

**European Community Directive  
on the Conservation of Natural Habitats  
and of Wild Fauna and Flora  
(92/43/EEC)**

Supporting documentation for the  
Third Report by the United Kingdom under  
Article 17

on the implementation of the Directive  
from January 2007 to December 2012  
Conservation status assessment for

Species:

S1409 - Bog-mosses (*Sphagnum* sp.)

**IMPORTANT NOTE – PLEASE READ**

- The country-level reporting information contained in this document is a contribution to the Article 17 UK report for the habitat/species concerned.
- It has been provided by **Natural Resources Wales** and refers only to the state of the habitat/species in **Wales** - it does not constitute an assessment for the whole of the UK.
- The Article 17 UK Approach document provides details on how this information has been used and, combined with information supplied by other Statutory Nature Conservation Bodies
- The format of the document is closely aligned to that set out by the European Commission for Member State reporting – as a result, some of the fields are not applicable at a country-level and have deliberately been left blank – in addition, the content of most fields is constrained by the EC reporting categories.

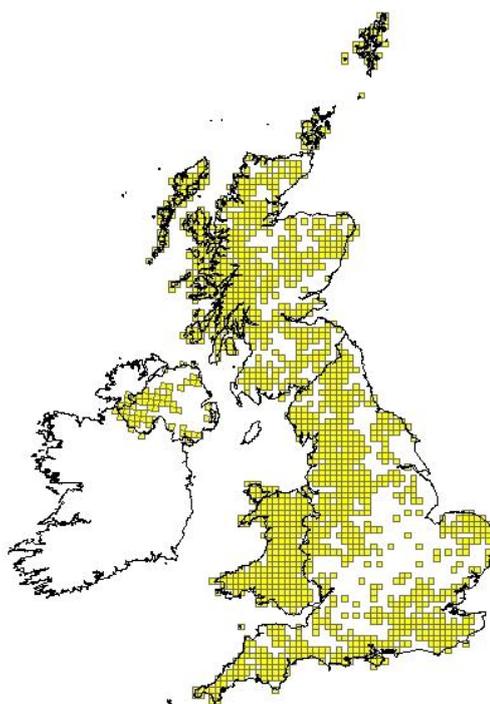
As of 1 April 2013, the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales became Natural Resources Wales/Cyfoeth Naturiol Cymru

## Reporting format on the 'main results of the surveillance under Article 11' for Annex II, IV & V species

<i>Field name</i>	<i>Brief explanations</i>	
<b>0.2 Species</b>	<b>0.2.1 Species code</b>	<b>S1409</b>
	<b>0.2.2 Species scientific name</b>	<b><i>Sphagnum</i> sp.</b>
	<b>0.2.3 Alternative species scientific name</b> Optional	
	<b>0.2.4 Common name</b> Optional	<b>Bog Mosses</b>

### 1.1 Maps

<b>1.1.1 Distribution map</b>		<b>Sensitive</b>	<b>False</b>
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<b>1.1.2 Method used - map</b>	<b>Complete survey/Complete survey or a statistically robust estimate</b>
	Map includes all NBN data for <i>Sphagnum</i> and covers the period 1989-2012. This gives a GOOD indication of the true current distribution of <i>Sphagnum</i> in Wales.
<b>1.1.3 Year or period</b>	<b>1989-2012</b>
	The map covers the period 1989-2012. If a later start date is selected, the mapped 10km squares decline dramatically in north Wales because of the lack of recent recording there, although there is no evidence to indicate that there has been a loss of <i>Sphagnum</i> AT THE 10km LEVEL

	from north Wales, while casual observations indicate the continued presence of the genus in each 10x10km square examined.
<b>1.1.4 Additional distribution map</b>	<b>False</b>
<b>1.1.5 Range map</b>	

<b>2.1 Biogeographical region &amp; marine regions</b>	<b>ATL</b>
<b>2.2 Published sources</b>	<p>"BERENDSE, F., VAN BREEMEN, N., RYDIN, H., BUTTLER, A., HEIJMANS, M., HOOSBEEK, M.R., LEE, J.A., MITCHELL, E., SAARINEN, T., VASANDER, H. &amp; WALLEN, B. 2001. Raised atmospheric CO2 levels and increased N deposition cause shifts in plant species composition and production in <i>Sphagnum</i> bogs. <i>Global Change Biology</i>, 7: 591-598.</p> <p>BLACKSTOCK, T.H., HOWE, E.A., STEVENS, J.P., BURROWS, C.R. &amp; JONES, P.S. 2008, <i>Habitats of Wales</i>. University of Wales Press.</p> <p>BOSANQUET, S.D.S. 2012. Supporting information for Countryside Council for Wales submission on <i>Sphagnum</i>.</p> <p>GARNETT, M.H., INESON, P. &amp; STEVENSON, A.C.. 2000. Effects of burning and grazing on carbon sequestration in a Pennine blanket bog, UK, <i>The Holocene</i>, 10:6, 729-736.</p> <p>HUGHES, P.D.M., LOMAS-CLARKE, S.H., SCHULZ, J. &amp; JONES, P. 2007. The declining quality of late-Holocene ombrotrophic communities and the loss of <i>Sphagnum austinii</i> (Sull. ex Aust.) on raised bogs in Wales, <i>The Holocene</i>, 17:5, 613-625.</p> <p>TUBA, Z., SLACK, N.G. &amp; STARK, L.R. (eds.) 2011. <i>Bryophyte Ecology and Climate Change</i>. Cambridge University Press."</p>

<b>2.3 Range</b>	
<b>2.3.1 Surface area Range</b>	
<b>2.3.2 Method used Surface area of Range</b>	<p><b>Complete survey/Complete survey or a statistically robust estimate</b></p> <p>see comment for 1.1.2</p>
<b>2.3.3 Short-term trend Period</b>	<p><b>2001-2012</b></p> <p>It has been agreed that the UK should use 2001-2012 (2 reporting periods) to assess short-term trends.</p>
<b>2.3.4 Short term trend Trend direction</b>	<p><b>decrease 1% or less/year</b></p> <p>The NBN data suggest a decline in range, but that is merely an artifact of low recording levels in some parts of Wales and there is no evidence of any real decline in the overall 10x10km square distribution of the genus. The range decline is less than the population decline because some 'lost' 10x10 km squares are within the continued broad range</p>

	envelope	
<b>2.3.5 Short-term trend Magnitude</b>	<b>a) Minimum</b>	
	<b>b) Maximum</b>	
<b>2.3.6 Long-term trend Period</b>	<b>1989-2012</b>	
	It has been agreed that the UK should use 1989-2012 (4 reporting periods) to assess long-term trends.	
<b>2.3.7 Long-term trend Trend direction</b>	<b>decrease 1% or less/year</b>	
	Change in recorded 10km squares from 224 (1989-2010) to 175 (2001-2012) entirely because of low level of bryophyte recording in the northern half of Wales since 1990. The NBN data suggest a slight decline in range, but that is merely an artifact of low recording levels in some parts of Wales. The range decline is less than the population decline because some 'lost' 10x10 km squares are within the continued broad range envelope.	
<b>2.3.8 Long-term trend Magnitude</b>  Optional	<b>a) Minimum</b>	
	<b>b) Maximum</b>	
<b>2.3.9 Favourable reference range</b>	<b>a) Value in km<sup>2</sup></b>	
	<b>b) Operator for FRR</b>	
	<b>c) FRR is unknown (indicated by "true")</b>	<b>True</b>
	It is not possible to work out a Favourable Reference Range using current data.	
	<b>d) Method used to set FRR</b>	
<b>2.3.10 Reason for change</b> Is the difference between the reported value in 2.3.1 and the previous reporting round	<b>a) Genuine change?</b>	<b>False</b>

mainly due to...	<b>b) Improved knowledge/more accurate data?</b>	<b>True</b>
	No Surface Area Range was given for the last reporting round. The current figure is based on 10x10km square data using all available datasets on the NBN Gateway, most of which were not available for the last reporting round. The data are therefore improved, albeit far from ideal.	
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>

<b>2.4 Population</b>		
<b>2.4.1 Population size estimation</b> (using individuals or agreed exceptions where possible)	<b>a) Unit</b>	
	<b>b) Minimum</b>	
	<b>c) Maximum</b>	
<b>2.4.2 Population size estimation</b> (using population unit other than individuals) Optional ( <i>if 2.4.1 filled in</i> )	<b>a) Unit</b>	<b>number of map 10x10 km grid cells</b>
	10x10km squares were agreed as the reporting unit because they give some impression of the widespread distribution of <i>Sphagnum</i> in the UK.	
	<b>b) Minimum</b>	<b>224</b>
	There is some uncertainty whether borderline squares between Wales and England have records from Wales because some data providers do not assign a county to their records.	
	<b>c) Maximum</b>	<b>231</b>
<b>2.4.3 Additional information on population estimates / conversion</b> Optional	<b>a) Definition of "locality"</b>	
	<b>b) Method to convert data</b>	
	<b>c) Problems encountered to provide population size estimation</b>	<b>Some border 10km squares may or may not have <i>Sphagnum</i> on the Welsh side of the border</b>
<b>2.4.4 Year or period</b>	<b>1989-2012</b>	
	Recording patterns only give a true picture of the distribution of <i>Sphagnum</i> at a 10x10 km square scale when assessed over a long period. It is obvious from examining maps that fewer than 10% of 10x10 km squares in Wales have <i>Sphagnum</i> (or any other bryophyte	

	species) recorded in any given year (see Supporting Information).	
<b>2.4.5 Method used Population size</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>	
	Population size is a count of all 10x10km squares in Wales with <i>Sphagnum</i> records from the period 1989-2012. It is as good an impression of distribution as can be attained with current data, but is likely to be only partial because some Welsh 10x10 km squares have not been visited by bryophyte recorders in even the last 30 years, especially in north Wales.	
<b>2.4.6 Short-term trend Period</b>	<b>2001-2012</b>	
	It has been agreed that the UK should use 2001-2012 (2 reporting periods) to assess short-term trends.	
<b>2.4.7 Short-term trend Trend direction</b>	<b>decrease &gt;1%/year</b>	
	The 14% decline (see 2.4.8) over 2001-2012 equates to just over a 1% per annum apparent decline. There probably is a genuine short-term decline in the small-scale distribution and abundance of the genus, albeit on a very minimal scale, because of habitat loss, drainage etc. This is nothing like on the magnitude suggested by the 10km square change, which is an artifact of recording. It is impossible to get a true handle on the population trend using current data.	
<b>2.4.8 Short-term trend Magnitude</b>	<b>a) Minimum</b>	<b>14</b>
	This compares the number of 10x10km squares with records from 2007 to 2012 (124) with those with records from 2001 to 2006 (141).	
	<b>b) Maximum</b>	<b>14</b>
	<b>c) Confidence interval</b>	
<b>2.4.9 Short-term trend Method used</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>	
	This trend is based on counts of 10x10km squares with <i>Sphagnum</i> records for the periods 2001-2006 and 2007-2012. Many squares were not visited in both periods, and many were not visited in either period, so the trend is an estimate based on partial data.	
<b>2.4.10 Long-term trend – Period</b>	<b>1989-2012</b>	
	It has been agreed that the UK should use 1989-2012 (4 reporting periods) to assess long-term trends.	
<b>2.4.11 Long-term trend Trend direction</b>	<b>decrease 1% or less/year</b>	
	The 16% decline (see 2.4.12) over 1989-2012 equates to under a 1% per annum apparent decline. There probably is a genuine long-term decline, albeit on a minimal scale, because of habitat loss, drainage etc. This is nothing like on the magnitude suggested by the 10km square change, which is an artifact of recording. It is impossible to get a true	

	handle on the population trend using current data.	
<b>2.4.12 Long-term trend Magnitude</b>  Optional	<b>a) Minimum</b>	<b>16</b>
	This compares the number of 10x10km squares with records from 2001 to 2012 (175) with those with records from 1989 to 2000 (209). The overall number with records from 1989 to 2012 is 224.	
	<b>b) Maximum</b>	<b>16</b>
	<b>c) Confidence interval</b>	
<b>2.4.13 Long term trend Method used</b>	<b>2</b>	
	This trend is based on counts of 10x10km squares with <i>Sphagnum</i> records for the periods 1989-2000 and 2001-2012. Many squares were not visited in both periods, and many were not visited in either period, so the trend is an estimate based on partial data.	
<b>2.4.14 Favourable reference population</b>	<b>a) Number of individuals/agreed exceptions/other units</b>	<b>200</b>
	This is a favourable reference population using 10km squares for Wales.	
	<b>b) Operator</b>	<b>more than</b>
	<b>c) FRP is unknown indicated by "true"</b>	<b>False</b>
	<b>d) Method used to set FRP</b>	<b>Expert opinion</b>
	Some marginal 10km squares support only small patches of <i>Sphagnum</i> and their loss would be insignificant. Loss of the species from any of the ca200 core 10km square would indicate severe habitat degradation.	
<b>2.4.15 Reason for change</b> Is the difference between the value reported at 2.4.1 or 2.4.2 and the previous reporting round mainly due to:	<b>a) Genuine change?</b>	<b>False</b>
	<b>b) Improved knowledge/more accurate data?</b>	<b>True</b>
	There has not been a genuine change, or at least not a significant one. Anyway, the last reporting round gave no figure. More data are available now on the NBN Gateway, so the data are	

	improved and more accurate although still incomplete for any given time period.	
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>

<b>2.5 Habitat for the species</b>		
<b>2.5.1 Area estimation</b>	<b>1070</b>	
	<p>Sphagnum grows in many habitats. This surface area is based on figures from Blackstock et al (2008) and combines the area figures for the whole of Wales for Bog, Fen, Acid Flush &amp; Wet Heath, all of which are considered suitable for Sphagnum when in good condition, along with 5% of the Marshy Grassland figure (an expert opinion of how much Marshy Grassland is likely to support Sphagnum) and 5% of the Woodland figure (also expert opinion).</p> <p>There is thought to be a sufficient amount of habitat in the UK to support a viable population of the species.</p>	
<b>2.5.2 Year or period</b>	<b>1979-1997</b>	
	<p>This date range covers the actual period of the Habitats of Wales survey. It is unlikely that there has been a significant reduction in the area of suitable habitat, although some of the component habitats are known to have declined in quality during the intervening period.</p>	
<b>2.5.3 Method used Habitat for the species</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>	
	<p>The estimate is based on complete survey data, but there was considerable extrapolation to derive the figures.</p>	
<b>2.5.4 Quality of the habitat</b>	<b>a) Habitat quality</b>	<b>Moderate</b>
	<p>Good or Moderate quality Bog, Wet Heath, Acid Flush and some Fen support Sphagnum, as do Good or Moderate quality examples of some forms of Woodland and Marshy Grassland.</p>	
	<b>b) Assessment method</b>	<b>Analysis of CCW reports</b>
	<p>Reports discuss the impacts of negative pressures on Sphagnum cover and composition in heathland, peatland and other habitats, for example bog vegetation with a low or zero cover of Sphagnum is likely to be so dry that it is in poor condition.</p>	
<b>2.5.5 Short-term trend Period</b>	<b>2001-2012</b>	
	<p>It has been agreed that the UK should use 2001-2012 (2 reporting periods) to assess short-term trends.</p>	
<b>2.5.6 Short-term trend Trend direction</b>	<b>decrease</b>	
	<p>There is a trend towards loss of the overall area of land suitable for Sphagnum, primarily because of drainage of wetlands for agriculture creating low quality marshy grassland. Peat cutting temporarily removes Sphagnum but in the long term creates new suitable habitat. Overall this trend is &lt;&lt;1%.</p>	

<b>2.5.7 Long-term trend Period</b>	<b>1989-2012</b>	
	It has been agreed that the UK should use 1989-2012 (4 reporting periods) to assess long-term trends.	
<b>2.5.8 Long-term trend Trend direction</b>	<b>decrease</b>	
	see note for 2.5.6	
<b>2.5.9 Area of suitable habitat for the species</b>	<b>a) Value in km<sup>2</sup></b>	<b>1070</b>
	<b>b) Absence of data indicated as '0'</b>	
<b>2.5.10 Reason for change</b> Is the difference between the value reported at 2.5.1 and the previous reporting round mainly due to	<b>a) Genuine change?</b>	<b>False</b>
	There was no figure given for the previous reporting round.	
	<b>b) Improved knowledge/more accurate data?</b>	<b>False</b>
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>

<b>2.6 Main pressures</b>		
<b>a) Pressure</b>	<b>b) Ranking</b>	<b>c) Pollution qualifier</b>
	H = high importance M = medium importance L = low importance	
B01: forest planting on open ground	H	
C01: Mining and quarrying	H	
C03: Renewable abiotic energy use	H	
H04: Air pollution, air-borne pollutants	H	N
J01: fire and fire suppression	H	
J02: human induced changes in hydraulic conditions	H	
A04: grazing	M	
A11: Agriculture activities not referred to above	M	
A08: Fertilisation	L	
E01: Urbanised areas, human habitation	L	
E02: Industrial or commercial areas	L	

F04: Taking / Removal of terrestrial plants, general	L	
K02: Biocenotic evolution, succession	L	

A04 - changes in grazing intensity alter *Sphagnum* species composition and the area of any particular site that is occupied by *Sphagnum*.

A08 - studies have shown changes in species composition of *Sphagnum* communities following agriculture fertilisation, with some losses.

A11 - Agriculture impacts through drainage and fertilisation, but also through dust drift (Hughes et al. 2007).

B01 - planting of forestry on open ground has caused losses in the past, as *Sphagnum* occupies a significantly smaller area under trees than on open ground.

C01 - opencast mining and quarrying cause localised (but sometimes large scale) loss of *Sphagnum* habitat.

C03 - wind farms and solar arrays can cause local loss of *Sphagnum* habitats,

E01 - increased building causes some localised loss of *Sphagnum* habitat, but most building takes place on drier ground unsuitable for *Sphagnum* and planning laws protect *Sphagnum* habitats.

E02 - see comment for E01.

F04 is surely what we need to be concerned about, as *Sphagnum* spp are on Annex 5. Moss collecting appears to cause only short-term damage, at least in Wales, but there is almost no evidence for the scale of the industry in the UK.

H04 - N pollution causes changes in *Sphagnum* species composition and growth (Berendse, 2001).

J01 - fire profoundly changes blanket bog and heathland (Garnett et al., 2000).

J02 - drainage can entirely destroy *Sphagnum* communities, or can modify them so as to encourage growth of *Juncus* and other competitive species.

K02 - succession causes changes in *Sphagnum* species composition but only rarely does it lead to entirely *Sphagnum*-free vegetation.

#### 2.6.1 Method used – Pressures

**based exclusively or to a larger extent on real data from sites/occurrences or other data sources**

Pressures on *Sphagnum* are covered widely in the scientific literature (e.g. papers cited in note for 2.6) but their impact is seldom sufficient to cause change that will be detectable through 10x10 km square loss.

## 2.7 Threats

a) Threat	b) Ranking	c) Pollution qualifier
	H = high importance M = medium importance L = low importance	
B01: forest planting on open ground	H	
C01: Mining and quarrying	H	
C03: Renewable abiotic energy use	H	
H04: Air pollution, air-borne pollutants	H	
J01: fire and fire suppression	H	

J02: human induced changes in hydraulic conditions	H	
M02: Changes in biotic conditions	H	
A04: grazing	M	
A11: Agriculture activities not referred to above	M	
A08: Fertilisation	L	
E01: Urbanised areas, human habitation	L	
E02: Industrial or commercial areas	L	
F04: Taking / Removal of terrestrial plants, general	L	
K02: Biocenotic evolution, succession	L	

M02 - Climate change is likely to impact on all of the current pressures. All current pressures are likely to remain.

**2.7.1 Method used – Threats**

**modelling**

All current threats are considered likely to continue. The impacts of Global Climate Change on *Sphagnum* communities have been studied in detail, for example 3 chapters in Tuba et al (2011).

**2.8 Complementary information**

**2.8.1 Justification of % thresholds for trends**

**2.8.2 Other relevant information**

**Sphagnum species grow in a wide range of habitats, and their continued presence both depends on the condition of those habitats and informs the condition of the habitats.**

**2.8.3 Trans-boundary assessment**

**2.9 Conclusions (*assessment of conservation status at end of reporting period*)**

Please refer to the United Kingdom assessment for this species.

**3 Natura 2000 coverage & conservation measures - Annex II species**  
*(only applies to species listed under Annex II of the Directive)*

3.1 Population	
<b>3.1.1 Population size</b>  Estimation of population size included in the SAC network	<b>a) Unit</b>
	<b>b) Minimum</b>
	<b>c) Maximum</b>
<b>3.1.2 Method used</b>	
<b>3.1.3 Trend of population size within the network</b> (short-term trend)	

3.2 Conservation measures														
Conservation measures taken (i.e. already being implemented) within the reporting period and provided information about their importance, location and evaluation.														
3.2.1 Measure	3.2.2 Type					3.2.3 Ranking  H = high importance M = medium importance L = low importance	3.2.4 Location  where the measure is PRIMARILY applied			3.2.5 Broad evaluation of the measure				
	a) Legal/statutory	b) Administrative	c) Contractual	d) Recurrent	e) One-off		a) Inside	b) Outside	c) Both inside & outside	a) Maintain	b) Enhance	c) Long term	d) No effect	e) Unknown

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