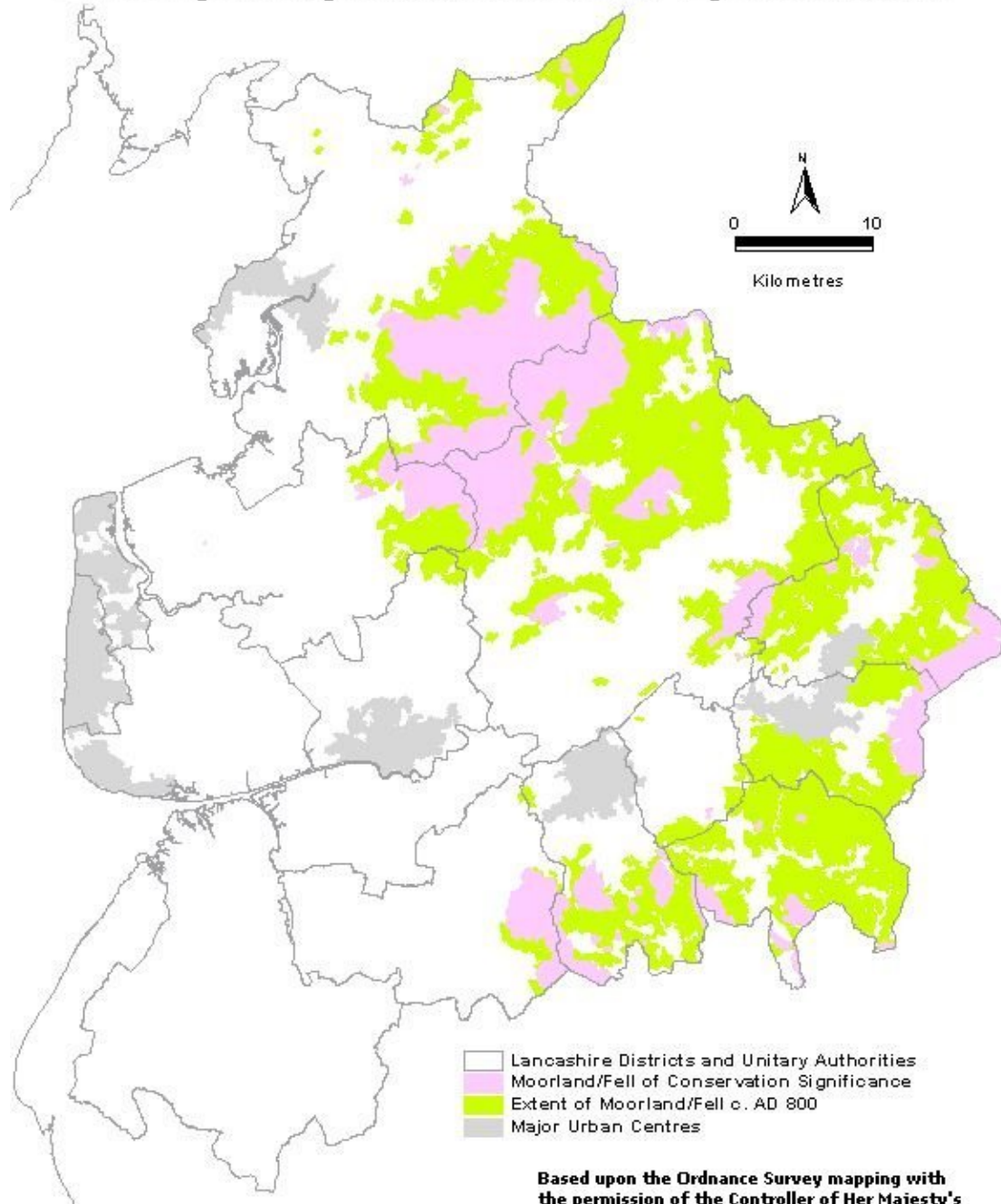


Moorland and Fell



*View of heather moorland at Marshaw Wyre and Black Clough, Forest of Bowland.
Copyright: Jon Hickling*

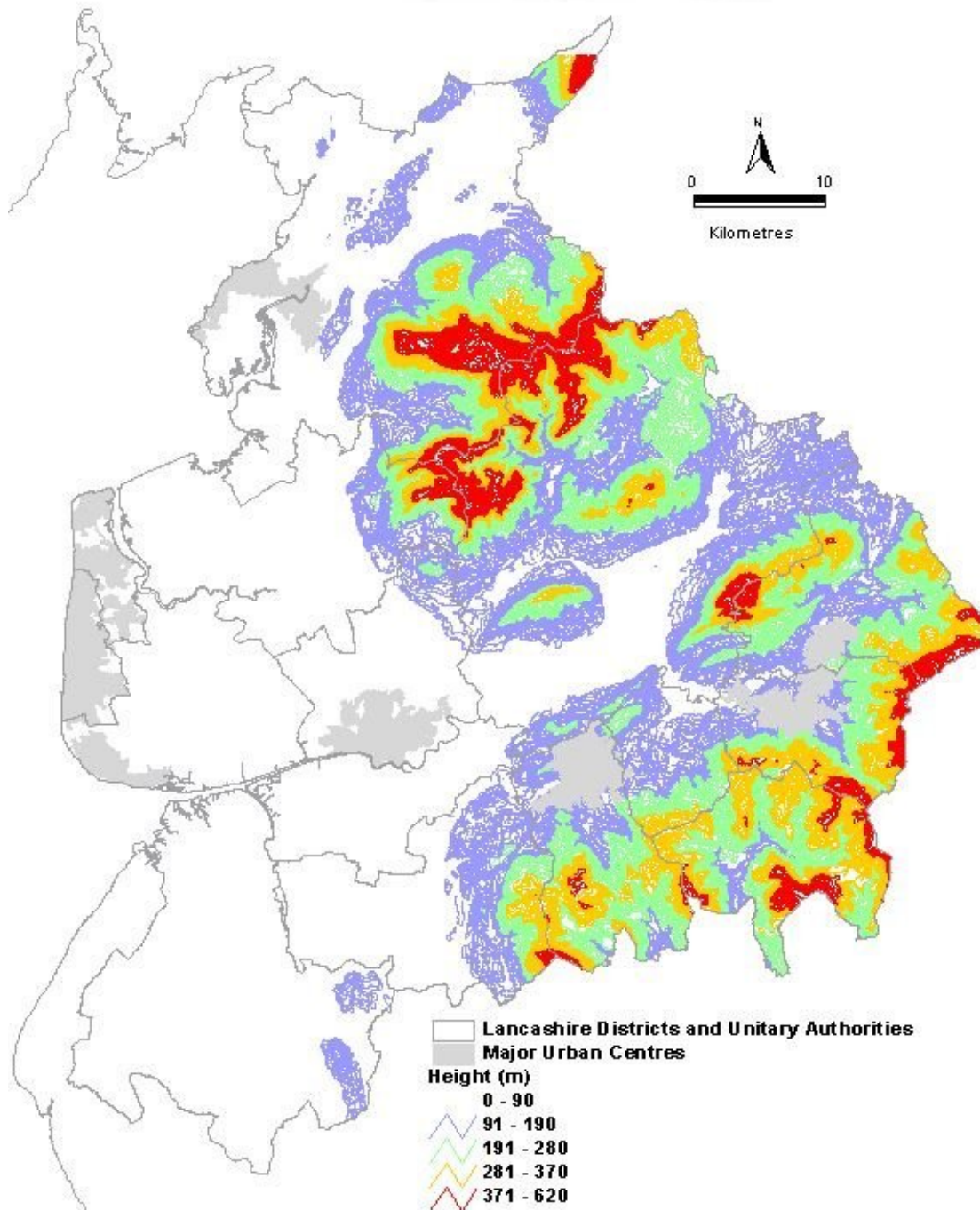
Extent of Moorland/Fell in Lancashire Showing Existing Areas of Moorland of High Conservation



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Contour Map of Lancashire



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Habitat Description

Moorland/fell includes the unenclosed upland vegetation of Lancashire as well as those fields and enclosures that support the principal upland habitat types of blanket bog, heathland, acid grassland and marshy grassland.

The distinctions between blanket bog (especially that which has been modified) and wet heath, and between blanket bog and marshy grassland, can be subtle since they often occur together in mosaics. If the peat is deeper than 50cm it is defined as bog, even if dominated by heather. Wet heath and marshy grassland, however, occur on peat less than 50cm deep. Flushes frequently occur and are associated with flowing water and springs. Stands of bracken are another significant habitat type on the lower slopes of moors & fells. Rock outcrops may support scarce plants and provide nesting sites for some birds of prey.

Upland habitats are the most extensive semi-natural vegetation types in Lancashire, i.e. over 40,000 ha covering more than 13% of the County and over 50% of the area semi-natural vegetation. Bowland Fells are the largest continuous area of semi-natural habitat in Lancashire ⁽¹⁾. However, bog and heathland are globally scarce.

Upland habitats are strongly influenced by altitude, climate, slope, hydrology and management practices. In Lancashire, large areas have become impoverished botanically through a combination of burning, drainage and/or grazing pressure.

Moorland dominated by heather (i.e. over 50% cover) is sometimes referred to as 'black moor', that with 25-50% cover as 'grey moor' and that with less than 25% cover, including little or no heather, as 'white moor'.

Blanket bog is one of two main mire habitats found in Lancashire, the other being lowland raised bog. Peat is formed over thousands of years from decaying vegetation in cool wet conditions as a layer or blanket on gently-undulating hillslopes or the flat plateaux on hill-tops. 'Valley mires' may develop also along the lower slopes and floor of small valleys. 'Basin mires' develop in waterlogged hollows especially on the periphery of moorland.

In Lancashire, the gentle slopes and hilltops of the Bowland Fells and the Southern Pennines, including the West Pennine Moors, are particularly suitable for blanket bog development.

To qualify as heathland an area should have at least 25% cover of dwarf shrub heather-like plants. Different types of heathland can be discerned including wet, dry or montane heaths.

Upland acid grassland and marshy grassland include areas of herbaceous vegetation dominated by grasses and certain plant communities characteristic of wet conditions dominated by sedges and purple moor-grass. Acid grassland is often unenclosed and occurs on a range of acid soils with pH less than 5.5. It is generally species-poor and may be derived from degraded blanket bog or heathland as a result of heavy grazing or poor burning practice. It often grades into wet or dry heathland and, where appropriate, management should aim to restore the bog or heath community. Acid grassland tends to occur on the lower margins of the moors and fells where the grazing pressure is heavy and is often associated with degraded habitat.

In parts of the county, particularly in the south and east, blanket bog and upland heath habitats have been enclosed historically and replaced by species-poor grassland due to a combination of over-grazing, drainage and burning. These grasslands may support poor agriculturally-improved swards or they are dominated by hair's-tail cotton-grass and wavy hair-grass.

Marshy grassland is a diffuse category that includes areas dominated by purple moor-grass, often on peat, and grasslands with a high proportion of rushes and sedges. Marshy grassland generally occurs on level or gently sloping ground especially on the moorland fringe. It is

generally poor in herb and dwarf shrub species but can provide breeding grounds for birds such as curlew and snipe.

Flushes are associated with springs, flowing water and seepages that occur on gently sloping ground. They are often linear or triangular and may include small watercourses or occur below spring lines. Flushes may or may not form peat, but where they do, the peat is often less than 50cm deep. Bryophytes are a normally a conspicuous feature.

Flushes reflect the underlying geology and generally they are acidic or neutral. Although examples of upland basic flushes are rare in Lancashire, good examples occur on Leck Fell and on the northern slopes of the Forest of Bowland. Flushes can be species-rich in comparison to surrounding upland habitats.

National status

Peat bogs are confined to parts of the world with a cool humid climate. Between 10 - 12% of the World's blanket bog occur in the UK (approx. 1.5 Million ha, most of which is in Scotland). Blanket bog is listed in Annex 1 of the EC Habitats and Species Directive and it is a priority habitat in the UK BAP.

Most areas of blanket bog in Britain have been damaged in some way ⁽²⁾. Damage to one area of blanket bog is likely to affect other parts as they are linked hydrologically. Hence many sites are probably continuing to degrade following damaging events that may have occurred many years ago. Moorland drains (or 'grips'), for example, may have become well vegetated but can still be effective and continue to cause damage. Past applications of fertiliser may still be affecting a site's ecology, particularly on the moorland fringe.

Upland heathland is largely confined to the western sea-board of Europe. At an estimated 2 Million ha, the UK resource is very significant. It is estimated that there are 269,000 ha in England. However, there have been considerable losses since 1947 due to afforestation and heavy grazing by sheep ⁽²⁾.

Losses of heather moorland between the 1940`s and 1970`s have been calculated at 70% in Cumbria, 63% in Galloway and 25% in the Grampian Region ⁽⁶⁾. In the Peak District, there was an estimated loss of 36% between 1913 and 1981. The causes vary between regions, with afforestation the primary factor in Scotland, but increased grazing pressure or conversion to improved grassland the main factor in England.

'Dry heath' and 'Atlantic wet heath with *Erica tetralix*' are listed in Annex 1 of the EC Habitats and Species Directive. Upland heath is also a UK BAP priority habitat.

Regional status (4)

Blanket bog within the Forest of Bowland and the south Pennines is of international conservation importance.

Upland heathland covers extensive areas of north west England but there have been major losses due to heavy grazing exacerbated by excessive burning particularly in Cumbria and the South Pennines.

Local status

Much of Lancashire's blanket bog has been affected by centuries of burning and drainage. Most of what remains has been highly modified by heavy grazing and drainage with the loss of many of the characteristic species. Atmospheric pollution/acid rain has been another contributing factor, especially in areas of the south Pennines that were affected by the

industrial revolution. The main peat-forming plants the mosses are particularly susceptible to pollution.

Losses of upland heath have been substantial in the South Pennines, including the West Pennine Moors, beginning before the second world war. The West Pennine Moors suffered a major decline in heather cover of 50% between 1946 and 1988³. In Bowland, however, there has been very little loss except some conversion to grassland on the moorland fringe. The heathland resource on Bowland is maintained largely to facilitate grouse shooting and the losses have mainly occurred on land where this activity had ceased.

In the South Pennines there appears to be a clear connection between Sphagnum decline and industrial pollution of the 19th and 20th centuries. Moss (1913) listed 18 Sphagnum species on the southern Pennines of which only two were rare. However, Tallis (1964) recorded only five species of which only one was common.

The Phase 1 Habitat Survey of the county 1988-92 recorded 17,005 ha of acid grassland (5.5% of the County), 9,814 ha of dry heath (3.2%), 8,750 ha of dry modified bog (2.9%) 3,903 ha of blanket bog (1.3%), 390 ha of wet heath and 169 ha of wet modified bog (both 0.1%). An additional 9,959 ha of marshy grassland, 2,008 ha of dense bracken and 756 ha of flush/spring were recorded in Lancashire, much of which occurs on the moors, fells and marginal enclosures⁽¹⁾.

Wet heath and wet un-modified blanket bog are regarded as scarce habitats in the County⁽¹⁾.

A more recent estimate of the area of Lancashire's upland habitats has been provided by English Nature. According to their unpublished data there are 10,477 ha of blanket bog (modified and active) and 11,224 ha of 'upland heathland' (including acid grassland).

Despite the distribution of moorland/fell habitats being restricted by altitude, the principal habitats occur in all but 4 of the 14 Districts of Lancashire. Upland habitats are absent in Blackpool, Fylde, South Ribble and West Lancashire. Unimproved acid grassland covers nearly 19% of Rossendale, nearly 10% of Burnley and over 5% of Ribble Valley.

Blanket bog and heathland habitats are not easy to separate in the field and often grade into one another making boundaries and area measurement difficult to determine. However, the Phase 1 habitat survey calculated that dry heath covered just over 7% of Lancaster District by area, nearly 6% of Ribble Valley and between 3-4% of Pendle and Wyre. Wet heath occurs in Chorley, Lancaster, Pendle, Ribble Valley and Wyre but accounts for only between 0.1 and 0.4% of the Districts' area. Sub-montane heath is represented on Leck Fell and Ward Stones, the highest point in the Bowland Fells SSSI.

Blanket bog occurs in Burnley (0.6%), Lancaster (2.1%), Pendle (1.1%), Ribble Valley (3.3%) and Wyre (1.8%) with a small area in Rossendale (0.1%). Modified bog occurs in Blackburn with Darwen (10.5%), Rossendale (9.7%), Burnley (8.6%), Pendle (7.1%) and less than 5% coverage in Chorley, Hyndburn, Lancaster and Ribble Valley.

Marshy grassland and bracken are found in all of the upland districts in Lancashire. The largest areas of marshy grassland are found in Blackburn, Burnley, Lancaster and Ribble Valley. The vast majority (75%) of flush/spring habitat is found in Lancaster District with 14% in Ribble Valley. Large stands of bracken are found in Lancaster and Ribble Valley Districts.

Important Sites

The Bowland Fells and also the South Pennines were designated SPAs under the Birds Directive in 1993 and 1995 respectively. They are both of exceptional nature conservation importance within Britain for the range of upland bird species they support associated with blanket bog and heather moorland. The Bowland Fells SSSI was designated SPA for hen

harrier, merlin, peregrine, golden plover and short-eared owl. The South Pennine Moors SSSI was designated SPA for golden plover, dunlin, merlin, twite, curlew & short-eared owl.

In August 2000 the South Pennine Moors SSSI was nominated as a candidate SAC under the Habitats Directive. This was for its extensive areas of blanket bog, European dry heath, Northern Atlantic wet heaths with *Erica tetralix* as well as transition mires and quaking bogs. The SSSI does not include the West Pennine Moors, but responses to the proposed SAC designation have suggested that the boundary should be extended to include this area.

In addition to the above sites of European and National importance, areas have been identified as County Biological Heritage Sites. Some 23 BHSs have been identified for upland heathland and 21 for blanket bog but these and/or additional sites may also be of importance for upland birds.

Examples of upland BHSs include: Pendle Hill; Newton and Dunsop Fells, Burn Moor and Goodber Common on the Bowland Fells; Holcombe Moor, Scout Moor and Deerplay Moor in the South Pennines and Anglezarke Moor, Darwen Moor and Turton Moor in the West Pennine Moors.

Current factors affecting the Habitat

Virtually all the unenclosed moorland/fell is grazed by sheep. Many areas have become botanically impoverished through a combination of burning, grazing and/or drainage.

Rotational strip burning and/or grazing at appropriate stocking rates are essential to maintain heathland supporting upland species. Natural succession if allowed to proceed, would result in scrub and woodland establishment.

For conservation purposes the ideal stocking rate for upland heathland and blanket bog is about 1.5 ewes/ha, or less in summer. Heather is particularly susceptible to high stocking levels throughout the year but particularly in September/October and, to a lesser extent, in April. Damage is most acute on the lower altitude fells and tends to be concentrated on the edges of heathland, particularly in the valley bottoms towards the fell gate. Such damage can be exacerbated by supplementary feeding (foddering) for sheep especially near the fell gates. Good burning practice and shepherding spread sheep out over the whole moor lessening local overgrazing problems.

Heavy grazing can lead to an absence of bog-mosses and/or heather and can cause or exacerbate erosion following rainfall.

Rotational burning involves the controlled burning of heather strips burnt annually to produce an intimate mosaic of heather stands of different age, height and structure. This is generally beneficial to grouse and to many other species that depend on heathland habitat. However, if the period between burning is too short, then this does not allow tall heather to grow or does not allow the degenerative and regenerative stages to occur in the natural life-cycle of heather.

Uncontrolled or mismanaged burning can reduce both floristic and invertebrate diversity of moorland and degrade the layers of peat. This is a serious concern in some urban-fringe moorlands.

The most appropriate burning rotation periods vary according to altitude, local climate and drainage conditions. On the Abbeystead estate in Bowland the rotation is between 5 –10 years (Orzechowski pers comm.). Burning is thought to be poor practice on actively growing blanket bog and at altitudes over 500m above sea level (i.e. Pendle Hill and Leck Fell).

Well-managed heathland provides a diverse structural mosaic for red grouse and also a range of other ground nesting birds, plants and invertebrates. Although heather burning is

carried out mainly for sporting purposes, it may also be conducted by graziers in some areas to increase the amount of young heather for sheep to graze. Heathland managed on a rotational basis also presents less of a fire risk. The cessation of burning would result in changes to bird populations and an increased risk of fires burning out-of-control.

Gamekeeping is integral to the management of moorland. Grouse suffer from predation, in particular, from foxes and carrion crows, as well as from some birds of prey (raptors). The persecution of raptors has been widespread in the past, causing severe population declines, but has been illegal since 1975. Grouse numbers in Bowland have suffered badly in the past few years due to epidemics of parasitic gut worm (strongylosis) and outbreaks of heather beetle (*Orzechowski pers comm.*).

Artificial land drainage is a major issue on blanket bogs and wet heaths and is highly damaging to their ecology. Although few, if any, new hill drains (grips) have been installed in recent times, the continuing effects of past drainage is still a significant problem in parts of Bowland and the South Pennine Moors.

Drainage lowers the water table and this can result in dehydration and oxidation. On Darwen Moor it is estimated that up to 1 metre depth of peat has been lost through shrinkage during the past 40 years (*Jepson pers. comm.*). A reduction in the water table is also a factor in increasing the risk of uncontrolled fires and the extent of potential damage.

Whilst significant afforestation has taken place on uplands in other parts of the UK, large-scale planting of conifers has not taken place in Lancashire. However, several plantations have been created on the flanks of moorland habitat (e.g. within the Dunsop valley, on Grindleton Fell, and Longridge Fell as well as at Higher Thrushgill).

Tree planting for amenity and landscape purposes has occurred to the detriment of upland habitat at Red Moss BHS.

Woodland may also develop through natural regeneration in the absence of grazing, although this can take a long time and trees are likely to be stunted. Woodland eventually replaces existing moorland habitat. This situation is not necessarily undesirable. The natural tree regeneration that occurs usually includes birch, rowan and sessile oak as, for example, at Clougha (Birk Brow). Widely-spaced birch, willow and rowan scrub less than 2 m in height amongst a mosaic of heather and bilberry would increase habitat diversity and possibly its value for red and black grouse, merlin, short-eared owl, hen harrier and whinchat. Succession to woodland of this type would increase the county resource of a UK BAP Priority Habitat (Upland Oak Woodland).

The agricultural productivity of moorland/fell habitats can be increased by the application of soil improvers (fertilisers and lime) and/or by ploughing and reseeded, which is normally combined with soil improvement. However, the benefits are short term and continued application of soil improvers or repeated reseeded is required to maintain artificial levels of productivity.

In the past, moorland was enclosed by dry stone walls, the land was improved for agriculture and used for pasture, hay making and/or growing crops. However, due to changes in the climate, farm practices or economics, the intensity of management on many fields especially on the moorland fringe was reduced and native species re-colonised. Such fields have tended to revert to acid grassland or rushy pasture, although heather has also regenerated in some instances.

Blanket bogs receive all their inputs from the atmosphere. They are extremely nutrient deficient and hence very sensitive to atmospheric pollution, in particular to Nitrogen. Past sources included industrial pollution but now include vehicular emissions as well as fertiliser drift from agriculture. Whilst their effects may be localised, the overall impact is towards nutrient enrichment, which will alter significantly the vegetation composition of blanket bogs in

the long term. Nutrient enrichment results in increased plant growth and competition between species change with sensitive species replaced by more dominant plants.

The quarrying of rock and open cast coal mining has had a localised impact on upland vegetation in some areas, especially in Rossendale and Burnley, although the landscape impact may be considered greater than that on the ecology.

Quarrying can disrupt the hydrology of adjacent habitats over a much wider area. Abandoned quarries do not remain unvegetated for long and natural succession, however, may recreate acid grassland or heathland, often followed by scrub woodland. The steep inaccessible quarry faces often provide ideal nesting sites for peregrine. One quarry not subject to grazing has been colonised by three species of clubmosses, two of which had been believed previously to have become extinct in the county (Jepson pers. comm.).

Unlike lowland heath and raised bog, the upland habitats have not been subject to the same pressure for landfill or development, although quarries have been convenient places to landfill. This pressure is likely to increase in the future.

Recreational pressure, causing localised disturbance and erosion may adversely affect upland habitats. Wet areas can be damaged by vehicular traffic. Birds may be disturbed by off-road driving, motorbike scrambling, mountain biking, horse riding and by walkers with dogs. High levels of recreation also can increase fire risk.

Ground-nesting birds on the moors/fells are especially vulnerable during the breeding season. Access to moorland/fell is an issue that will be addressed through implementation of the Countryside and Rights of Way Act.

Development, such as wind farms and pipelines, can damage vegetation and the hydrology of peatlands. There are currently two windfarms on Lancashire's uplands, one at Coal Clough, Burnley, and the other at Caton Moor, Lancaster. Whilst the footprint occupied by the turbines is small, there are associated buildings and access tracks. Such infrastructure can cause damage to hydrology and localised enrichment due to the importation of materials, e.g. concrete. Concerns have been expressed about bird mortality from turbine strikes, in particular in relation to skylark and golden plover in areas of high breeding density.

There have been a few examples of waste paper pulp being spread on upland areas following its promotion by MAFF as a soil improver, (e.g. Heald Moor BHS in Burnley District and in 2000 at the Coal Clough windfarm). If spread thickly, the pulp forms a crust and takes years to break down. This practice should be positively discouraged.

Current Action / Mechanisms

SAC and SPA designations should protect large areas of upland habitat in Lancashire from inappropriate development. With regard to other areas, local authority Local Plans contain policies that afford varying degrees of protection, at least in terms of development control, to BHS.

MAFF's Countryside Stewardship Scheme provides potential funding for sustainable land management practice, targeted at priority habitats including heathland. Regional offices can set local priorities, and for Lancashire this includes twite and BHSs. Countryside Stewardship and English Nature's Wildlife Enhancement Scheme can provide payments for off-wintering.

The main issues that need to be addressed in terms of moorland conservation are sheep stocking densities of sheep, sustainable patterns of heather burning and the rewetting of formerly drained bogs and wet heathland. Where peat is still present, the habitat has capacity for recovery especially where the blanket bog has only been modified partially.

Over 25% of the Bowland Fells SPA is under some form of Wildlife Enhancement Scheme (WES) with English Nature. Such agreements help to reduce sheep stocking numbers, erect fencing enclosures to de-stock fells for temporary periods or to allow reseeded. English Nature also provides management advice based on the heather condition surveys.

Site Management Statements exist for all estates and tenants over agreed grazing and burning practices. English Nature has also come to an agreement with North West Water over a code of practice for bracken control. Furthermore, an additional 50% of the Bowland Fell SPA has recently been entered into Countryside Stewardship largely through the work of the Bowland Initiative. Agreements have been reached over reduced stocking levels and control of grazing, on forestry fencing and grass re-seeding/bracken spraying.

North West Water and a few private landowners own large areas of moorland/fell in Lancashire. The Ministry of Defence also has a training area on Holcombe Moor. Outside of these large estates, especially in Rossendale and the West Pennine Moors, the upland habitats are owned by large numbers of private individuals, principally farmers. Many of these landholdings have been identified as BHS sites.

The BHS Project aims to identify and contact the owners and managers of all BHS in Lancashire, to produce site descriptions, and to offer advice on future management and sources of further advice and grant aid. All known landowners and managers in Burnley and Pendle Districts were contacted in 1999, those in Blackburn with Darwen and Chorley in 99/00. Preston will be undertaken in 2001 followed by Hyndburn and Rossendale. Officers from the Bowland Initiative have made contact with many land managers in the Bowland Fells but there is need for further work in Lancaster and Ribble Valley districts.

Unlike other upland areas in the UK, relatively little of Lancashire's moorland or fells are publicly owned or managed by voluntary conservation agencies (e.g. the National Trust, the RSPB or The Wildlife Trusts). The National Trust does own some land at Stubbins, Holcombe Moor. Lancashire County Council also owns land at Healey Nab, Chorley and Blackburn with Darwen Borough Councils own land on Darwen Moor.

The Forest of Bowland Area of Outstanding Natural Beauty was designated in 1964. The main purpose of designation under the National Parks and Access to the Countryside Act 1949 and subsequent legislation is the conservation and enhancement of the natural beauty of the Area which includes protecting flora, fauna and geological as well as landscape features. A Joint Advisory Committee was set up in 1986 and a management plan published in 1995.

The Bowland Initiative was set up to operate within the Objective 5b area of the Lancashire uplands and is funded from June 1999 - June 2001. One of its strategic aims is to help farmers identify environmental features, implement environmental management plans that will increase the area's quality and biodiversity in ways that compliment the economic development of the area. The possibility of creating a successor scheme to the Bowland Initiative covering the whole of Lancashire (from April 2001) has received widespread support and options for how this may be progressed are being discussed

The West Pennine Moors Area Management Scheme has a wide-ranging membership with an interest in all aspects of upland conservation, recreation and education relevant to the area. Two countryside officers are employed and a variety of survey and practical conservation and access works are carried out. Attempts have also been made to restore areas of degraded moorland.

The Standing Conference Of South Pennine Authorities (SCOSPA) is a collaborative effort between 14 local authorities, across parts of 3 counties. SCOSPA has produced a Heritage Strategy and is submitting a bid to the Heritage Lottery Fund for an Action Plan to deliver the strategy.

Habitat translocation, restoration and monitoring are to be undertaken at Waddington Fell Quarry as part of the planning consent to extend the quarry.

Atmospheric pollution issues are being studied by a joint MAFF/DETR initiative and by the North-West Region Climate Group. English Nature has carried out heather condition surveys on two-thirds of the Bowland Fells SPA.

Indicators of Habitat Quality:

Blanket bog is moving towards a favourable condition when:

- Blanket bog and other habitats associated with the hydrological unit are intact.
- Characteristic bog-moss species, notably *Sphagnum papillosum* and *Sphagnum magellanicum*, are abundant and cover at least 25% of the surface.
- A full complement of characteristic bog plants exists.
- Bog pools occur in abundance on the bog surface.

Heathland is moving towards a favourable condition when:

- ericaceous species cover 50-75%,
- less than 40% of annual heather growth is removed by grazing animals
- a mosaic of stands of heather, with cranberry and bilberry, of varying height and age exists,
- the level of management is sufficient to prevent the establishment of trees and shrubs.

Table 1: NVC Communities associated with moorland and fell in Lancashire

Code	Community	Code	Community
	<u>Heathland Communities</u>		<u>Mire (Bog) Communities</u>
H9	<i>Calluna vulgaris</i> - <i>Deschampsia flexuosa</i> heath	M2	<i>Sphagnum cuspidatum/recurvum</i> bog pool community
H12	<i>Calluna vulgaris</i> - <i>Vaccinium myrtillus</i> heath	M3	<i>Eriophorum angustifolium</i> bog pool community
H18	<i>Vaccinium myrtillus</i> - <i>Deschampsia flexuosa</i> heath	M10	<i>Carex dioica</i> - <i>Pinguicula vulgaris</i> mire
	<u>Acid grassland Communities</u>	M16	<i>Erica tetralix</i> - <i>Sphagnum compactum</i> wet heath
U2	<i>Deschampsia flexuosa</i>	M18	<i>Erica tetralix</i> - <i>Sphagnum papillosum</i>

	grassland		raised and blanket mire
U4	<i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland	M19	<i>Calluna vulgaris</i> - <i>Eriophorum vaginatum</i> blanket mire
U5	<i>Nardus stricta</i> - <i>Galium saxatile</i> grassland	M20	<i>Eriophorum vaginatum</i> blanket and raised mire
U6	<i>Juncus squarrosus</i> - <i>Festuca ovina</i> grassland	M25	<i>Molinia caerulea</i> - <i>Potentilla erecta</i> mire
U20	<i>Pteridium aquilinum</i> - <i>Galium saxatile</i> community	M37	<i>Cratoneuron commutatum</i> - <i>Festuca rubra</i> spring

Table 2a: Vascular plants, bryophytes and lichens associated with heathland on moorland and fell in Lancashire

Common name	Scientific name	Status
'Wet Heath'		
Heather	<i>Calluna vulgaris</i>	
Cross-leaved heath	<i>Erica tetralix</i>	
Purple moor-grass	<i>Molinia caerulea</i>	
Deer grass	<i>Trichophorum cespitosum</i>	
Carnation sedge	<i>Carex panicea</i>	
Common cotton-grass	<i>Eriophorum angustifolium</i>	
Bilberry	<i>Vaccinium myrtillus</i>	
Cranberry	<i>Vaccinium oxycoccus</i>	
Tormentil	<i>Potentilla erecta</i>	
Bog mosses	<i>Sphagnum</i> Spp.	
'Dry Heath'		
Heather	<i>Calluna vulgaris</i>	
Bilberry	<i>Vaccinium myrtillus</i>	
Cowberry	<i>Vaccinium vitis-idaea</i>	Ff4b
Sheep's fescue	<i>Festuca ovina</i>	

Wavy-hair-grass	<i>Deschampsia flexuosa</i>	
Mat grass	<i>Nardus stricta</i>	
Heath bedstraw	<i>Galium saxatile</i>	
Tormentil	<i>Potentilla erecta</i>	
Heath rush	<i>Juncus squarrosus</i>	
A moss	<i>Hypnum jutlandicum</i>	
A moss	<i>Pleurozium schreberi</i>	
A moss	<i>Dicranum scoparium</i>	
A lichen	<i>Cladonia impexa</i>	

'Sub-Montane Heath' (This habitat type is restricted in the County to bare rocky areas around Leck Fell and Ward Stones)

Stiff sedge	<i>Carex bigelowii</i>	Ff3
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Table 2b: Vascular plants and bryophytes associated with blanket bog on moorland and fell in Lancashire

Common name	Scientific name	Status
Active blanket bog has at least 25% sphagnum cover. Typical species include		
A bog moss	<i>Sphagnum papillosum</i>	
A bog moss	<i>Sphagnum magellanicum</i>	Br4
Cotton-grasses	<i>Eriophorum</i> spp.	
Cross-leaved heath	<i>Erica tetralix</i>	
Heather	<i>Calluna vulgaris</i>	
Bilberry	<i>Vaccinium myrtillus</i>	
Crowberry	<i>Empetrum nigrum</i>	
Cranberry	<i>Vaccinium oxycoccus</i>	
Cowberry	<i>Vaccinium vitis-idaea</i>	Ff4b
Deergrass	<i>Scirpus cespitosus</i>	
Bog rosemary	<i>Andromeda polifolia</i>	Ff4a
Cloudberry	<i>Rubus chaemaemorus</i>	Ff4a

Round-leaved sundew	<i>Drosera rotundifolia</i>	
Bog asphodel	<i>Narthecium ossifragum</i>	
White sedge	<i>Carex curta</i>	
Typical vegetation in bog pools includes:		
Bog bean	<i>Menyanthes trifoliata</i>	Ff4b
Bog pondweed	<i>Potamogeton polygonifolius</i>	

Table 2c: Vascular plants and bryophytes associated with wet flushes on moorland and fell in Lancashire

Common name	<i>Scientific name</i>	Status
The flora of flushes and seepages depends on the pH of the water and its nutrient status. Most flushes on moorland in the county are acidic but there are examples of basic flushes on Leck Fell. Species found include:		
A bog moss	<i>Sphagnum recurvum</i>	
A bog moss	<i>Sphagnum auriculatum</i>	
A bog moss	<i>Sphagnum palustre</i>	
Star mosses	<i>Polytrichum</i> spp.	
Lesser clubmoss	<i>Selaginella selaginoides</i>	Ff4a
Soft-rush	<i>Juncus effusus</i>	
Sharp-flowered rush	<i>Juncus acutiflorus</i>	
White sedge	<i>Carex curta</i>	
Star sedge	<i>Carex echinata</i>	
Common yellow sedge	<i>Carex demissa</i>	
Few-flowered spike-rush	<i>Eleocharis quinqueflora</i>	Ff4a
Dioecious sedge	<i>Carex dioica</i>	Ff4b
Bogbean,	<i>Menyanthes trifoliata</i>	Ff4b
Bog pondweed	<i>Potamogeton polygonifolius</i>	
Bog pimpinell	<i>Anagallis tenella</i>	Ff4b
Bird's-eye primrose	<i>Primula farinosa</i>	NS, Ff2

Round-leaved sundew	Drosera rotundifolia	
An eyebright	Euphrasia scotica	
Creeping forget-me-not	Myosotis secunda	
Pale forget-me-not	Myosotis brevifolia (stolonifera)	Ff2
Marsh willowherb	Epilobium palustre	
Marsh violet	Viola palustris	
Marsh pennywort	Hydrocotyle vulgaris	
Marsh thistle	Cirsium palustre	
Marsh horsetail	Equisetum palustre	
Marsh marigold	Caltha palustris	
Lesser twayblade	Listera cordata	
Common butterwort	Pinguicula vulgaris	
Devil's-bit scabious	Succisa pratensis	

Table 2d: Vascular plants and bryophytes associated with grassland on moorland and fell in Lancashire

Common name	Scientific name	Status
Upland acid grassland		
Wavy hair-grass	Deschampsia flexuosa	
Sheep's fescue	Festuca ovina	
Mat-grass	Nardus stricta	
Heath rush	Juncus squarrosus	
Heath bedstraw	Galium saxatile	
Sheep's sorrel	Rumex acetosella	
Tormentil	Potentilla erecta	
Marshy grassland		
Purple moor-grass	Molinia caerulea	
Rushes	Juncus spp.	

Sedges	Carex spp.	
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Table 2e: Ferns associated with rocky outcrops on moorland and fell in Lancashire

Common name	Scientific name	Status
On acid rocks		
Parsley fern	Cryptogramma crispa	Ff3
Broad buckler-fern	Dryopteris dilatata	
Wilson's filmy fern	Hymenophyllum wilsonii	Ff3
Lemon-scented fern	Oreopteris limbosperma	
On calcareous rocks		
Rigid buckler-fern	Dryopteris sub-montana	Ff2

Table 3: Invertebrate species associated with moorland and fell in Lancashire

Common name	Scientific name	Status
Grasshoppers:		
Common green grasshopper	Omocestus viridulus	
Mottled grasshopper	Myrmeleotittix maculatus	
Bees:		
Bilberry bumble-bee	Bombus monticola	
A heather-feeding solitary bee	Colletes succinctus	
Beetles:		
A ground beetle	Pterostichus aethiops	
A tiger beetle	Cicindella campestris	
Heather ladybird	Chilocorus 2-pustulatus	
Heiroglyphic ladybird	Coccinella hieroglyphica	

Butterflies and moths:		
Green hairstreak	<i>Callophrys rubi</i>	LE4
Large Heath	<i>Coenonympha tullia</i>	NS, LE2
Northern eggar	<i>Lasiocampa quercus callunae</i>	
Fox moth	<i>Macrothylacia rubi</i>	
Emperor moth	<i>Pavonia pavonia</i>	
Smoky wave	<i>Scopula ternata</i>	
Manchester treble-bar	<i>Carsia sororiata</i>	NS, LE2
Grey scalloped bar	<i>Dyscia fagaria</i>	
Wood tiger	<i>Parasemia plantaginis</i>	
Grey mountain carpet	<i>Entephria caesiata</i>	
Small autumnal moth	<i>Epirrita filigrammaria</i>	
Neglected rustic	<i>Xestia castanea</i>	
Heath rustic	<i>Xestia agathina</i>	
Beautiful yellow underwing	<i>Anarta myrtilli</i>	
Kentish glory	<i>Endromis versicolora</i>	
A micro-moth	<i>Prolita sexpunctella</i>	
A micro-moth	<i>Clepsis senecionana</i>	
A micro-moth	<i>Philodone gerningana</i>	
Spiders:		
A jumping spider	<i>Euophrys erratica</i>	
A wolf spider	<i>Pardosa nigriceps</i>	
A spider	<i>Haplodrassus signifer</i>	
A spider	<i>Clubiona trivialis</i>	
A spider	<i>Agroeca proxima</i>	
A spider	<i>Coelotes atropos</i>	

Garden spider	Araneus diadematus	
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Table 4: Bird species associated with moorland and fell in Lancashire

Common name	Scientific name	Status
Breeding on moorland/fell		
Red grouse	Lagopus lagopus	E
Golden plover	Pluvialis apricaria	Bi2a
Dunlin	Calidris alpina	Bi2a
Curlew	Numenius arquata	
Twite	Carduelis flavirostris	LSAP
Short-eared owl	Asio flammeus	Bi2a
Hen harrier	Circus cyaneus	Bi2a
Merlin	Falco columbarius	Bi2a
Ring ouzel	Turdus torquatus	Bi2a
Skylark	Alauda arvensis	Bi2c
Whinchat	Saxicola rubetra	
Meadow pipit	Anthus pratensis	
Associated with rocky outcrops		
Peregrine falcon	Falco peregrinus	Bi2c
Wheatear	Oenanthe oenanthe	
Raven	Corvus corax	
Visiting migrants		
Dotterel	Charadrius morinellus	
Rushy pasture/inbye on moorland fringe		
Redshank	Tringa totanus	

Snipe	Gallinago gallinago	
Curlew	Numenius arquata	
Lapwing	Vanellus vanellus	
Oystercatcher	Haematopus ostralegus	

Objectives, targets and proposed actions for moorland/fell in Lancashire

Broad Objective:	A. Maintain the current extent and distribution of blanket bog and heathland in Lancashire			
Operational Objective	Action Required (Priority)	Partners	Time-scale	Type
1. Create database of all upland blanket bog and heathland sites and categorise according to importance, naturalness and restorability.	1. Use soil maps, survey data, photographs and remote sensing data if available to determine extent of blanket bog and heathland cover relative to agreed categories.	EN, LCC, WT.	S	RM
2. Ensure planning and legislative mechanisms protect existing upland bog and heathland.	1. Review existing planning permissions on Natura 2000 sites (SPAs and cSACs) to ensure none conflict with european designation. (High)	LAs	S	SS
	2. Ensure that all areas of upland bog and heathland that meet SSSI criteria are notified by 2005, with particular attention paid to the West Pennine Moors. (High)	EN	M	SS
	3. Ensure that no SSSI consent is issued that would permit damage or destruction to upland bog and heathland. (High)	EN	O	SS

	4. Ensure important areas outside SSSIs are recognised as BHS and that their management is discussed with the land owners/managers by 2005. (High)	BHS P/ship, landowner/farming community	M	RM
	5. Ensure that new afforestation avoids blanket bog and heathland through Forest Design Plans and grant aid from the Forestry Commission. (Medium)	FC, NWW, LCC, BHS, Woodland Initiatives, private forestry companies	O	SS
	6. Ensure new applications for quarries are restored for conservation benefit, including habitat restoration and provision of cliffs, ledges and scree. (Medium)	LCC, LAs, EN, WT, BHS	O	P
	7. Support review of common land legislation. (Medium)	EN, WT, MAFF	M	P
3. Ensure links between geographical concentrations of blanket bog and heathland are maintained and enhanced.	1. Give priority attention to key stepping-stone sites such as Browsholme Moor/Easington Fell, Pendle Hill, White Moor (Barnoldswick), Longridge Fell. (High)	MAFF, BHS	M	LM
4. Ensure upland heathland is not reduced by grazing levels or destroyed by agricultural improvement.	1. Compile inventory of upland heathland sites at risk of loss due to stocking density and / or other agricultural / land management operations (Low)	EN, LCC, WT	S	SS
	2. Identify priority sites on which grazing pressure can be studied (Low)	EN/MAFF	S	SS

	3. Target agri-environment and other schemes at upland heathland to obtain more favourable management (High)	EN, MAFF, FWAG	S	SS
	5. Take action under cross-compliance and overgrazing regulations if significant severe overgrazing is likely to be persistent. (High)	MAFF	M	SS
	6. Seek to ensure that no heathland areas are significantly deteriorating through grazing pressure by 2010. (High)	MAFF/EN, NWW, FWAG	L	SS
	7. Seek to ensure that no heathland is lost through drainage or agricultural improvement. (High)	MAFF, EN	S	SS
	8. Discourage landmanagers from applying paper pulp on upland habitats. (Low)	MAFF, FWAG, NFU, CLA	O	LM
5. Investigate effects of pollution and climate change and identify solutions.	1. Conduct surveys and collect data on effects of acidification and climate change on upland habitats. (Medium)	EA, MAFF, DETR, NW Climate Change Group	S	RM
	2. Raise awareness of effects and seek mitigation if necessary. (Medium)	EA, MAFF, DETR, NW Climate Change Group, LAs	M	CP/SS

Broad Objective:	B. Improve the condition of degraded blanket bog and heathland that are capable of restoration.			
Operational Objective	Action Required (Priority)	Partners	Time-scale	Type

1. Introduce sustainable management on SSSI, BHS and other areas of blanket bog and heathland.	1. Ensure appropriate levels of grazing through CAP reform, cross-compliance measures and agri-environment schemes, targeting areas of 'grey moor', i.e. grass/heath mosaic. (High)	MAFF, EN, FWAG,	M	SS
	2. Prevent new drainage activities and restore natural drainage through SSSI mechanism, owner/occupier liaison and agri-environment schemes. (High)	MAFF, EN, FWAG, BHS,	M	SS
	3. Ensure appropriate burning regimes through advice to owner/occupiers and incentive schemes. (Medium)	MAFF, EN, FWAG, BHS,	M	SS
	4. Avoid tree planting on bog and heath vegetation, including grass/heath mosaics, and on other peat soils where bog/heath could be restored. (Medium)	FC, MAFF, EN, FWAG, LCC, LAs, WT, BHS, Woodland initiatives	O	SS
	5. Lobby for more economically attractive rates of payment for bog/heathland conservation and restoration under Countryside Stewardship and other grant schemes. (High)	MAFF, WT, LCC, FWAG	S	P
	6. Prevent inappropriate use of vehicles for management purposes. (Low)	LAs, HA, CA	O	SS
	7. Seek to prevent raptor persecution. (Medium)	EN, Game-keepers, Police, RSPB, DETR	M	SP

2. Foster awareness and understanding of upland biodiversity and how it can be conserved and enhanced.	1. Provide information and advice to land managers through SSSI and BHS project and upland management leaflet. (Low)	EN, MAFF, BHS, LCC, FWAG, LAs,	S	CP
	2. Disseminate information to the public through press releases and articles in newspapers, magazines and tourism/ recreational literature. (Low)	EN, MAFF, BHS, LCC, FWAG, LAs	M	CP
3. Monitor changes in upland habitats and notable species to assess effectiveness of action.	1. Collate information on Lancashire from UK Moorland Inventory being developed under the auspices of Scottish Natural Heritage	EN	S	RM
	2. Develop and implement a strategy for monitoring quality and extent of upland bog and heathland.	EN, LCC, WT, RSPB	S	RM
	3. Research the effectiveness of restoration techniques on habitats and species.	EN, LCC, NWW, WT, RSPB	O	RM
	4. Undertake survey for notable species, including dwarf cornel in the West Pennines and for Armillaria ectypa on suitable bogs.	LCC, WT, EN, HE/FE	S	RM
	5. Encourage student projects and placements through liaison with universities.	HE/FE, LCC, WT, RSPB	O	RM

Other Action Plans:

- Broadleaved & mixed woodland HAP
- Twite SAP
- Large heath SAP

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