support a longer term increase in population[52].


Golden plover Paul Hobson ©

These results generally match the survey results that the Moors for the Future survey shows, which tends to be contrary to the broader county-based tetrad results, particularly for snipe and lapwing (Table 10). This also suggests that on the moorlands where re-wetting and restoration works continue, there is a real chance that breeding waders will benefit from the raised water tables and the associated support this gives to cranefly larvae - the main prey for the waders (and grouse chicks in their first few weeks of life).

The future therefore looks more positive for golden plover, dunlin, snipe and curlew on the moorland peat where restoration works are progressing and gives another strong argument for extending this to other moorland estates where and as far as possible.

This is significant in the context of national declines in range and the elevation of curlew from amber to a red-listed species of conservation concern[51]. This is particularly important since the future of some moorland species is thought to be under threat through climate change as temperatures are too warm in summer, or there could be a mismatch with cranefly emergence, or craneflies could decrease with further drying of the peat[53]. The rewetting therefore provides some resilience to the peat environment in the face of climate change.

Breeding snipe tend to utilise marshy grasslands rather than the blanket mires, so do not benefit as much from the moorland restoration works. This is a species of high concern in need of more focussed conservation effort within the wet marshy grasslands.

Lapwing is also a pasture rather than peatland species and, except for the Moors for the Future moorland survey, has shown significant declines across all areas. This is also a species of high concern, matching its nationwide status as a red-listed species owing to the enormity of the national losses. The Peak District NPA/Natural England's Wader Recovery Project, supported up to 2015, worked closely with farmers and land managers to enhance management for lapwing and other waders with some success. Predator control seems to be essential whilst bird densities are so low as well, and birds have benefited from grouse moor management and keepers' control of crows, foxes, stoats and weasels, leading to higher productivity.

Common sandpiper is a species of reservoir shores and open river edges. There have been declines in this species in the Peak District part of South Yorkshire (37% loss), matching the national decline. It seems to have abandoned the River Noe and lower reaches of the Derwent and parts of the River Ashop, but has remained along the Upper Derwent reservoirs. In Derbyshire, the Goyt, Upper Longdendale and Derwent Valley strongholds have been maintained, but the Moors for the Future survey shows a 100% increase in abundance and of occupancy. Apart from a couple of pairs around Lamaload Reservoir, there are none in East Cheshire. These data suggest mixed fortunes for this species, with some areas doing well and others lost, particularly outside the moorland environment.

Other waders are rare within the Peak District moorlands and moorland fringes. Redshank populations peaked in the 1940s and declined in the 1960s so that pairs are only found now in Longdendale, Beeley Moor and Middleton Moor in Derbyshire. This is supported by the six pairs found in the Moors for the Future surveys at only four sites (Middleton Moor was not in this survey area), with no confirmed breeding in the West Yorkshire section of the region. The cause of the decline is not known, but could be related to drainage and high levels of grazing at that time on many marshy grasslands at the edge of the moors.

[52] O'Hara, D. 2015 Effect of blanket bog restoration on breeding birds, Moors for the Future MoorLIFE conference, Halifax

[53] Pearce-Higgins, J.W., Dennis, P., Whittingham, M.J. & Yalden, D.W. 2010 Impacts of climate on prey abundance account for fluctuations in a population of a northern wader at the southern edge of its range. *Global Change Biology* 16, 12-23

Oystercatcher, a magnificently distinctive vocal species, has started appearing in the Peak District to breed, having been recorded on some eastern moorland edge habitats[54] and increasingly in southern Derbyshire.

A key moorland species is the red grouse, the race of which is found nowhere else in the world. This is at a particularly high density along the eastern moors of the Peak District and at overall much higher population levels than in 1990. The wider Derbyshire surveys showed a decline in some marginal moorland between 1972 and 2008-10. Occurrence seems to be fairly stable despite range changes, although numbers fluctuate regularly owing to density-dependent factors and disease.

Other moorland birds of interest in the core assemblage are reed bunting, skylark, meadow pipit, cuckoo, nightjar, ring ouzel, wheatear, grasshopper warbler, whinchat and stonechat.

Table 11 Other upland bird changes as recorded in the county and national bird atlases and other surveys

Species (breeding)	Sheffield Area 2003-8	Derbyshire 2013	MfF 2004 survey	South West Peak hotspot survey 2013	Cheshire 2008	National Atlas 2007-11
Black grouse *	Few seen by 2010 after introductions	Staffs pop last seen 2000, 210 birds by 2007 after introduction in Upper Derwent, 1 seen 2011	N/A	N/A	Lost in 1960	29% decline over 40yrs in Britain, habitat loss & changes
Cuckoo *	50% decline in occupancy, least on moors & most in limestone	Stable pop Eastern moors	Decrease abundance 69% & occupancy 71%	12 peak from 16 squares. Possible decline in 2009	Overall decline, concentrated in East hills	7% decline in Britain
Nightjar *	43% increase occupancy, 10-20prs at 2-10 sites moorland fringes	Have bred in Goyt Valley and below Curbar edge	N/A	N/A	None in Cheshire	12% increase in occupancy over 40yrs, population doubled
Skylark *	13% decline occupancy, mostly moorland fringe & limestone plateau	Data not extractable	Abundance decrease 7%, occupancy decrease 2%	Slight increase in occupancy	Decline	1% loss in Britain of occupancy over 40yrs, but 58% population decline
Meadow pipit *	Ubiquitous still	Possible decline in inbye fields	19% decrease abundance, 1% decrease occupancy	Slight increase in occupancy	Commonest on East hills, c.68birds/ tetrad	2% loss of occupancy over 40yrs in Britain, but population decline
Whinchat *	Range contraction – 11% decline, including Eastern Moors	Declining e.g. Eastern Moors from 64 to 23 pairs	64% increase abundance, 73% in occupancy	2 poss. pairs	2 pairs in East hills	47% loss in occupancy in Britain
Stonechat *	Increased dramatically, especially moorland fringe, 29 sites by 2008	91 pairs 2004, 3 in 1990. Declined in recent cold winters	N/A	4 pairs Roaches/ Gradbach 2014	Colonised since 1995, 7 tetrads with proven breeding	52% increase in Britain over 40yrs

[54] Wood, D. and Hill, R. eds 2013 Breeding Birds of the Sheffield Area. Sheffield Bird Study Group

Species (breeding)	Sheffield Area 2003-8	Derbyshire 2013	MfF 2004 survey	South West Peak hotspot survey 2013	Cheshire 2008	National Atlas 2007-11
Wheatear *	Long term slow decline, 15% decline occupancy	5% decline 1995-1008	59% reduction abundancy, 43% in distribution	5 pairs	Only East hills, range contraction	14% decline over 40yrs in occupancy
Ring ouzel *	7% decline occupancy, 18 territories 2002 Burbage to Stanage, 16 in 1998	Decline over 30yrs, lost from limestone	15% abundance increase, 6% occupancy decrease	2 pairs 2009, 1 singing male 2013	Only in East Hills, decline from 9-12prs to 3-4prs	43% decline in Britain over 40yrs
Twite *	97% loss occupancy, single tetrad for breeding, were 60 in 1980s + 30 breeding sites	Decline since late 1970s	10prs, 7 locations compared with 131 at 88 sites in 1990	Possibly extinct in South West Peak	None found, lost from 13 tetrads, 10 prs lost +/-2000	19% loss of occupancy in 40 yrs Britain
Reed bunting *	Increase in west of region	Stable on Eastern Moors (62prs 1998, 65 2010). Some local losses in far north	Abundance increase 794%, occupancy increase 600%	30prs 2009, 33-39 2013	Numbers crashed 1975-1984, stable since	5% loss over 40yrs in Britain, mostly South East
Grasshopper warbler *	Increase 1970s onwards. 7 males calling Leash Fen 2010	N/A	N/A	12 singing males 2009, 9 in 2015	3 tetrads in East hills, decline in whole county	Long term decline to mid-1990s, 1% in England since, much higher Scotland

Decline probable, stable or increasing in the area
Birds of Conservation Concern[55] ***red listed** *amber listed *green listed**

The good news stories are few and far between from this list. However, there are some local surveys that counteract the wider trends. For example, on the Eastern Moors Estate, now more sustainably managed by an RSPB/National Trust partnership, numbers of whinchat have defied the wider trends by increasing from 25 to 60 pairs between 2010 and 2015. Similarly, ring ouzel have increased from 4 to 7-8 pairs on Burbage Moors between 2010 and 2015 and grasshopper warblers are also showing local increases. These examples suggest a more complex picture with management potentially being a key driver.

Other species seem to be responding to climate change: stonechat and nightjar could be increasing due to warmer winters. Dartford warbler have also appeared at a few sites – a species once limited to Dorset heathland after the severe 1963 winter and possibly now an indicator of climate amelioration in our area. Reed bunting has spread from its favoured marshy habitats into drier areas and seems to be spreading, although numbers nationally are reduced and it is included on the amber list of Birds of Conservation Concern.

[55] Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, L., Musgrove, A., Noble, D., Stroud, D. & Gregory, R. 2007 *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man* British Birds 108 708-746

Of more concern are the considerable numbers of species that are declining, sometimes for reasons that are not clear. Black grouse declined on the Eastern Moors area in the 1960s and 1970s and were eventually lost, as they were from the South West Peak by 1998, despite the amount of conservation effort. These losses match a widespread trend across England and Wales, with 29% reductions in range over the last 40 years[56]. The reasons for the losses are attributed to habitat loss, fragmentation and degradation of the mosaic of habitats that should form the transitional zone between open moorland and inbye farmland. Climate change may also be a factor[53]. Black grouse were re-introduced into the Upper Derwent Valley in 2003 (Severn Trent and National Trust), with birds released over three years. Some of these are known to have widely dispersed but breeding was recorded. However, they do not seem to be persisting as a sustainable population now.

The near loss of twite as a breeding species in the Peak District, having once been a national stronghold (although never in large numbers), is possibly linked to changes from hay to silage and from unimproved to more improved grasslands close to the moorlands, since they are dependent on the seeds of hay meadow species. This would match the loss of species-rich grasslands described under hay meadows in Section 3. Further information provided by the RSPB (Byron pers. com) shows that the most recent national twite survey, in 2013, recorded a 21% decline in the size of the UK population since 1999. However, in England there was a much greater decline (-71%), with the South Pennine Moors SPA holding the bulk of the English population. A repeat breeding bird survey of the South Pennine Moors SPA for Natural England in 2014 recorded just 34 pairs, although it was noted that this could be an under-estimate given the difficulty of detecting breeding Twite. The survey report notes that this represents a 40% reduction since a similar survey in 2005 and follows a 57% decline between 1990 and 2005.

There has been a Natural England/RSPB supported twite recovery project in the South Pennines since 2010 and RSPB reports (Byron pers. com) that 2016 will be a key year, as monitoring will be undertaken to enable assessment of the effectiveness of the habitat intervention work. The key achievements so far are:

- Completion of baseline monitoring of birds in 2008–2010 and of the habitat in 2013
- 68 landowners/farmers have signed up to government and private funded schemes for 10 years (starting in 2010) to help increase food supplies for twite, with the overall aim of providing 10ha of land for foraging at each colony
- Over 338ha of land has been reseeded with twite friendly food sources (dandelion/common sorrel/autumn hawkbit, plus yellow rattle and locally harvested seed where required) to provide food sources throughout spring and summer when twite are in the South Pennines
- Raised public awareness of the plight of the twite through school visits, news articles, fetes, fairs and farm events.

Work planned or underway for 2016 includes:

- Monitoring - surveying fields which have been reseeded and also monitoring twite numbers to provide before-and-after monitoring data to assess the effectiveness of the intervention work. This will inform planning of the next phase of the project;
- Completion of the management plans for the 26 twite colonies.

Amongst the other species, skylarks have also vacated improved or heavily grazed grasslands and favour the grassy/heath matrices or rough grassland within the moorlands. The decline in the cuckoo could be linked to conditions in Africa during the winter, reduced synchrony with host nesting times due to climate change and/or to loss of prey through reduced moth populations. Ring ouzel contraction is also possibly climate change related plus low survival rates of chicks. Other species' declines such as whinchat and wheatear are unexplained. In the Peak District, the latter could be related to reduced grazing rates on the moors since they prefer short vegetation and populations have remained fairly stable on the limestone area where vegetation is often shorter.

[56] Balmer, D., Gillings, S., Caffrey, B., Swann, B., Downie, I. & Fuller, R. 2013. *Bird Atlas 2007-11. The breeding and wintering birds of Britain and Ireland.* British Trust for Ornithology

6.2.2 Birds of prey and ravens

There have been some spectacular successes over the years. Ravens were once abundant in the area up to the late 1860s and returned naturally probably in 1992. Now they are a regular sight across the area (although less so across surrounding lowland areas). The buzzard story is similar, with first breeding recorded in the 1975-80 period and subsequent spread throughout the area, possibly related to reduced persecution.

Similarly, peregrine falcon were absent from the Peak District for most of the 20th century owing to persecution plus the effects of certain pesticides. There are now around 33-44 pairs across the area. Most breed in quarries in all areas, but numbers have declined again substantially across the Dark Peak in recent years.

Goshawk numbers show a similar story. They were exterminated as a breeding species in the late 19th century, but re-established themselves after the escape or deliberate release of falconers' birds in the 1960s. By 1980 there were estimated to be about 60 breeding pairs nationally, increasing to 280 breeding pairs by 2008. The local population in the woodlands of the Peak District were considered to be of national significance[57]. However, by the late 1990s the range and numbers of territories had declined locally, particularly on the eastern side of the Dark Peak, which was proven to at least partly be the result of illegal persecution[57].

Hen harriers have always been very rare in our region (as well as most of England except for Bowland) and have bred successfully only four times in the last 20 years after an absence of over a century. However, there have been several other unsuccessful breeding attempts and they have yet to re-establish as a regular breeding species, despite suitable habitat being available.

Short-eared owl breeding pairs tend to fluctuate with numbers of their chief prey – field voles - but benefit from reduced grazing and ranker vegetation in which the voles prefer to live.

As a result of sharp reductions in populations of several birds of prey, particularly in the Dark Peak, and after some years of co-ordinated working to attempt to reverse their fortunes, the Birds of Prey Initiative, a partnership between the NPA, Natural England, Moorland Association, RSPB and National Trust, was set up in 2011 with a paid field worker. The project is working with land managers and owners in an attempt to reverse the disturbing downward trends in some birds of prey and is trying to promote a safe environment for hen harriers as well. Work is focussing on peregrine, merlin, goshawk and short-eared owl within the Dark Peak where populations are below expected levels. So far there has been no increase in populations of the threatened species, despite considerable effort being expended, and extra effort is being made in 2016 in a further attempt to reverse the losses.

[57] Wood, D. and Hill, R. eds 2013 Breeding Birds of the Sheffield Area. Sheffield Bird Study Group

6.2.3 Other birds

Many common birds occur in other habitats and gardens across the area, but there is a small group of upland specialists that are of particular interest. Pied flycatcher, redstart and wood warbler are upland oak woodland specialists, but the common redstart also occurs regularly around farmsteads. Redstart appears to be fairly stable, but pied flycatcher, having first re-colonised the area in 1945 and spread widely in the last 20 or more years, could be showing signs of decline. This is one species where synchrony with its main prey items is in doubt due to climate change. The increases across the area of other species are contrary to national declines, showing the importance of the populations in the Peak District.


Pied flycatcher

Wood warbler populations are more unstable, showing significant declines in the limestone dales, but have shown recent increases in the Upper Derwent, which is now an important centre for this migratory warbler. Another increasing species is the crossbill, particularly also in the Upper Derwent conifer plantations.

One last characteristic Peak District bird is the dipper - this seems to be stable or increasing in Derbyshire and South Yorkshire parts of our area, but declining in the Cheshire hills to the west. The increases are thought to be related to improved quality of the rivers, but this is not matched in the Cheshire sector, suggesting other factors are working here as well.

6.2.4 The future

There are a number of current initiatives that will be continuing for some years to support and help increase some bird populations. In particular, the re-wetting of the peat on the moors will continue to improve the habitat for golden plover, dunlin, snipe and curlew. More sustainable moorland management at a generally reduced intensity, as expressed in the National Trust's High Peak Vision for example, would support others, as has been shown on the Eastern Moors.

The Clough Woodland Project and other woodland restoration/ establishment programmes will all support scrub and then woodland birds as the trees mature. Farmland birds are less well supported by these programmes and merit further research and action, some of which will be produced by the South West Peak Landscape Partnership project as well as work by Natural England on the SSSI land in the South West Peak moors. Some re-wetting or reversal of drainage would restore marshy grassland as well as create better habitats for some of the wet grassland species like snipe and curlew. Increasingly intensively managed farmland is not conducive to good bird populations along with the dearth of plants and invertebrates as shown in Section 3. Efforts will be needed to engage with farmers in an attempt to reverse some of these declines.

7 Other species

7.1 Key points

- There is a general dearth of information on trends of species as a whole
- A number of species are recovering from past sulphur dioxide pollution, particularly mosses and lichens
- There are a number of sites of high value for fungi as a whole, including some rare species
- Several species (plants and invertebrates in particular) have been found or re-found in the Peak District recently, but equally, a number of species have declined or become locally extinct, particularly marsh/wet grassland and fen plants and those of agricultural grasslands
- A number of invertebrates have been recorded for the first time or are expanding their range in the Peak District in recent years, but equally, several butterfly species have been lost or have declined
- Of the mammals, red and fallow deer, otter, polecat and badger numbers have been stable or expanding recently, but others such as hedgehog and brown hare are possibly declining, and pine marten and red squirrel have been lost. Dormice, once lost, have been introduced into two Peak District woods, but their future is not yet assured.
- Bats, fully protected along with the structures that they occupy, are vulnerable to certain activities
- Habitat protection and creation would support many of the species described as well as others not specified but they need to be better integrated to support species moving as a response to climate change pressures

7.1.1 Lichens and mosses

The reduction in air pollution across the region has been shown to be having very positive effects on a variety of mosses, liverworts and lichens. This is after the major losses that occurred in the past whilst sulphur dioxide pollution, in particular, increased. Many of the species are new to the areas in which they have been found, or have re-colonised now sulphur dioxide levels have declined, associated with reduced acidity of some tree barks, which provide better conditions for species linked to specific hosts such as elder and crack willow. Recent finds include several *Orthotrichum* species and two *Ulota* species[58].

There have been 39 new lichen species to Derbyshire within the Peak District, including new species on limestone scree, shade lovers, north facing cliff species (Lathkill Dale, Deep Dale), on Longshaw estate, and many of the older woodlands in Bretton Clough, Ladybower, Lathkill Dale, Ouzeldon Clough and Matlock. Churchyards are revealing their fair share of new species as well, such as in Baslow and Monyash. The best woodland site for lichens found from 1994-2003 was Errwood Hall in the Goyt Valley[59].

[58] Lake, H. & Egan, J. 2007. Bryophytes - the return of the Epiphytes to South Yorkshire and Northeast Derbyshire. *Sorby Record*, 43, p14-22

[59] Gilbert, O. 2003. Lichen Recorder's Report 1994-2003, *Sorby Record*, 39, p70-71

7.1.2 Fungi

Good habitats for fungi other than waxcaps are varied. There are species adapted to most habitats, especially woodland, where many species form associations with trees, helping them obtain minerals and receiving nutrients in exchange. The Longshaw Estate has received much diligent fungi recording (largely by National Trust volunteers) and stands high in the list of important sites for Britain as a whole, along with the woodlands in the Upper Derwent Valley and Ashop valley. Other sites of importance are Abney Clough woods, Chatsworth estate and Rowsley cutting. The range of fungi present include a number of rarities included in the national BAP and on the red data lists. Important sites for rare species are varied but include Monsal Head, Chatsworth, Hayfield area, Kinder Scout, Ladybower, Lathkill Dale, Longshaw Estate and Upper Derwent Dale (pers. com, National Trust volunteer mycologists).

7.1.3 Higher plants

New sites for, or new species of plants have been found as a result of diligent searching and have probably been present for decades or more, but by chance not been found. Others are also more likely to be responding to reduced sulphur dioxide pollution and the concomitant reduction in soil acidity. Examples of new finds are the hybrid rose, *Rosa sabinii*, two bushes of which were recorded in 2015, one in Monk's Dale and one in Cressbrook Dale. The plant had not been recorded since 1911, probably because rose hybrids are difficult to determine. Another example is the small herb, basil thyme, found in 2015 in Cressbrook Dale – a new site for this rare species in our region (author, pers. obs).

Other notable less recent examples include marsh fern, discovered on the Eastern Moors in 1991, bog bilberry from Bleaklow in 2004, blue moor-grass from Monk's Dale in 1980, and the gametophyte (sexual phase of growth) of Killarney fern in 1990. Several uncommon moorland species, most notably bog rosemary, stag's horn clubmoss and fir clubmoss, appear to have increased in recent years, possibly in response to moorland restoration, reduced grazing or reduced air pollution and its associated reduction of acidity.

In contrast 26 species of plants (excluding hybrids, micro-species and casuals) are thought to have become extinct in the Peak District over the last two centuries, including eight moorland species (probably victims of the decline in moorland quality during the industrial revolution) and five wet grassland species. The majority (17 species) were lost in the 19th century or first few years of the 20th century, with five species lost between 1939 and 1969, and a further four since 1985. In addition the Flora of Derbyshire[60] lists 53 species which occur in the Peak District as declining in the county between 1965-86 and 1987-2008, though it does not distinguish between declines in the Peak District and lowland Derbyshire. The largest group (16 species) are associated with wet grassland/marsh/fen, with 11 species associated with grassland and a further 11 with woodland habitats. Six species are aquatic, five are associated with upland habitats and four with open/disturbed ground. These figures are based on the number of tetrads occupied and they will therefore underestimate declines in the abundance of commoner species, perhaps best illustrated by the decline in hay meadow species such as common knapweed and oxeye daisy (see Section 3.3.3).

[60] Willmot, A. & Moyes, N. 2015 *The Flora of Derbyshire*

7.1.4 Invertebrates

There have been a number of new records for invertebrates. One example is the slender groundhopper *Tetrix subulata,* which seems to have colonised the Peak District since the late 1990s from lowlands to the east, possibly as a response to climate change[61]. Another is the rare hoverfly *Criorhina ranunculi*; a Nationally Notable species and scarce locally in the Peak District, which has been found in several sites on sallow, blackthorn and other related flowers[62].

The Peak District BAP report[63] lists the logjammer hoverfly *Chalcosyrphus eunotus*, a Red Data Book species, as having been found recently during Staffordshire Wildlife Trust surveys in two tributaries of the Dane River. As an indicator of clean headwater streams with ample supplies of saturated dead wood, this points to good quality habitat in these streams. The same surveys found the upland summer mayfly *Ameletus inopinatus* recently in the upper reaches of the Rivers Dove and Manifold, making it the most southerly records for this usually Arctic-alpine species. This is a useful species to monitor in relation to climate change as it is likely to disappear from its most southerly habitats. Reducing potential future temperature increases in the rivers through woody debris installation and tree planting could assist its longer term survival.

Moth trapping sessions on Blacka Moor found nearly one third of the national larger moths reflecting the diversity of habitats on the site, including heathland, bog, woodland and scrub associated species. One particularly important moth is the beautiful snout, occurring here at the southern end of its range, and the populations of golden-rod brindle and scarce silver Y, both of which are considered to be of national importance. Alder kitten, also found on the Moor, is a nationally notable species which depends on alder[64]. There is a dearth of accounts for moths from other habitats and sites meaning that other important sites and comparisons between them cannot be undertaken at this point.

Information from the Cheshire and Peak District branch of Butterfly Conservation suggests that the situation for butterflies is generally positive, with species still common and widespread that may be declining further south. Some species like speckled wood, hedge brown, ringlet, small skipper, comma, purple hairstreak and most recently Essex skipper, have spread into the area in the last few decades, possibly in tandem with climate change. Two species appear to have undergone declines - the wall and white-letter hairstreak. Others such as small blue were believed to be extinct but have more recently been recorded, albeit in very small numbers and occasions. Several extinctions have occurred - grayling and high brown fritillary were known from one or two sites in the late 19th/early 20th century, and both pearl-bordered and small pearl-bordered fritillary may have occurred very rarely up until the 1970s.

The Bumblebee Conservation Trust describes the loss of bumblebees nationwide attributed to agricultural intensification, loss of habitat and of flowers. There is a three-year Peak District 'Pollinating the Peak' project started in 2015 run by the Trust to encourage people to help monitor and create new habitats for bumblebees across the Peak District. Moors for the Future is involved in this project, using citizen science to contribute to knowledge about the bilberry bumblebee in particular.


Bilberry bumblebee

7.1.5 Mammals

Other, rather larger animals in the Peak District include deer. Red deer populations have increased in the South West Peak after escaping from Swythamley Estate and possibly also Lyme Park in the 1970s. The total red deer herd in the South West Peak was estimated to be about 180-240 in 2001[65]. A second population is centred round the Eastern Moors and assumed to have escaped in the past from Chatsworth. It totals about 126 animals[66]. There may be potential for red deer to recolonise the High Peak, which would be a welcome addition to the fauna, but create challenges in maintaining or enhancing the condition of moorland and woodland.

[61] Whiteley, D, 2004. The Slender Groundhopper in the Sorby Area, *Sorby Record*, 40, p32-35
[62] Whiteley, D. 2004. Notes on the Hoverfly *Criorhina ranunculi* in the Peak District. *Sorby Record* 27, 2001, p66-67
[63] Peak District National Park. Biodiversity Action Plan Report 2011-2013
[64] Housley, P, 2004. Moths recorded on Blacka Moor and Wyming Brook between 1999 and 2003. *Sorby Record* 40, p18-27
[65] Yalden, D.W. 2001. Red Deer (*Cervus elaphus*) in the South.West.Peak District. *Sorby Record* 37, p25-31
[66] Mallon, D., Alston, D. and Whiteley, D. 2012. *The Mammals of Derbyshire*. Derbyshire Mammal Group and Sorby Natural Society

Fallow deer are more restricted. There is a small population on Stanton Moor and nearby wooded valleys as well as herds in deer parks like Lyme and Chatsworth. The free animals have spread slowly, possibly owing to the lack of woodland, and are renowned for their black animals possibly originating from Stanton Hall deer park in the past[65,66]. Roe deer are rare in the area, having re-established themselves after they died out by the end of the 18th century[66]. The only introduced deer species known to be in the area is the Reeves's muntjac, which is very rare currently but could invade. In large numbers they can be very damaging to woodland ground flora and young regenerating trees and shrubs (pers. obs.)

Another group of mammals of national and international importance are bats, which are fully protected by law. The commonest species are the pipistrelle and brown long-eared. Others are less frequent in our region, with Daubenton's focused on the river valleys, and others much less frequent. The major threats to bats in general are disturbance in caves where they might roost or hibernate and loss of old trees and buildings, which offer summer roosting or breeding opportunities. There are measures in place in the planning system in particular to reduce these losses related to the full legal protection of all bats and the places they occupy, but vigilance is needed in other situations to protect these species and the habitats they occupy.


Otter Paul Hobson ©

The fortunes of other mammals are varied – badger numbers have increased, whilst polecat and otter have started recolonising the area. In contrast there is some evidence that hedgehog and brown hare may have decreased. Relic populations of pine marten may have persisted into the latter part of the 20th century but appear to be extinct, and the last red squirrel was recorded in 1990 in the Upper Derwent Valley.

The hazel dormouse, a fully protected species, disappeared from Derbyshire as well as most of the Midlands and Northern England during the early part of the 20th century. However, it has been re-introduced as part of the National Species recovery programme into two woods in Derbyshire (one in our area) and one in Staffordshire within the Peak District in the 2000s. Monitoring of these new populations has shown that there appears to be a small population in the two Peak District sites. Animals have been found to have spread away from the release site in the Derbyshire wood, but the size of the population is unknown. In the Staffordshire site, nibbled nuts indicate that animals are still present, at least until last year, but again, the population is not known. The future successful establishment of breeding and expanding populations of dormice in our area is not yet assured.

Although only a few species are discussed in this section and in the report as a whole, this is largely owing to the lack of trend information for the majority. It is simply not known if many species are increasing, stable or declining. Inferences can be made from habitat changes, but the factors affecting species are many and not all respond in the same way. More information is needed on a wide range of plants and animals.

7.2 The future

Although some species are establishing and increasing, whilst others seem to be fairly stable, there are indications of significant declines and losses of some plant species, particularly those associated with enclosed grassland and wetland habitats and of some animal species. Habitat recommendations described in the preceding sections should be able to support new and larger populations of some of these species. Some species will be lost or will increase or appear in the region because of climate change. The Peak District is in need of a better integrated network of habitats of all kinds suited to the region, to enable the spread and development of new species and movement up in altitude or to the north for species that lose their climate envelope further south or in the lowlands. This would also enhance the environment for local people and visitors alike and increase the support of local ecosystem services that these habitats can provide.

New surveys and searches will reveal more or different species over time, and the involvement of many volunteers, particularly in such recording, is of paramount importance and recognised as of high value. More systematic recording is needed where good baselines are produced against which to judge future changes. Volunteers and professionals alike can contribute hugely to this.

8 Concluding comments and future direction

8.1 An overview

This review has highlighted the habitats and some of the species regarded as of high value and importance within the Peak District and shown how they contribute to the overall network and to supporting various ecosystem services.


Dark Peak moorland

Penny Anderson ©

It should be stressed that, compared with surrounding counties, the Peak District is blessed with a much larger amount and variety of intact habitats and associated species owing to the dramatic topography, steep slopes, climate and generally poor growing conditions for intensive farming. Conifer plantations have not blanketed out our habitats owing to the high pollution levels in the past, which made it uneconomic to plant up the moorland or acid grasslands compared with areas such as the Lake District and parts of Scotland. This combination of factors makes the Peak District a special place and worthy of the National Park status of much of our region. It also emphasises its importance for visitors and local people interested in being in many of the habitats and seeing some of the plants and animals – many are simply absent from or scarce in surrounding lowland areas.

This review has demonstrated the considerable extent of restoration work that has been and is being undertaken on the Dark Peak moorlands. There is still a long way to go to restore the full wetland functionality to much of the peat, but the results show we are heading in the right direction where work is being implemented. There is much that needs attention on the moors though, especially in the Dark Peak, related to issues of burning on peat and losses of birds of prey.

In the South West Peak, some moorland restoration work has been completed, an important valley woodland project has been successful, and the area is the subject of a major Heritage Lottery Fund Landscape Partnership scheme which, if successful in the next stage, will run for the next five years, with priorities being set out for this landscape and its habitats and cultural heritage. There will be more that is needed, but this will need to be reviewed once the Landscape Partnership project is completed or will need to be integrated into this project.


Penny Anderson ©

South West Peak looking north from Ecton Hill

The Peak District supports one of the lowest quantities of woodland in the country – possibly a result of past air pollution that limited commercial tree growth, although old, semi-natural woodlands are also in short supply. More woods designed to suit the local environmental conditions and as structurally functional woodland habitat (i.e. not homogenous plantations) to support a wide variety of species and other ecosystem services are needed, but this should not replace other habitats identified as of importance. The creation of more quality wet woodland, seeking opportunities to expand further upland oak woodland and upland scrub in cloughs and moorland edges and continuing the work to address the consequences of ash die-back are particularly urgent. This will include planting new trees within the landscape where mature ash are prominent and diversifying ash woods to provide some buffering of the likely effects of ash loss.

There is also considerable activity associated with watercourses in the area, promoted and supported by the Environment Agency and others such as the Rivers Trust, although there is more to be done. Ponds and their wildlife are in need of more action to find out just how many there are and to restore more of the culturally important dew ponds and other water bodies and the species they support, particularly where these form clusters which would support more species. Water in the environment is also a major attraction to people.

The White Peak stands out as being particularly short of habitats that are joined up, large enough to be sustainable and provide the full range of ecosystem services, particularly in terms of visitor enjoyment and adaptation to climate change in the future. It has been shown how the habitats here are closely dependent on the dales grasslands and woodlands, with often tiny vestiges of former widespread species-rich grasslands, lead rakes, limestone heaths and woodlands surviving on the plateaux. A new large scale project is urgently needed across the White Peak with its main objectives focused on 'bigger, better, joined up and more', as urged in the Lawton report[67] and supported by the Government in its Natural Environment White Paper. Some ideas have already been drafted by the LNP, seeking to support and extend the commoner habitats and species throughout the area, but also seeking to increase limestone heath and protect and link lead rake grasslands.

8.2 Ecosystem Services and Natural Capital

It is important to consider the Peak District's natural resources beyond individual habitats and species and place them in the wider context of the benefits to humans (the ecosystem services) and their role within the Natural Capital Programme.

When habitats are in healthy condition supporting the full complement of species typical of them, they are better placed to contribute more widely to ecosystem services. Examples would include the re-wetting of the peatlands and re-introduction of bog mosses which contribute to holding more water on the moors. This in turn helps reduce flooding downstream, particularly when restoration is on a large, landscape scale. It also helps reduce colour and sediment in water supplies. Since this is expensive to remove (as well as engendering its own environmental issues), the cost is passed onto us as the consumers.

The restored peatland will conserve its large carbon store as well as capturing more carbon from the atmosphere and actively developing more peat – all of which support efforts to reduce climate change. The restored moorland environment is much more resilient to future climate change, thus helping adaptation. A wetter moor resists wildfire more effectively, so reducing damage in drought conditions which could otherwise result in more bare and degraded peat again.

A healthier moorland environment is better for visitors too, with increased visual attraction of flowers and iconic scenes such as cottongrasses waving in the wind, heather to see and smell, and fruits, e.g. bilberries, to eat. Vegetated ground is more pleasant than slipping on bare peat or soil, and fewer erosion scars do not mar the landscape. Vegetated ground supports stock, grouse and other animals better than extensive eroding bare peat or mineral ground.


Cottongrass

[67] Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J. & Wynne, G.R. *Making Space for Nature: a review of England's wildlife sites and ecological network.* 2010

Expanding woodland cover, as in SCaMP, the Clough Woodland and Dane Valley projects, also captures more carbon than short-grazed grassland, reduces water flows and thus contributes to reduced flooding downstream, helps maintain cleaner water, reduces fertilisers, pesticides and pathogens from animal faeces reaching the water courses, and provides new habitat which is attractive to view. The woodland could provide a sustainable source of timber in the future as well. These are all benefits to people as well as showing improvements to the quality of the natural resource.

The converse of these benefits is felt when habitats are lost or simplified through intensification of land management. Thus, reseeded and species-poor grasslands trap and store less carbon than flower-rich ones. When tightly grazed, runoff to streams is faster. Fertilisers, nutrients from slurry spreading and pesticides used on grasslands in runoff lead to polluted water, reduced aquatic invertebrates and fish (a wildlife and recreational resource), higher costs at treatment works for domestic water supplies, and less attractive water bodies for visitors.

The loss of diversity in terms of habitats and species described in this report reduces the potential pleasure and health and wellbeing benefits that people can derive from visiting. The landscape is more homogenous, the colours less varied, the abundance of flowers, birds, butterflies, bees and other species that people can enjoy and love with all their senses are reduced. There is the danger of the dearth of habitats and species in some areas being regarded as the new norm. Where can people see clouds of butterflies, masses of wildflowers and skylarks singing all through a day's walk? The opportunities are much more limited in some areas now than they would have been. The 'wow' factor is severely diminished.


Walk on Fin Cop Karen Shelley-Jones ©

The same sort of relationships feed into the Natural Capital Initiative[68], the key aim of which was to produce a mechanism and process for incorporating Natural Capital into project appraisals and research agendas. The Committee, set up as part of the commitments made in the Government's 2011 Natural Environment White Paper, set out to integrate better the value of Natural Capital into decision making at all levels, setting out an experimental accounting framework that organisations can use to value the Natural Capital they own or for which they are responsible, and developing ways of measuring it and identifying which assets are at risk.

The conclusions of the Committee are that the elements of Natural Capital which provide valuable goods and services to people such as clean air, water, food and recreation, are in long-term decline, such that there is a large Natural Capital debt which is costly to our wellbeing and the economy. They argue that Natural Capital has to be safeguarded if economic growth is to be sustained[69]. The report found a strong economic case for (amongst other recommendations not relevant to our area) more woodland planting, peatland restoration and wetland creation, as well as improving the environmental performance of farming, including investing in measures that would connect wildlife areas across farmed landscapes. It has been calculated that for every £1 invested in agri-environmental schemes, society gains over £3 in return.

These findings and recommendations are of considerable significance within the Peak District context. Together with the condition of our natural resources as set out in the preceding sections, they provide a powerful case for action to restore, enhance and create habitats to support their typical plants and animals. This is not just for the sake of the wildlife itself, but as the foundation for sustained prosperity and wellbeing.

Such an approach also ties in with the new 8-Point Plan for England's National Parks[70], which focuses on connecting people with nature, creating thriving natural environments and driving forwards the economy of National Parks by promoting them as national treasures and world-class destinations. All the benefits to health and wellbeing, landscape and heritage and the rural economy that the Plan promotes would result from activities promoted by this State of Nature Report.

[68] Natural Capital Initiative 2015 Valuing our Life Support Systems 2014. Summit Summary Report
[69] Natural Capital Committee 2015 *The State of Natural Capital. Protecting and Improving Natural Capital for Prosperity and Wellbeing.* Third report to the Economic Affairs Committee
[70] Defra et al. 2016 8-Point Plan for England's National Parks

8.2.1 Natural Resources Data

The basis for any future restoration of our natural resources in the Peak District is data. This State of Nature Report focuses on the wildlife resources, but this is only one element in the Natural Capital approach. Collating data on the other natural resources so as to place wildlife into a broader environmental context would be useful. There are data available locally on water quality (some of which is referred to in this report), air quality, mineral resources and archaeology, but less on soil condition and land. Integrating these into a Natural Capital review would be useful, and provide the basis for identifying other priority actions in relation to these.

In addition, the review has shown that there is a shortage of sound data, not only on the total amount of habitat of different qualities, but also of trends over time. This is one aspect of biodiversity that LNPs elsewhere have taken a role in resolving. There is a need not only for further surveys, but some systematic recording based on habitats that can be captured on GIS and in databases. Much data is recorded voluntarily, some with well organised structures such as for bird and plant atlas recording, but others are less systematic and less easy to use in the future for comparison. There is a strong need for more organised recording across species groups and habitats and for this information to be shared freely amongst the prime users in the Peak District.

8.3 Future directions

Making a really significant difference to the overall quality of the natural resource in the Peak District requires some new models of land management, goals and rewards. New lines of thinking need to be discussed, developed and trialled. Leaving the European Union could provide the opportunity to secure more sustainable support for land management that embraces a much broader base over large areas.


Hay making in the South West Peak

One approach is High Nature Value (HNV) farming. This is low intensity farming to support valuable wildlife and the natural environment. The European Environment Agency has identified farmland with a high proportion of semi-natural vegetation or that supporting rare species or a high proportion of European populations as qualifying as HNV farmland. The system would tend to be extensive beef and sheep farming, using hay rather than silage and unimproved pastures for grazing.

Bearing in mind that in the uplands in particular, farmers receive high levels of support paid through our taxes (and indeed in many cases could not make a living without this support), then a case could be made that the farming system should provide more benefits for people (ecosystem services) and the environment, with less emphasis on agricultural productivity, which is generally very low compared with elsewhere, particularly in the Dark Peak. Farmers are often living on the edge, with difficulty in making a living, but are essential members of the local communities and social fabric and have high levels of skills and knowledge of local conditions which we cannot afford to lose.

However, to gain significant benefits for the environment would require more than just low intensity farming of what is present now, but expansion and enhancement of habitats and species. This would require a new approach to support, with the potential for including Payment for Ecosystem Services, but in a way that is consistent and long term to facilitate planning and investment.

The goal is for healthy habitats and systems, functioning to provide the optimum ecosystem services as well as to support some agriculture. The emphasis needs to change in some areas to be farming to support the habitats rather than the other way round. Such a reversal of normal thinking would support the ecosystem services more effectively. The key is for a sustainable, long-term support system to enable this approach for interested farmers and land owners.

At the same time, any new land management model would need to contribute to an overall strategy to facilitate species and habitat adaptation or migration in the face of climate change. We may well lose some species, but some butterflies, dragonflies, bees and grasshoppers, for example, could appear that are more usual in southern habitats, as well as more of the southern bird species like Dartford warbler and wood lark. If the habitats are not sufficiently linked or large enough, species movements would struggle, particularly for the less mobile ones. Large areas of low fertility land would be needed to accommodate this migration. Without it, our wildlife could decline even further over time.

An example of an HNV and Payment for Ecosystem Services approach could be a healthy, living upland environment including low levels of grazing, deer management (if present), late hay making in the inbye fields to support wildflowers and invertebrates, restored wildflower-rich hay meadows to support twite and provide beautiful vistas, more scrub, woodland and edge habitats of high quality and less intensive management for grouse. Successful re-introduction of black grouse and healthy populations of birds of prey, including hen harrier, in such a sensitively and sustainably managed landscape would be the high point. Such a landscape would also support flood control, clean air, clean water, recreation, human wellbeing, carbon sequestration and protection, and provide resilience to future climate change for habitats, humans and species.


Hen harrier Paul Hobson ©

In the limestone area, this sort of approach might look rather different, although many of the principles would be applicable.

Another paradigm worth exploring is re-wilding. This is variously defined, but the re-wilding website calls it 'ecological restoration plus a little bit more': working to restore functions, re-introducing missing species, letting natural processes reassert themselves, helping people to thrive alongside wildlife and securing the benefits nature provides (ecosystem services). The re-wilding website sees re-wilding as farming's ally.

So how would this translate itself in the Peak District? The project 'Wild Ennerdale'[71] in the Lake District, set up in 2006, is possibly the nearest suitable example. This is a joint approach between the National Trust, the Forestry Commission and United Utilities, with support from Natural England and much involvement of the local community. It focuses on one valley where the emphasis is on low input land management (not abandonment). 'Wild' is not wilderness – Britain hardly has any true wilderness - but more the sense of wildness which people can experience/perceive in an environment that has actually been shaped by centuries of human influence, supported by the encouragement of natural processes. A joint vision was developed based on an assessment and valuation of what was important in the valley:

'to allow the evolution of Ennerdale as a wild valley for the benefit of people, relying more on natural processes to shape its landscape and ecology'.

The management programme included the following:

- introducing extensive year round naturalistic grazing by cattle to create and maintain structural diversity and open areas within the valley
- allow red deer to establish a herd, maintain culling as there are no natural predators
- remove rhododendron and deliver SSSI conservation objectives for the designated areas
- monitor heritage features and consider their management
- work with farmers to remove redundant boundary fencing
- maximise opportunities to benefit farm support and development opportunities that build on special qualities of the valley
- monitor effects of changes in grazing regimes (reduced sheep on fells, increased cattle)
- reduced impact of mechanised forestry operations, and reversion of tracks to vegetated routes
- planting native broadleaf seed trees to help natural processes and allowing natural woodland encroachment
- allowing rivers to function naturally and removal of revetments in lakes to free natural processes
- working with local communities and provision of tourist opportunities.

[71] http://www.wildennerdale.co.uk/managing/stewardship-plan/

This approach is unique to the conditions and circumstances in Ennerdale and any similar approach in parts of the Peak District would need to develop its own vision and programme. It is an approach that is closest to that adopted by the National Trust's High Peak Vision and for the management of Dove Stones and the Eastern Moors, but could be extended to other areas. It could result in less intensive moorland management, increased native woodland and scrub cover in cloughs, valleys, slopes and moorland fringes, a broader local economy based on sustainable land-use and land managers benefiting more from, and being incentivised to provide, greater cultural/regulatory/supporting ecosystem services (e.g. eco-tourism), rather than the current emphasis on provisioning services.

Such an approach could involve encouragement/introduction of large natural herbivores - red and roe deer should be here, with appropriate mitigation and control measures to avoid damage as they would have no natural predators. Once the current and new habitats are healthier, beaver and wild boar (re)introductions might be considered, although larger predators (lynx and wolves) may not be a feasible option as there is not enough space or food and too many people for sustainable populations. Reintroduction of medium-sized predators such as pine marten would provide an interesting debate along with other 'missing' species such as red kite (although this could colonise naturally), osprey and black grouse.

This type of approach would provide a reinvigorated natural resource which would be much more attractive to people. A central part of any programme would be the need to engage with visitors and local people to connect them to land management and environmental quality.

This is not an exhaustive review of possible models for future land and natural resources management. Re-wilding based on the Ennerdale example is less likely to be appropriate in the White Peak, but a version of it, carefully designed, could be developed. The aim of this section is to start a debate in order to realise Nature Peak District's vision for the future.

Acknowledgements

This report has been compiled with assistance from the Peak District National Park Authority (NPA), particularly from Sarah Bird and Karen Shelley-Jones, who analysed the NPA's database and provided me with the maps, tables and some of the numbers. I was also supported by the nature conservation organisations that I was representing on the Local Nature Partnership at the time who suggested that I produce this report in the first place. Several organisations have provided comments and made helpful suggestions to improve the report.

The NPA also enabled the support I was dependent on in a period of severe austerity. I would like to thank all these organisations and the individuals involved for their support and help. The responsibility for the report's contents, however, rests with me.

Penny Anderson
August 2016

Appendix 1 Scientific names of species mentioned in text

Animals

Adder *Vipera berus*
Alder kitten *Furcula bicuspis*
American mink *Neovison vison*
Atlantic salmon *Salmo salar*
Badger *Meles meles*
Barred tooth-striped moth *Trichopteryx polycommata*
Beautiful snout *Hypena crassalis*
Beaver *Castor fiber*
Black grouse *Lyrurus tetrix*
Black-headed gull *Chroicocephalus ridibundus*
Brook lamprey *Lampetra planeri*
Brown hare *Lepus europaeus*
Brown long-eared bat *Plecotus auritus*
Brown trout *Salmo trutta*
Bullhead *Cottus gobio*
Buzzard *Buteo buteo*
Canada goose *Branta canadensis*
Comma *Polygonia c-album*
Common lizard *Zootoca vivipara*
Common sandpiper *Actitis hypoleucos*
Crossbill *Loxia curvirostra*
Cuckoo *Cuculus canorus*
Curlew *Numenius arquata*
Dark green fritillary *Argynnis aglaja*
Dartford warbler *Sylvia undata*
Daubenton's bat *Myotis daubentonii*
Dingy skipper *Erynnis tages*
Dipper *Cinclus cinclus*
Dunlin *Calidris alpha*
Essex skipper *Thymelicus lineola*
Fallow deer *Dama dama*
Field vole *Microtus agrestis*
Fieldfare *Turdus pilaris*
Garden warbler *Sylvia borin*
Golden plover *Pluvialis apricaria*
Goldeneye *Bucephala clangula*
Golden-ringed dragonfly *Cordulegaster boltonii*
Golden-rod brindle *Xylena solidaginis*
Goosander *Mergus merganser*
Goshawk *Accipiter gentilis*
Grasshopper warbler *Locustella naevia*
Grayling *Hipparchia semele*
Grayling *Thymallus thymallus*
Great crested grebe *Podiceps cristatus*
Great crested newt *Triturus cristatus*
Green woodpecker *Picus viridis*
Grey wagtail *Motacilla cinerea*
Hairy-eyed wood ant *Formica lugubris*
Hazel dormouse *Muscardinus avellanarius*
Hedge brown *Pyronia tithonus*
Hedgehog *Erinaceus europaeus*
Hen harrier *Circus cyaneus*
High brown fritillary *Fabriciana adippe*
Hoverfly *Criorhina ranunculi*
Kingfisher *Alcedo atthis*
Lapwing *Vanellus vanellus*
Lemon slug *Limax tenellus*
Lesser redpoll *Acanthis cabaret*
Lesser spotted woodpecker *Dryobates minor*
Little grebe *Tachybaptus ruficollis*
Little ringed plover *Charadrius dubius*
Logjammer hoverfly *Chalcosyrphus eunotus*
Lynx *Lynx lynx*
Mallard *Anas platyrhynchos*
Mandarin duck *Aix galericulata*
Marsh tit *Poecile palustris*
Meadow pipit *Anthus pratensis*
Merlin *Falco columbarius*
Mountain hare *Lepus timidus*
Nightjar *Caprimulgus europaeus*
Northern brown argus *Aricia artaxerxes*
Osprey *Pandion haliaetus*
Otter *Lutra lutra*
Oystercatcher *Haematopus ostralegus*
Pearl-bordered fritillary *Boloria euphrosyne*
Peregrine *Falco peregrinus*
Pied flycatcher *Ficedula hypoleuca*
Pied wagtail *Motacilla alba yarrellii*
Pine marten *Martes martes*
Pipistrelle spp. *Pipistrellus spp.*
Polecat *Mustela putorius*
Purple hairstreak *Neozephyrus quercus*
Raven *Corvus corax*
Red deer *Cervus elaphus*
Red grouse *Lagopus lagopus*
Red kite *Milvus milvus*
Red squirrel *Sciurus vulgaris*
Red-breasted merganser *Mergus serrator*
Redshank *Tringa totanus*
Redstart *Phoenicurus phoenicurus*
Redwing *Turdus iliacus*
Reed bunting *Emberiza schoeniclus*
Reeves's muntjac *Muntiacus reevesi*
Ring ouzel *Turdus torquatus*
Ringlet *Aphantopus hyperantus*
Roe deer *Capreolus capreolus*
Sand martin *Riparia riparia*
Scarce silver Y *Syngrapha interrogationis*
Shelduck *Tadorna tadorna*
Short-eared owl *Asio flammeus*
Signal crayfish *Pacifastacus leniusculus*
Skylark *Alauda arvensis*
Slender groundhopper *Tetrix subulata*
Small blue *Cupido minimus*
Small pearl-bordered fritillary *Boloria selene*
Small skipper *Thymelicus sylvestris*
Snipe *Gallinago gallinago*
Song thrush *Turdus philomelos*
Speckled wood *Pararge aegeria*
Stonechat *Saxicola rubicola*
Summer mayfly *Ameletus inopinatus*
Teal *Anas crecca*
Tree pipit *Anthus trivialis*
Tufted duck *Aythya fuligula*
Twite *Carduelis flavirostris*
Wall *Lasiommata megera*
Water vole *Arvicola amphibius*
Wheatear *Oenanthe oenanthe*
Whinchat *Saxicola rubetra*
White-letter hairstreak *Satyrium w-album*
White-spotted pinion moth *Cosmia diffinis*
Wild boar *Sus scrofa*
Willow tit *Poecile montanus*
Wolf *Canis lupus*
Wood warbler *Phylloscopus sibilatrix*
White-clawed crayfish *Austropotamobius pallipes*

Higher and lower plants

Alder *Alnus glutinosa*
Alpine pennycress *Thlaspi caerulescens*
Appleyard's feather moss *Brachythecium appleyardiae*
Ash *Fraxinus excelsior*
Aspen *Populus tremula*
Australian stonecrop *Crassula helmsii*
Autumn hawkbit *Scorzoneroides autumnalis*
Basil thyme *Acinos arvensis*
Beech *Fagus sylvatica*
Beech fern *Phegopteris connectilis*
Bell heather *Erica cinerea*
Bilberry *Vaccinium myrtillus*
Bird's-foot trefoil *Lotus corniculatus*
Blackthorn *Prunus spinosa*
Bladder campion *Silene vulgaris*
Bloody cranesbill *Geranium sanguineum*
Blue moor-grass *Sesleria caerulea*
Bluebell *Hyacinthoides non-scripta*
Bog asphodel *Narthecium ossifragum*
Bog bilberry *Vaccinium uliginosum*
Bog rosemary *Andromeda polifolia*
Bracken spp. *Pteridium spp.*
Broadleaved dock *Rumex obtusifolius*
Butter waxcap *Hygrocybe ceracea*
Cloudberry *Rubus chamaemorus*
Common bent *Agrostis capillaris*
Common cow-wheat *Melampyrum pratense*
Common dog violet *Viola riviniana*
Common knapweed *Centaurea nigra*
Common sorrel *Rumex acetosa*
Common water crowfoot *Ranunculus aquatilis*
Cottongrass spp. *Eriophorum spp.*
Cowberry *Vaccinium vitis-idaea*
Cowslip *Primula veris*
Cranberry *Vaccinium oxycoccos*
Curled hookmoss *Cratoneuron commutatum*
Creeping buttercup *Ranunculus repens*
Creeping thistle *Cirsium arvense*
Crested dog's-tail *Cynosurus cristatus*
Crimson waxcap *Hygrocybe punicea*
Crowberry *Empetrum nigrum*
Dandelion *Taraxacum officinale*
Dark-red helleborine *Epipactis atrorubens*
Date waxcap *Hygrocybe spadicea*
Derbyshire Feather moss *Thamnobryum angustifolium*
Downy birch *Betula pubescens*
Dwarf thistle *Cirsium acaule*
Earth tongue spp. *Glutinoglossum spp.*
Dwarf bladder-moss *Physcomitrium sphaericum*
Fairy club spp. *Clavariadelphus spp.*
Field scabious *Knautia arvensis*
Fingered sedge *Carex digitata*
Fir clubmoss *Huperzia selago*
Flat-sedge *Blysmus compressus*
Fragrant orchid *Gymnadenia conopsea*
Frog orchid *Coeloglossum viride*
Giant hogweed *Heracleum mantegazzianum*
Globe flower *Trollius europaeus*
Gorse *Ulex europaeus*
Great burnet *Sanguisorba officinalis*
Greater tussock-sedge *Carex paniculata*
Greater woodrush *Luzula sylvatica*
Green spleenwort *Asplenium viride*
Hawthorn *Crataegus monogyna*
Hazel *Corylus avellana*
Heath bedstraw *Galium saxatile*
Heather *Calluna vulgaris*
Himalayan balsam *Impatiens glandulifera*
Hoary plantain *Plantago media*
Holly *Ilex aquifolium*
Hutchinsia *Hornungia petraea*
Hybrid rose *Rosa sabinii*
Ivy-leaved bellflower *Wahlenbergia hederacea*
Jacob's ladder *Polemonium caeruleum*
Japanese knotweed *Fallopia japonica*
Killarney fern *Trichomanes speciosum*
Lady's bedstraw *Galium verum*
Large-leaved lime *Tilia platyphyllos*
Lesser celandine *Ficaria verna*
Lesser skullcap *Scutellaria minor*
Lily-of-the-valley *Convallaria majalis*
Limestone fern *Gymnocarpium robertianum*
Limestone waxcap *Hygrocybe calciphila*
Marsh cinquefoil *Comarum palustre*
Marsh fern *Thelypteris palustris*
Marsh marigold *Caltha palustris*
Marsh valerian *Valeriana dioica*
Mat-grass *Nardus stricta*
Meadow buttercup *Ranunculus acris*
Meadow vetchling *Lathyrus pratensis*
Mezereon *Daphne mezereum*
Moonwort *Botrychium lunaria*
Mountain pansy *Viola lutea*
Mouse-eared chickweed *Cerastium spp*
Mudwort *Limosella aquatica*
Oak fern *Gymnocarpium dryopteris*
Orpine *Sedum telephium*
Ox-eye daisy *Leucanthemum vulgare*
Pignut *Conopodium majus*
Pink waxcap *Hygrocybe calyptriformis*
Pond water crowfoot *Ranunculus peltatus*
Primrose *Primula vulgaris*
Purging flax *Linum catharticum*
Purple moor-grass *Molinia caerulea*
Pyramidal orchid *Anacamptis pyramidalis*
Red clover *Trifolium pratense*
Rough hawkbit *Leontodon hispidus*
Round-leaved sundew *Drosera rotundifolia*
Rue-leaved saxifrage *Saxifraga tridactylites*
Rusty-back fern *Asplenium ceterach*
Sallow *Salix cinerea*
Sessile oak *Quercus petraea*
Sheep's fescue *Festuca ovina*
Sheep's sorrel *Rumex acetosella*
Shoreweed *Littorella uniflora*
Small-leaved lime *Tilia cordata*
Soft rush *Juncus effusus*
Solomon's seal *Polygonatum multiflorum*
Spear thistle *Cirsium vulgare*
Spring sandwort *Minuartia verna*
Stag's horn clubmoss *Lycopodium clavatum*
Sycamore *Acer pseudoplatanus*
Thrift *Armeria maritima*
Toothwort *Lathraea squamaria*
Tormentil *Potentilla erecta*
Wavy hair-grass *Deschampsia flexuosa*
Willow spp. *Salix spp*
Wood anemone *Anemone nemorosa*
Wood sorrel *Oxalis acetosella*
Wych elm *Ulmus glabra*
Yellow iris *Iris pseudacorus*
Yellow rattle *Rhinanthus minor*