

LOWLAND RAISED BOG (UK BAP PRIORITY HABITAT)



Summary

This is bog situated among agricultural lowlands, in places where deep (>50 cm), wet peat has accumulated to form a gently raised dome. A typical raised bog has three zones: a central extensive, raised and rather level *mire expanse*, which is surrounded by a *rand* of deep peat sloping down towards the *lagg* which is the outermost, lowest zone and has only a thin, patchy peat cover so there is some nutrient enrichment from the underlying mineral soils. The extents of Lowland raised bog are variable from just a few hectares to more than a hundred hectares.

The vegetation of the mire expanse and rand consists mainly of dwarf shrubs, sedges and their allies, and *Sphagnum* mosses. The outer lagg zone, where it exists although many have been destroyed, can have mosaics of bog vegetation as described above and various sedge mires, fens and woodland communities. Lowland raised bog is important in being the main type of bog in the agricultural lowlands of Britain, where it adds valuable ecological diversity to an otherwise very different and more intensively managed type of landscape. It commonly occurs in association with other semi-natural habitats such as fens and wet woodland.

Ideal management for conservation of this habitat includes light or moderate grazing and an absence of peat-cutting, draining, burning and afforestation.

What is it?

Lowland raised bog represents a stage in the infilling of lowland ponds and lakes and other low-lying areas with impeded drainage. Colonising vegetation has formed increasingly thick mats where the upper surfaces have gradually risen so as to lose contact with the underlying

mineral soils and groundwater. The habitat is kept wet by rainwater – hence its scarcity in the driest parts of Britain – and has become strongly acidic, with centuries of dead vegetation accumulating to form a thick cover of wet peat which has a raised, gently dome-shaped profile and which can be up to about 12 m deep.

A typical Lowland raised bog has three zones. In the centre is the extensive, raised and rather level *mire expanse*. This is surrounded by the *rand*, which is where the peat surface slopes noticeably down from the central mire expanse. The outermost, lowest zone is called the *lagg* where the peat cover is thin and patchy, so there is more nutrient enrichment from the underlying mineral soils. Lowland raised bog varies in size from just a few hectares to more than a hundred hectares. Where raised bog merges into blanket bog in upland areas or upland margins they are not counted as being in the Lowland raised bog priority habitat but are classed instead as Blanket bog priority habitat.

In the wet, acidic and very nutrient-poor conditions of the peat-covered parts of the mire expanse and the rand, the vegetation consists mainly of a mixture of the dwarf shrubs especially ling *Calluna vulgaris* and cross-leaved heath *Erica tetralix*, sedges *Carex spp.* and their allies such as hare's-tail cottongrass *Eriophorum vaginatum*, common cottongrass *E. angustifolium* and deergrass *Trichophorum cespitosum*, purple moor-grass *Molinia caerulea* and *Sphagnum* mosses, especially *S. papillosum*, *S. magellanicum* and *S. capillifolium*. Other vascular plants include bog asphodel *Narthecium ossifragum*, tormentil *Potentilla erecta* and the small insectivorous sundews *Drosera spp.*. The relative proportions of dwarf shrubs, sedges/grasses and *Sphagnum* mosses can vary in response to the effects of land management (see under Management below).

The bog surface can have a hummock-hollow structure, with *Calluna* dominant on the drier upper parts of the hummocks which may be formed by, for example, *Sphagnum capillifolium*, while *S. cuspidatum*, *S. fallax* and *S. denticulatum* fill wet depressions with shallow water. This surface microtopography tends to be less pronounced in the more disturbed raised bogs such as those which have been drained, burned or cut for peat. On cut-over bogs the surface may be lowered so that the bog looks flatter and less raised and this can make recognition as raised bog less obvious.

Disturbance such as drainage and peat cutting result in the bog becoming drier, and this can allow trees to colonise, mainly on the sloping rand and on drier uppermost parts of the mire expanse. The most common tree species here is downy birch, which can thicken up into patches of woodland, but willows and Scots pine can also occur.

The outer, more nutrient-enriched lagg zone can have mosaics of bog vegetation as described above and various sedge mires, fens and woodland communities. These non-bog vegetation types do not form part of the Lowland raised bog priority habitat, which is why they are not included in the list of NVC types in the 'Definition' section below. They generally belong to other priority habitats, especially Wet woodland and Lowland Fens.

How do I recognise it?

Differentiation from other priority habitat types

Lowland raised bog and Blanket bog are similar in terms of their vegetation (see NVC details below) and the habitat of deep, wet peat. The distinguishing feature is that Lowland raised bog forms gently domed areas of peat situated within enclosed agricultural lowlands, while Blanket bog forms level or gently undulating 'blankets' of peatland in unenclosed upland areas. M25 *Molinia*-dominated vegetation similar to that found on both Lowland raised bog and Blanket bog also occurs very commonly and extensively on shallower (<50 cm) peat in unenclosed upland areas of Britain where it does not belong in any priority habitat, and less

extensively within the agricultural lowlands where it belongs in the Purple moor grass and rush pastures priority habitat.

Definition in relation to other habitat classifications

Classification	Habitat types belonging to this UK BAP priority habitat
NVC	M1-3, M17-20 and deep peat (>50 cm deep) examples of M15-16, M25 and W4: all on gently raised domes of deep peat in agriculturally enclosed lowlands). All of these communities except M25 are included in the Scottish Biodiversity List.
Phase 1	E1: on raised bogs situated among enclosed agricultural lowlands.
UK BAP broad habitat	All of the Lowland raised bog in Scotland (and in Britain as whole) forms part of the Bogs UK BAP broad habitat except for birch woodland on raised bogs which is in the Broadleaved, Mixed and Yew Woodland broad habitat.

M18 is the most extensive NVC type on Lowland raised bog in Scotland and in Britain as a whole. However this community also occurs on Blanket bog in the north and west.

Definition in relation to legislative classifications

Classification	Habitat types belonging to this UK BAP priority habitat
Habitats Directive Annex I	H7110, H7120 (all occurrences) and H7150 (occurrences on raised peat surfaces in agricultural lowlands).
SNH SSSI habitat features	Raised bog: Examples of NVC M1-3, M17-20 and (on peat >50 cm deep) M15-16 and M25 which are on more or less level (not raised) areas of blanket peat situated among enclosed farmland at low altitude. Estuarine raised bog: raised bogs which have developed beside river estuaries Intermediate bog (raised): Lowland examples of NVC M1-3, M17-20 and (on peat >50 cm deep) M15-16 and M25 which are intermediate between Lowland raised bog (on gently raised peat surfaces) and Blanket bog (on more or less level peat).

Where is it?

The Lowland raised bog priority habitat mostly occurs as gently raised, domed areas of deep, wet peat among the agricultural lowlands. A typical raised bog complex includes other types of wetland in the lagg zone around the margins which can include vegetation belonging to the Lowland fens and Wet woodland priority habitats. The surrounding land is typically flat or gently undulating farmland with enclosed pastures and meadows which may be either agriculturally improved (NVC types MG6-7) or unimproved (various NVC types such as MG5, MG9, MG10, MG13, U4, M23 and M25). At some sites the surrounding farmland includes arable fields. The outer margins of the whole raised bog complex, including the lagg zone, are most commonly sharply defined by fence lines or ditches. This outer boundary tends to be especially sharp where the surrounding farmland is intensively managed, agriculturally improved grassland or arable land. Within the bog complex the boundary between the main raised bog area and the outer lagg zone can also be sharply defined, but in some cases these two zones intergrade more gradually.

In Scotland Lowland raised bog is most common in the middle and western parts of the central belt, from Ayrshire north-east to West Lothian and western Fife. It also occurs less commonly in the lowlands from the Moray Firth east to Aberdeenshire, in Angus, the Borders and the southern parts of Dumfries and Galloway. Elsewhere in the UK it is found in the western lowlands from Cumbria south to Shropshire and Wales, and in Northern Ireland, with a few scattered outliers in drier regions such as South Yorkshire, 'the Fens' and Somerset. The total extent of intact Lowland raised bog is estimated to be about 2500 hectares in Scotland and about 3300 ha in the rest of the UK (UK BAP 2008).

What is special about it?

Lowland raised bog is important in being the main type of bog in the agricultural lowlands of Britain, where it adds valuable ecological diversity to an otherwise very different and more intensively managed type of landscape. It commonly occurs in association with other semi-natural habitats such as fens and wet woodlands, both of which can be in the less acidic and more nutrient-rich lagg zone around the margins of the raised bog mire expanse. The whole complex of raised bog and surrounding lagg fen/woodland forms an interesting ecological unit.

Some species of special conservation status recorded in this priority habitat are listed below.

Group	Common name	Latin name	UK BAP priority list	EC Habitats Directive Annex II	Scottish Bio-diversity List	Red Data List	Wildlife and Countryside Act (1981)
bird	Eurasian curlew	<i>Numenius arquata</i>	y		y	y	
bird	skylark	<i>Alauda arvensis</i>	y		y	y	
bird	grasshopper warbler	<i>Locustella naevia</i>	y		y	y	
bird	reed bunting	<i>Emberiza schoeniclus</i>	y		y		
butterfly	large heath	<i>Coenonympha tullia</i>	y		y		y
fungus	lousewort rust	<i>Puccinia clintonii</i>	y		y		
liverwort	marsh flapwort	<i>Jamesoniella undulifolia</i>	y		y	y	y
mammal	otter	<i>Lutra lutra</i>	y		y	y	y
mammal	water vole	<i>Arvicola amphibius</i>	y		y		y
moss	waved fork-moss	<i>Dicranum bergeri</i>	y		y	y	
moss	fuzzy fork-moss	<i>Dicranum leioneuron</i>			y	y	
moss	Baltic bog-moss	<i>Sphagnum balticum</i>	y		y	y	y
moth	argent and sable	<i>Rheumaptera hastata</i>	y		y		
moth	Haworth's minor	<i>Celaena haworthii</i>	y		y		
spider	a money spider	<i>Notioscopus sarcinatus</i>	y		y		
spider	a money spider	<i>Saaristoia firma</i>	y		y		
spider	a money spider	<i>Erigone welchi</i>	y		y		

How do we manage it?

The most common types of land management which have affected Lowland raised bog in the last few centuries are peat-cutting, draining, burning, grazing and afforestation.

Ideal management for conservation includes light or moderate grazing and an absence of peat-cutting, draining, burning and afforestation.

Light to moderate grazing by deer or by stock such as sheep or cattle can allow a good cover of dwarf shrubs to be maintained. At the same time such grazing can prevent heather from growing so tall and dense as to smother smaller plants of interest and in this way high botanical diversity can be maintained. It can also keep tree regeneration under control so that the habitat is maintained as bog. Grazing can also prevent heather plants from growing to such a size that they take up so much groundwater that the habitat becomes drier. As long as stock are not given winter feed on the bog surface then light to moderate grazing and associated trampling of peat is not likely to be extensive and damaging.

Avoidance of burning helps to maintain a varied dwarf shrub, grass and sedge cover and a diverse lower layer of *Sphagnum* mosses and other low-grown wet-demanding species. *Calluna* or *Molinia* can become overwhelmingly dominant as a result of burning.

Avoidance of draining helps to maintain a high water table, preventing the peat drying out and corresponding increase of *Calluna*, and decreased abundance and diversity of wet-demanding species such as *Sphagnum* mosses. Where functional drains are present, blocking them can help to maintain a high water table and guard against the habitat drying out.

Avoidance of peat-cutting allows the microtopography of the bog surface, including small-scale patterning of hummocks, hollows and bog pools, to remain intact. This also helps to maintain a diverse flora. Mechanical peat milling techniques employed since the 1950's strip peat on a very large scale and causes serious damage as the vegetation is removed, the peat depth greatly reduced and any small-scale natural variation in peat surface structure and hydrology disappears to leave large, smooth, level expanses of bare peat. Traditional, non-mechanised peat-cutting, while still damaging affects only small areas of a bog at a time, leaving most parts intact or revegetating. This produces a patchwork of bog vegetation at varying stages of development on varying depths of peat, and for the most part the characteristic plant communities and much of the botanical interest are able to persist.

By limiting the amount of trampling and avoiding draining and peat-cutting, any exposure of bare peat is minimised. This helps to retain the large amounts of carbon stored in the peat and prevent the carbon from being released into the atmosphere (a matter of concern with regard to climate change).

References, links and further reading

Averis, A., Averis, B., Birks, J., Horsfield, D., Thompson, D., & Yeo, M. 2004. An Illustrated Guide to British Upland Vegetation. Peterborough, JNCC <http://jncc.defra.gov.uk/page-2463>

Ellis, N.E. and Munro, K. 2004. A preliminary review of the distribution and extent of BAP priority habitats across Scotland. Scottish Natural Heritage Commissioned Report No.044 (ROAME No. F00NA02).

<https://www.nature.scot/information-library-data-and-research/information-library>

Rodwell, J.S. (Ed.) (1991b). British Plant Communities. Volume 2 - Mires and Heaths. Cambridge, Cambridge University Press.

Rodwell, J.S., Dring, J.C., Averis, A.B.G., Proctor, M.C.F., Malloch, A.J.C., Schaminee, J.H.J. & Dargie, T.C.D. 1998. Review of coverage of the National Vegetation Classification. Joint Nature Conservation Committee contract report F76-01-170. Coordinated by the Unit of Vegetation Science, Lancaster University.

UK BAP 2008; http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-31-LowlandRaisedBog.pdf

Usher, M.B., Bain, C. and Kerr, A. eds. 2000. Action for Scotland's Biodiversity. Scottish Biodiversity Group. Edinburgh, The Scottish Executive and The Stationery Office.

Common Standards Monitoring guidance <http://www.jncc.gov.uk/page-2199>

International Union for Conservation of Nature (IUCN) UK Peatland Programme:
<http://www.iucn-uk.org/Projects/PeatlandProgramme/tabid/109/Default.aspx>

National Biodiversity Network (NBN) Gateway <https://data.nbn.org.uk/>

Scottish Natural Heritage website: <http://www.nature.scot>

UKBAP information on JNCC website: <http://jncc.defra.gov.uk/default.aspx?page=5155>