

lowland bog

Description of Habitat

Lowland raised bogs, or Mosses, are a rare but highly distinctive part of Wales' peatlands. The last glaciation left many depressions in the landscape, which have in-filled with peat over the past ten thousand years, often progressing from open water through swamp, fen and carr to acidic raised mire. As the hollows fill in, the gradual build-up of peat 'raises' and isolates the surface of the mire from the influence of surface run-off and groundwater, and rain-fed (ombrogenous) peat begins to form.

Sphagnum bogmosses acidify the rainwater, 'pickling' bog plant remains, building up a dome of acidic peat sometimes up to 10 metres thick - a multi-millennial record of past landscape and climate change. The classically domed raised bog profile is rarely visible, as bogs have collapsed when they have been drained. Small sites sitting in distinct depressions are called basin mires.



A lowland bog

Current Status

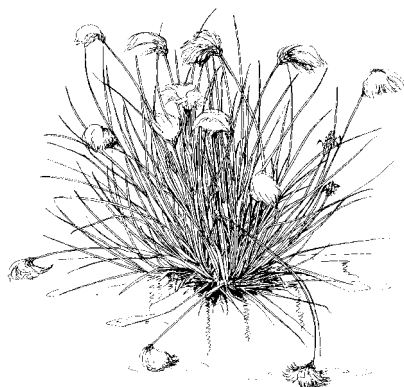
Few plant and animal species can tolerate the waterlogged, acidic and nutrient-poor raised bog conditions. Characteristic mire plants include a range of bogmosses, particularly *Sphagnum papillosum*, *S. magellanicum* and *S. cuspidatum*, hare's-tail cotton sedge (*Eriophorum vaginatum*), common cotton sedge (*E. angustifolium*), cross-leaved heath (*Erica tetralix*), round-leaved sundew (*Drosera rotundifolia*), bog asphodel (*Narthecium ossifragum*) and species which are becoming rarer in the lowlands, such as golden bogmoss (*Sphagnum pulchrum*), wavy-fork moss (*Dicranum bergeri*), bog rosemary (*Andromeda polifolia*) and cranberry (*Vaccinium oxycoccus*). Drainage encourages invasion by birch (*Betula spp.*), pine (*Pinus spp.*), heather (*Calluna vulgaris*), bracken (*Pteridium aquilinum*), and purple moor-grass (*Molinia caerulea*).

The marginal 'lagg', the fen, swamp, carr and stream communities around raised mires, often contain marsh cinquefoil (*Potentilla palustris*), marsh violet (*Viola palustris*) and marsh

pennywort (*Hydrocotyle vulgaris*), but often the lagg has been lost.

Mosses often support a characteristic variety of wildfowl and waders such as snipe (*Gallinago gallinago*), curlew (*Numenius arquata*), raptors including short-eared owl (*Asio flammeus*) and hobby (*Falco subbuteo*), and nightjar (*Caprimulgus europaeus*). Their characteristic invertebrates include large heath butterfly (*Coenonympha tullia*), a wide range of dragonflies, most importantly the white-faced darter (*Leucorrhinia dubia*), bog bush cricket (*Metrioptera brachyptera*) and raft spider (*Dolomedes fimbriatus*). They are important for adder (*Vipera berus*) and viviparous lizard (*Lacerta vivipera*). Otter (*Lutra lutra*) also occurs.

Reed bunting (*Emberiza schoeniclus*), nightjar, skylark (*Alauda arvensis*), curlew, lapwing (*Vanellus vanellus*), water vole (*Arvicola terrestris*), brown hare (*Lepus europaeus*), pipistrelle bat (*Pipistrellus pipistrellus*) and argent & sable moth (*Rhemaptera hastata*) are raised mire species of particular importance in terms of conserving Welsh biodiversity (S.74 species, CROW Act, 2000).

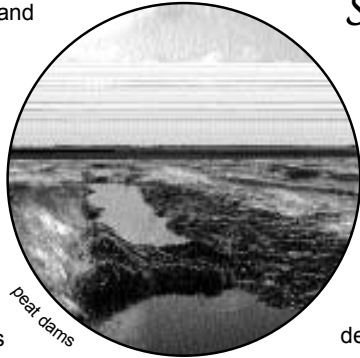


Cottongrass



Distribution

Active raised bog is one of Europe's most rare and threatened habitats and is a priority habitat under the European Union's Habitats and Species Directive and degraded raised bog is a non-priority habitat. Across the UK the area of relatively undisturbed surface has fallen by 94%, to 6000 ha. In Wales there has also been a significant decline of 80%, from 4000 ha to 800 ha. Drainage for forestry, agriculture, development and peat cutting has caused the greatest loss, together with lowering of ground water.



peat dams

Of the seven raised and basin mire sites in Wrexham covering 737 ha, none is undamaged. Wrexham holds part of Britain's third largest raised mire, Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SSSI (948 ha in

total, of which 691 ha, 73%, is in Wales). All of the other 8 sites are very small and some comprise a mosaic of habitats.

Legislation & Site Designation

Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SSSI is a candidate Special Area of Conservation (cSAC) under the European Habitats Directive for its active and degraded raised bog habitat, and is the largest of 27 SSSIs designated as the Midlands Meres and Mosses Wetland of International Importance under the Ramsar Convention. 635 ha of the SSSI (512 ha in Wales) have been declared a National Nature Reserve (NNR).

Vicarage Moss SSSI (21 ha), also part of the Ramsar site, and Llay Bog SSSI (2 ha), are basin mires developed in kettle holes near Wrexham. Both have a small central area of raised mire plants.

The Conery (15 ha, originally part of Fenn's Moss), and Arowry Moss (3 ha) and the Cranberry Mosses (2 ha) both lying in glacial depressions in SW Wrexham, retain a few bog species but are wooded over, as is Borrás Bog (2 ha) near Wrexham. All are Wildlife Sites of county importance. At least one depression in the Pant yr Ochain pools Wildlife Site (<0.5 ha) is also a basin mire.

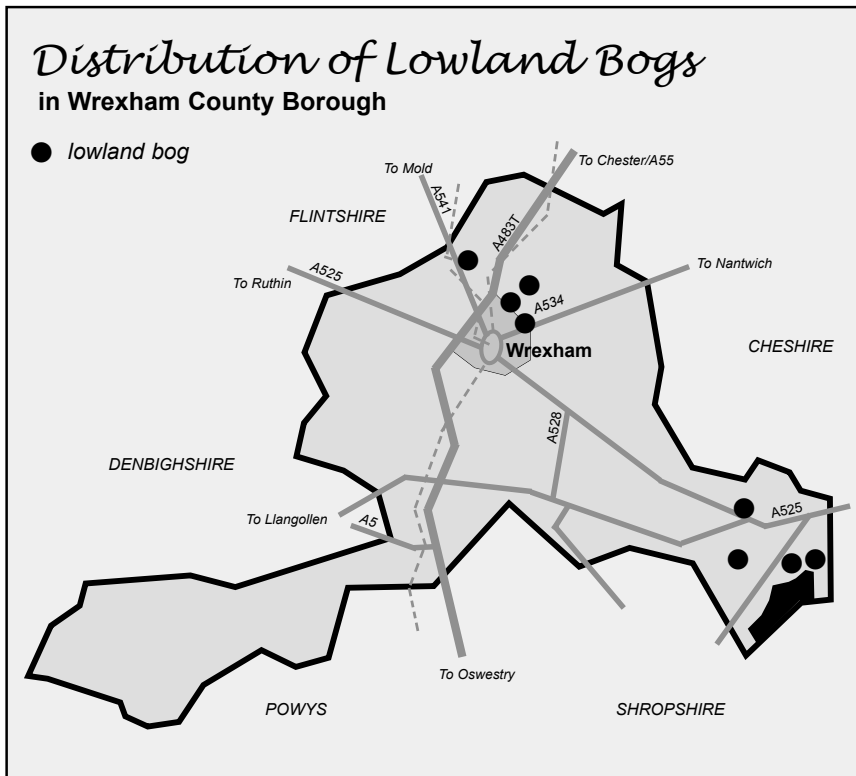
Several of the species occurring on Wrexham's raised bogs are legally protected under the Wildlife & Countryside Act 1981 (as amended, including by the Countryside & Rights of Way, CROW, Act 2000), the Conservation (Natural Habitats, and c.) Regulations 1994 and the Protection of Badger Act 1992.

Current Action

Site & Habitat/Species Protection

97% of the area of peatland sites bearing semi-natural communities in Wrexham is nominally protected by notification as SSSI (3 sites - Fenn's & Whixall, Vicarage Moss, Llay Bog). 94% (1 site) is protected as a cSAC/ Ramsar site (Fenn's & Whixall). 3% is recognised as Wildlife Sites (5 sites - Borrás Bog, The Conery, Arowry Moss, Cranberry Moss, and part of Pant-yr-Ochain Pools).

Species legally protected under the Wildlife & Countryside Act 1981 and the Countryside & Rights of Way Act 2000, and occurring on Wrexham's raised bogs, include otter, water vole, all bats, viviparous lizard, adder, common frog, great crested newt, palmate newt, large heath butterfly, the raptors hen and marsh harrier, hobby, peregrine, merlin, red-backed shrike and barn owl, and the waders black-tailed godwit, greenshank, red-necked phalarope, little ringed plover, ruff, green sandpiper and whimbrel. Badgers on the fringes of the sites are protected under the Protection of Badger Act 1992.



© Crown Copyright



Management and Programmes of Action

- Extensive areas of Fenn's, Whixall & Bettisfield Mosses NNR are being restored to active raised bog, where permitted by the Land Drainage Act (1991)
- Privately owned parts of Fenn's & Whixall SSSI in Wrexham outside the NNR are being managed under management agreement to conserve and enhance their current interest, although none is being restored to active raised bog.
- Fenn's, Whixall & Bettisfield Mosses National Nature Reserve is being used to interpret peatlands and encourage the public to use alternatives to peat.



various bog mosses



curlew

Abbreviations

Abbreviations for lowland bog sites (see table below):

- SSSI** Site of Special Scientific Interest
- WS** Wildlife Site
- NNR** National Nature Reserve
- AM** Arowry Moss (WS)
- BB** Borrass Bog (WS)
- C** The Conery
- CM** Cranberry Moss (WS)
- F** Fenn's, Whixall & Bettisfield Mosses (NNR)
- LB** Llay Bog (SSSI)
- POP** Pant yr Ochain Pools (WS)
- VM** Vicarage Moss (WS).

<i>Current Factors Affecting Habitat</i>	
● Drainage of the peat body, lowering of lagg streams and regional groundwater drainage, including by mineral extraction, which permits other land uses.	F, LB, BB, CM,AM,C
● Dereliction of drained sites allowing tree, scrub and bracken encroachment.	F, LB, BB, CM, POP, AM
● Peat cutting and moss gathering.	F
● Nutrient enrichment from surrounding land due to agricultural practices, sewerage, atmospheric pollution and inappropriate development.	F, LB, BB,VM, AM, CM, POP
● Agricultural use of parts of the peatland restricting management of other areas.	F, LB, AM
● Planting of trees on degraded areas of bog, making conversion back to former condition very difficult due to increased litter and nutrient levels.	F, C, CM
● Waste disposal on or adjacent to sites.	F
● Inappropriate development or activities such as road construction and shooting.	BB, F, C
● Lack of information on current condition of former raised bogs and raised bog fragments that are not within SSSIs.	F, LB, AM, BB and much of SW Wrexham
● Scattered and isolated nature of small remaining raised bogs. This makes them very susceptible to chance events which can result in local extinction for some species and makes re-colonisation unlikely.	LB, BB, VM, CM, AM
● Climate change.	All sites
● Lack of public appreciation for peatlands and continued use of peat in gardens/ horticulture.	

<i>Objectives and Targets</i>	
1	To implement management of all recognised sites to restore and maintain hydrological processes and appropriate flora and fauna to achieve active peat formation.
2	To produce an inventory of Wrexham's lowland peatland and to ensure that all raised mire with remnant bog and wetland vegetation/ fauna is formally designated and funding mechanisms for restoration management are found.
3	To raise awareness of the value of peatlands with the general public and promote the use of alternatives to peat in gardening.
4	To promote green composting and the use of peat alternatives with commercial users and businesses.
5	To promote the value of raised bogs with the owners of designated sites.
6	To consider restoration of archaic peatlands to semi-natural wetland sites if not active bog.

Links to Other Action Plans

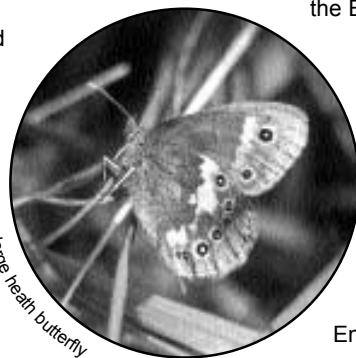
- UK Lowland Raised Bog HAP
- Meres & Mosses Strategy
- Wrexham Local Biodiversity Action Plan - Wet Woodland HAP*
- Wrexham Local Biodiversity Action Plan - Blanket Bog and Upland Heath HAP*
- Wrexham Local Biodiversity Action Plan - Lapwing SAP*
- Wrexham Local Biodiversity Action Plan - Otter SAP
- Shropshire Biodiversity Action Plan - Peat Bogs
- Cheshire Peatland Action Plan
- Whitchurch-Ellesmere Corridor, Environmental Assessment and Enhancement Project.

* NB: To be published by 2003.

Survey, Research and Monitoring

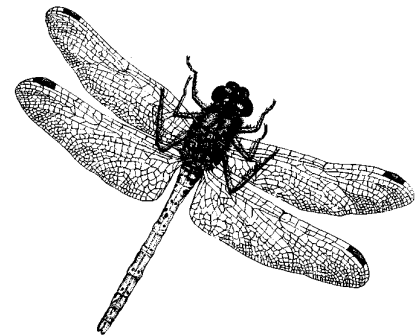
Extensive research has been carried out at Fenn's, Whixall & Bettisfield Mosses NNR, into vegetational, faunal and hydrological changes which occur with raised mire restoration. This is listed in chap. 2.3 and chap. 6 of Daniels 1998. **Key references are:**

- Boardman, P. 1997. Fenn's, Whixall and Bettisfield Mosses NNR. Five year review of butterfly and dragonfly monitoring, 1993 - 1997. EN internal report.
- Boardman, P. 1998. Fenn's, Whixall and Bettisfield Mosses NNR. 1998 Vegetation Survey. EN Contract Report.
- Daniels, J. L. 1998. Fenn's, Whixall, Bettisfield, Wem & Cadney Mosses SSSI and Fenn's, Whixall & Bettisfield NNR Management Plan 1998 - 2003. First Revision.



large heath butterfly

- Environmental Simulations International 2001 Upper Severn Area: Hydrogeological and hydrological assessment of selected wetland sites. Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses NGR SJ490365. Report to the Environment Agency.
- Gilman, K. 2000. Hydrological assessment of the implications of NNR management at Fenn's, Whixall & Bettisfield Mosses - Summary. Report to English Nature & Countryside Council for Wales
- Horton, K. (in prep) PhD dissertation into vegetation change on restored mire areas at Fenn's, Whixall & Bettisfield Mosses NNR.
- Judd, S. 1993. Liverpool Museum 1992-1993 Invertebrate Survey of Fenn's, Whixall and Bettisfield Mosses SSSI. Countryside Council for Wales Report - contract no. NW/ 11/92/93.



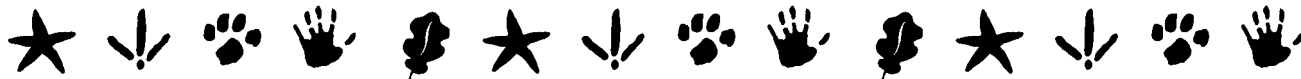
dragonfly

Research is needed at Fenn's Moss to determine the effect of restoration on mire invertebrates, other than the butterflies and dragonflies currently covered.

Also survey work is desperately needed to examine the current floral, faunal and hydrological value of the other peatland SSSIs, Wildlife Sites, adjacent peatlands and other archaic peatlands in Wrexham. Definition of hydrological and catchment boundaries would enable correct boundaries for sites to be drawn up, so restoration management to active raised bog could be achieved.



<i>Proposed Action with Lead Agencies</i>			
Action	Objectives	Partners	Target
Policy Appoint a part-time Peatland Project Officer or extend the post of the Meres and Mosses Project Officer to co-ordinate necessary research, designations, management agreements and funding sources for Wrexham's lowland peatlands.	Obj 1, 2, 3, 4, 5 & 6	CCW, EN, WCBC, EA (HLF)	2002 - 2005
Extend existing SSSIs to protect adjacent peat and mineral ground, so as to include necessary buffer/ catchment zones. In the interim, designate these areas as new Wildlife Sites - F, LB.	Obj 1, 2 & 6	WCBC, CCW, land owners	2003 - 2005
Review boundaries of existing Wildlife Sites to include a buffer zone necessary for their protection - BB, C, POP.	Obj 1, 2 & 6	WCBC, land owners, NWWT	2002 - 2005
Formulate ideal & achievable management plans for each site.	Obj 1	WCBC, CCW, EN contract	2002 - 2003
Formulate Water Level Management Plans (WLMP) for all SSSIs.	Obj 1	EA, WCBC	2002 - 2003
Resolve problems preventing restoration management at Borrás Bog.	Obj 1 & 2	CCW, WCBC, NWWT	2002- 2005
Review planning permissions for peat extraction and other destructive activities and ensure that Unitary Development Plan policies prevent peat extraction from SSSIs and WSs.	Obj 1	WCBC	2002 - 2007
Ensure the UDP protects all lowland peatland sites in Wrexham including their catchments and refuse planning permission for all developments which would affect their integrity.	Obj 1 & 2	WCBC	2002 - 2007
Review consents for activities affecting bogs through run-on and groundwater.	Obj 1	EA (Habitats Directive Only), CCW, WCBC	2002 - 2005
Ensure all lowland peatland sites are fully considered when developments are proposed nearby, or new land drainage consents are given.	Obj 1	CCW, NWWT, EA, WCBC	2002 - 2007
Clarify local application of Woodland Grant Scheme guidelines related to permitted open area, new stocking and replanting of bogs.	Obj 1	FC, CCW	2002
Practical Management Implement the F, W & B Mosses NNR Management Plan.	Obj 1	EN, CCW	2002 - 2007
Continue pro-active management under existing management agreements.	Obj 1	CCW, EN, EA (HLF), FC, owners	2002 - 2005
Encourage all peatland landowners to enter into Management Agreements to carry out necessary works <ul style="list-style-type: none"> ● Tree & scrub removal - F, LB, VM, C, CM, AM, BB, POP. ● Nutrient input reduction - F, VM, LB, CM, AM, POP. ● Pollution control - F, LB. ● Re-wet- F, LB, CM, AM, BB, C. ● Population re-introduction - All. 	Obj 1 & 2	CCW, FC, WCBC, EA (HLF), NWWT, NAWAD, owners (FWAG)	2002 - 2007
Instigate contracts to manage all sites.	Obj 1	WCBC, CCW, FC, NWWT, (FWAG)	2002 - 2007
Instigate specific management projects under SAPs relevant to lowland bogs.	Obj 1	CCW, EN, WCBC, EA (HLF), BW, (FWAG)	



<i>Proposed Action with Lead Agencies (continued)</i>			
Action	Objectives	Partners	Target
Advisory/Publicity			
Reduce use of peat by general public through awareness campaign.	Obj 3	WCBC, CCW, EN, NWWT	2002 - 2004
Biodiversity events & press at F.	Obj 3	WCBC, CCW, EN, NWWT	2002 - 2004
County level resurrection of the Peat Campaign through the Press, based on local damage.	Obj 3	WCBC, CCW, EN, NWWT	2002 - 2004
Promote green composting and campaign for tax on peat.	Obj 4	WCBC, NWWT	2002 - 2005
Reduce quantities of peat used by horticultural commercial users. Illustrate good practice by WCBC.	Obj 4	WCBC	2003 - 2007
Use Fenn's restoration scheme to promote best practice nationally.	Obj 5	EN, CCW	2002 - 2007
Communication			
Compile lists of alternatives to peat and local sources.	Obj 4	WCBC, EN, NWWT	2002
Promote the value of WSSIs to their owners and supply results of research - leaflet, visits.	Obj 5	WCBC (FWAG)	2002 - 2007
Monitoring and Research			
Determine areas to be included in new and extended Wildlife Sites and SSSIs using, in part, EN's Meres & Mosses catchment study approach.	Obj 1, 2	WCBC, CCW, owners	2002, 2003
Carry out wildlife audits on all Wildlife Sites and potential sites.	Obj2	WCBC, CCW	2002, 2003
Carry out hydrological assessments of all SSSIs and Wildlife Sites (excluding Fenn's & Whixall NNR).	Obj 2	WCBC, CCW, EA (only through WLMPS)	2002, 2003
Carry out hydrochemical analysis at Llay Bog relating to pollution.	Obj 1	CCW, EA	2002, 2003
Identify archaic peat/ missed basin mires.	Obj 2	WCBC, NAWAD	2002 -2003
Clarify distribution and status of key species on all sites.	Obj 1 & 2	CCW, EN, WCBC, NWWT	2002, 2003

Author: Joan Daniels

Further information

Biodiversity Officer

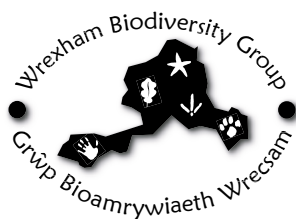
Environment Section,
 Planning Department,
 Wrexham County Borough Council,
 Lambpit Street, PO Box 1290
 Wrexham, LL11 1WL

tel: 01978 292019
 fax: 01978 292502
 e-mail: planning@wrexham.gov.uk
 website: www.wrexham.gov.uk/planning

All images courtesy of Peter Boardman and English Nature.

Mae'r Cynllun hon ar gael yn Gymraeg. Ffoniwch 01978 292019 am eich copi.

A large print version of this Plan is available.
 Please call 01978 292019.



Produced by the Planning Dept, Feb 2002

