



# Lowland Raised Mire

Raised mires are of nature conservation interest for their plant and animal communities. They are also invaluable as an archaeological resource as they preserve a record of past vegetational changes through the plant remains and pollen preserved in the peat. Some mires also preserve human remains and artefacts.

## Current status

Lowland raised mires (or bogs) are areas of deep peat which have developed on low-lying, level ground, mostly on marine, estuarine or fluvial deposits adjacent to estuaries or on the floodplains of rivers, but also over sites of shallow glacial lakes which became infilled and occupied by fen vegetation. Over many thousands of years the decay of wetland vegetation and the growth of specialised mire plants has led to the development of domes of peat, as much as 10m deep, with a veneer of surface vegetation. The mire surface on these domes is higher than the surrounding land and these mires receive all their water from rainfall. As a result a characteristic vegetation, adapted to nutrient-poor, acidic conditions has developed.

Oceanic lowland raised mire, the type found in Cumbria, is restricted to western and northern Britain, the Irish Midlands, the Netherlands, Denmark and a narrow coastal strip of Norway. Losses of this habitat have been severe throughout Europe.

The raised mire habitat was never extensive in Britain and most of that now remaining is in Scotland. The major concentration of raised mires is found in southern and eastern Scotland and north west England.

Most of the raised mires in Cumbria are concentrated around the coastal plains of the Solway Estuary and Morecambe Bay. The mires seen today are the remnants of formerly very extensive bogs. Further inland there are also some naturally smaller sites which have developed in more confined situations such as basins and floodplains.

94% of the raised bogs in Britain have been destroyed since the beginning of the 19th century (Lindsay and Immerzi, 1996) and all of the remainder have been damaged, mostly through attempts at drainage, peat extraction and afforestation. However some retain plant communities typical of raised bogs and a relatively undamaged hydrology. Raised mires are now nationally rare. Cumbria has most of the remaining raised mires in England and a relatively large area of little-damaged bog.

Active raised bogs and degraded raised bogs (still capable of natural regeneration) are listed in Annex I of the EC Habitats Directive, the former is a priority habitat. There are 19 SSSIs in Cumbria which are designated for their raised mire interest. Seven of these are included in three candidate Special Areas of Conservation and eight are partly National Nature Reserves.

## Characteristic wildlife

The least-damaged mires have a rich assemblage of *Sphagnum* bog mosses, growing with hare's-tail cotton grass, common cotton grass and cross-leaved heath. Other species present may include bog rosemary, cranberry and sundews. On modified bogs the communities have more affinities with wet heath. Heather may dominate and deer grass and bog myrtle are more common. Where the ground is drier bilberry or purple moor-grass may be dominant. Scrub in the form of birch, pine or rhododendron often becomes established and, particularly around the edges of the bog, can develop into woodland.

Raised bogs support a number of uncommon plant and animal species and have a unique invertebrate assemblage including dragonflies, such as white-faced darter, moths, butterflies and bog bush cricket. They are also important for some breeding bird species, including curlew, snipe and nightjar.

## Key species

The following rare or threatened species are associated with lowland raised mires in Cumbria. Species were selected on the basis that they are UK BAP Priority Species (marked P) or species of County importance in Cumbria. Where species of County importance are also UK BAP Species of Conservation Concern, they are marked C.

skylark	<i>Alauda arvensis</i>	P
reed bunting	<i>Emberiza schoeniclus</i>	P
redshank	<i>Tringa totanus</i>	C
adder	<i>Vipera berus</i>	C
a water beetle	<i>Acilius canaliculatus</i>	
a water beetle	<i>Graptodytes granularis</i>	
a water beetle	<i>Hydrochus brevis</i>	
a water beetle	<i>Hydroporus scalesianus</i>	
a water beetle	<i>Laccornis oblongus</i>	
large heath	<i>Coenonympha tullia</i>	C

bog bush cricket	<i>Metrioptera brachyptera</i>	
variable damselfly	<i>Coenagrion pulchellum</i>	
white-faced darter	<i>Leucorrhinia dubia</i>	C
keeled skimmer	<i>Orthetrum coerulescens</i>	
a dung fly	<i>Cordilura hyalinipennis</i>	
a fly	<i>Hercostomus angustifrons</i>	
a horse fly	<i>Hybomitra micans</i>	
a crane fly	<i>Limnophila fasciata</i>	
small grass emerald	<i>Chlorissa viridata</i>	
moth		
grey scalloped bar moth	<i>Dyscia fagaria</i>	C
narrow-bordered bee	<i>Hemaris tityus</i>	P
hawk moth		
a linyphiid spider	<i>Centromerus levitarsis</i>	
a bug	<i>Micracantha marginalis</i>	
a bug	<i>Paradelphacodes paludosus</i>	
a moss	<i>Calliergon (=Cratoneuron) giganteum</i>	
a moss	<i>Dicranum bergeri (=undulatum)</i>	
a bog moss	<i>Sphagnum fuscum</i>	
a bog moss	<i>Sphagnum imbricatum</i>	
marsh clubmoss	<i>Lycopodiella inundata</i>	P

## Best management practice

Undamaged raised mires do not require any management in order to maintain them. However, all of the mires in Cumbria have been damaged to varying degrees and require at least restoration management and possibly periodic or low-level ongoing management subsequently. Attempts at restoration are aimed at improving the hydrological regime of the site so that there is a higher and more consistent water table. Long term management to maintain areas of open water may be required as ditches become colonised by vegetation and are filled in.

Restoration management in its simplest form involves removal of scrub from areas of mire vegetation and blocking of ditches in order to raise the water table. More badly damaged sites may require measures such as bunding or other engineering works. For the longer term conservation of these sites it may also be necessary to raise water levels on land which was formerly part of the mire but is currently in another use.

## Current issues

The main issue affecting raised mires in Cumbria is water loss through past damage to the site. The major cause is through old ditch systems put in to prepare the mire for peat extraction, but can also be due to afforestation, commercial peat extraction or reclamation leaving a small or awkwardly-shaped mire remnant. The lowered water table resulting from drainage not only affects the mire communities directly but also allows the growth of scrub. The trees accelerate water loss and eventually the mire becomes wet woodland.

Creation of new lowland raised mires is not technically possible at present and extension of mire communities over their former extent will also be impractical in most cases. Usually much of the marginal peat has been cut and removed with the remainder converted to improved agricultural grassland or arable by ploughing and the application of inorganic fertilisers. Restoration of these areas is problematic as the hydrological link with the main peatland may have been severed, the ground level and water table are lower than the surviving mossland and the effects of fertiliser and lime application are hard to reverse except over a long timescale. Conservation measures must therefore concentrate on the existing resource.

- Creation of new mires and extension of existing sites is not possible at present.
- Commercial extraction of peat causes direct loss of mire communities but also damages the hydrology of the whole bog, making restoration difficult or impossible.
- Resolution of impacts of current activities, including revocation of licences and consents, may be required where damaging activities have statutory consent.
- Drying-out of mires due to past damage e.g. drainage ditches. Some of this damage (ditching and scrub growth) is relatively straightforward, if expensive, to deal with but other damage may be irreversible
- Drying-out of mires due to drainage of surrounding land where there is a hydrological connection with the mire.
- Use of bogs for growing trees damages the bog, both through disturbance during planting and maintenance activities, and through transpiration and interception of water and through shading.

- Multiple/unknown ownership makes arranging management more difficult.
- Agricultural reclamation is a minor threat at present but past reclamation has left most mires hydrologically isolated or truncated and further losses would decrease the likely success of restoration measures.
- Domestic peat cutting now only takes place on a small number of sites. It is a minor form of damage at the present time but cessation would benefit those mires where it occurs.
- Air pollution may affect mire communities, but its effects are little understood in this country.
- Uncontrolled fire has the potential to cause extensive damage. This is more common in north Cumbria than in the south.
- Recreational activities can lead to direct damage or conflict with restoration objectives.
- Conflict with other conservation aims. Other habitats or species may require management which conflicts with restoration management of the mire e.g. red squirrels or deer.

## Current action

- Restoration of damaged mires in Cumbria is being undertaken by English Nature, Cumbria Wildlife Trust and Royal Society for the Protection of Birds.
- Restoration techniques are being developed on National Nature Reserves and Wildlife Trust Reserves.
- Statutory protection: Ongoing protection of SSSI and County Wildlife Sites through Local Authority local and structure plan policies and Lake District National Park Management Plan.
- Preparation of Water Level Management Plans by the Environment Agency.
- Review of mineral planning permissions by Cumbria County Council and Lake District National Park Authority.

## Context in relation to other plans:

### UK Habitat Action Plans

There is a UK Biodiversity Action Plan for lowland raised mire in the UK Biodiversity Group Tranche 2 Action Plans Vol. 6 (1999), which sets the following UK objectives and targets:

- Maintain the current distribution and extent (c6,000ha) of primary near-natural lowland raised peat bog in the UK, and ensure that the condition of this resource is maintained where

favourable or enhance through appropriate management.

- Establish by 2005 appropriate hydrological and management regimes at those areas which have been damaged but still retain nature conservation interest (ie primary degraded and drained; c7,000ha), and aim to achieve favourable condition of these areas by 2015.
- By 2002 identify areas, timescales and targets for restoration or improvement of significantly altered raised bog areas, including those used for agriculture, peat workings and woodlands.
- Initiate by 2005 improvement or restoration management on areas which have been identified above according to the agreed timescales.

#### National Lead Agency

Lead Agency: English Nature (to be confirmed)

#### Local contacts

Jacqui Ogden, English Nature, Juniper House, Murley Moss Business Park, Kendal LA9 7RJ.  
Phone: 01539 792800.

#### Associated plans in the Cumbria BAP

The following Cumbria habitat action plans are of relevance to lowland raised mires:

##### Phase I

- red squirrel
- white-faced darter
- basin mires
- reedbed
- purple moor-grass and rush pasture

##### Phase II

- lowland heath
- swamps and tall herb fen

#### References

Lindsay, R.A. & Immirzi C.P. 1996. *An inventory of lowland raised bogs in Great Britain*. Scottish Natural Heritage Research, Survey and Monitoring Report. No 78.

## Objectives, targets and proposed actions for lowland raised mires in Cumbria

Broad Objective A	No further loss of lowland raised mire in Cumbria			
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
<b>1 Use statutory provisions to protect lowland raised mires</b>	1 Seek to refuse consent for proposals which would damage lowland raised mires or be detrimental to their management.	<b>LAs, EA, EN</b> CWT	O-L	SS
<b>2 Complete identification of lowland raised mires in Cumbria</b>	1 Identify as Wildlife Sites the most important areas for wildlife in the County outside of statutory sites, including areas of lowland raised mire, by 2006.	<b>CWT, LAs</b>	L	RM/ SS
<b>3 Put conservation of Cumbrian mires into a national context</b>	1 Encourage production of a national strategy.	<b>EN, CWT</b>	M	PL
	2 Provide information required for national strategy.	<b>EN, CWT</b>	M	PL

Broad Objective B		Achieve favourable condition for all active or potentially active sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
<b>1 Monitor and report on the condition of sites</b>	1 Assess the baseline condition of all lowland raised mire SSSI and Wildlife Sites using standard criteria by 2002, including collection of new information where appropriate (eg survey of selected invertebrate groups).	EN, CWT	M	RM
	2 Carry out monitoring against defined objectives for each site.	EN, CWT, RSPB, LDNPA	O-L	RM
<b>2 Ensure appropriate restoration measures are in place within the mire</b>	1 Draw up and implement a programme for conservation management of SSSIs, with the aim of achieving their favourable condition.	EN, CWT, RSPB, ECCP, LDNPA	O-L	SS
	2 Provide advice on management and grants to owners and occupiers of Wildlife Sites with lowland raised mire, by 2008.	CWT, FWAG	L	A/ SS
	3 Increase area under favourable management through the acquisition and management of nature reserves and through the provision of advice and positive management agreements with landowners.	EN, CWT, RSPB, LDNPA, ECCP	O-L	SS
<b>3 Seek to bring all hydrologically important land surrounding mires into favourable management</b>	1 Identify hydrological units for restorable sites by 2003.	EN, CWT, EA?	M	RM
	2 Seek to bring all hydrologically important land surrounding mires into favourable management, including increasing water levels where this would be beneficial, by 2015. This may include involvement or amendment of environmental or agri-environment grant schemes.	EN, CWT, RSPB, EA, MAFF, LDNPA, NWW, ECCP	O-L	SS
	3 Amend deficient SSSI boundaries where this would enable better management of the site by 2005.	EN	L	SS
<b>4 Prioritise the management of active/potentially active mire sites in Cumbria</b>	1 Finish EN's Cumbria Strategy for SSSI by 2001.	EN	S	PL

Broad Objective B		Achieve favourable condition for all active or potentially active sites		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
5 SAC designation for sites meeting criteria	1 Pursue SAC status for the Witherslack Mosses (Rusland Valley Mosses, Nichols Moss, Meathop Moss, Foulshaw Moss).	<b>EN</b> DETR	S	PL/ SS

Broad Objective C		Increase public awareness and understanding of lowland raised mires		
Operational Objective	Action Required	Suggested organisational involvement	Time-scale	Type
1 Increase public awareness and understanding of lowland raised mires	1 Review the success of the National Peat Campaign in Cumbria and make recommendations for further action by 2002.	<b>CWT</b> EN, RSPB	M	CP/ RM
	2 Run demonstration days or guided walks on appropriate sites for target audience.	<b>CWT</b> , EN, ECCP	O	A/ CP
	3 Install a display in Tullie House Museum interpreting biodiversity and conservation of the Solway Mosses by end 2001.	<b>THM</b> , EN	S	CP

## Key to Tables

**Suggested organisational involvement:** Key Deliverers in bold type; Partners in plain type.

CWT = Cumbria Wildlife Trust; DETR = Department of Environment, Transport and the Regions; EA = Environment Agency; ECCP=East Cumbria Countryside Project; EN = English Nature; LAs = Local Authorities; LDNPA = Lake District National Park Authority; RSPB = Royal Society for the Protection of Birds.

**Timescale:** O=ongoing; S=short term (2000-2001); M=medium (2002-2005); L=long (2006-2010).

**Type:** Type of action; PL=Policy & Legislation; SS=Site Safeguard & Management; SP=Species Management and Protection (species plans only); A=Advisory; RM=Research & Monitoring; CP=Communications and Publicity.