

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

**Fourth Report by the United Kingdom
under Article 17**

on the implementation of the Directive
from January 2013 to December 2018

Supporting documentation for the
conservation status assessment for the species:

S1400 - Large white-moss (*Leucobryum glaucum*)

SCOTLAND

IMPORTANT NOTE - PLEASE READ

- The information in this document is a country-level contribution to the UK Report on the conservation status of this species, submitted to the European Commission as part of the 2019 UK Reporting under Article 17 of the EU Habitats Directive.
- The 2019 Article 17 UK Approach document provides details on how this supporting information was used to produce the UK Report.
- The UK Report on the conservation status of this species is provided in a separate document.
- The reporting fields and options used are aligned to those set out in the European Commission guidance.
- Explanatory notes (where provided) by the country are included at the end. These provide an audit trail of relevant supporting information.
- Some of the reporting fields have been left blank because either: (i) there was insufficient information to complete the field; (ii) completion of the field was not obligatory; (iii) the field was not relevant to this species (section 12 Natura 2000 coverage for Annex II species) and/or (iv) the field was only relevant at UK-level (sections 9 Future prospects and 10 Conclusions).
- For technical reasons, the country-level future trends for Range, Population and Habitat for the species are only available in a separate spreadsheet that contains all the country-level supporting information.
- The country-level reporting information for all habitats and species is also available in spreadsheet format.

Visit the JNCC website, <https://jncc.gov.uk/article17>, for further information on UK Article 17 reporting.

Report on the main results of the surveillance under Article 11 for Annex II, IV and V species (Annex B)

NATIONAL LEVEL

1. General information

1.1 Member State	UK (Scotland information only)
1.2 Species code	1400
1.3 Species scientific name	Leucobryum glaucum
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Large white-moss

2. Maps

2.1 Sensitive species	No
2.2 Year or period	1990-2017
2.3 Distribution map	Yes
2.4 Distribution map Method used	Based mainly on extrapolation from a limited amount of data
2.5 Additional maps	No

3. Information related to Annex V Species (Art. 14)

3.1 Is the species taken in the wild/exploited?	No																
3.2 Which of the measures in Art. 14 have been taken?	<table> <tr> <td>a) regulations regarding access to property</td><td>No</td></tr> <tr> <td>b) temporary or local prohibition of the taking of specimens in the wild and exploitation</td><td>No</td></tr> <tr> <td>c) regulation of the periods and/or methods of taking specimens</td><td>No</td></tr> <tr> <td>d) application of hunting and fishing rules which take account of the conservation of such populations</td><td>No</td></tr> <tr> <td>e) establishment of a system of licences for taking specimens or of quotas</td><td>No</td></tr> <tr> <td>f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens</td><td>No</td></tr> <tr> <td>g) breeding in captivity of animal species as well as artificial propagation of plant species</td><td>No</td></tr> <tr> <td>h) other measures</td><td>No</td></tr> </table>	a) regulations regarding access to property	No	b) temporary or local prohibition of the taking of specimens in the wild and exploitation	No	c) regulation of the periods and/or methods of taking specimens	No	d) application of hunting and fishing rules which take account of the conservation of such populations	No	e) establishment of a system of licences for taking specimens or of quotas	No	f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens	No	g) breeding in captivity of animal species as well as artificial propagation of plant species	No	h) other measures	No
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3.3 Hunting bag or quantity taken in the wild for Mammals and Acipenseridae (Fish)

a) Unit

b) Statistics/ quantity taken	Provide statistics/quantity per hunting season or per year (where season is not used) over the reporting period					
	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
Min. (raw, ie. not rounded)						
Max. (raw, ie. not rounded)						
Unknown	No	No	No	No	No	No

3.4. Hunting bag or quantity taken in the wild Method used

3.5. Additional information

BIOGEOGRAPHICAL LEVEL

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs

Atlantic (ATL)

4.2 Sources of information

Main data source/review: Rothero, G.P. 2012. Surveillance of priority bryophytes in Scotland: Leucobryum Unpublished report to SNH.

National Biodiversity Network Atlas Scotland, (<https://scotland.nbnatlas.org/>) accessed on 20th December 2017 from the following datasets: dr859, dr681, dr1188, dr765, dr924, dr890, dr819, dr768, dr766, dr1817, dr774, dr775, dr786, dr922.

The Data Provider, Original Recorder [where identified], and the NBN Trust bear no responsibility for any further analysis or interpretation of the data and/or information.

British Bryological Society. 2014. Atlas of British & Irish Bryophytes. Eds. Blockeel, T.L., Bosanquet, S.D.S., Hill, M.O. and Preston, C.D. Volume 2. Pisces Publications. Newbury, UK.

Emmett, B.A., Rowe, E.C., Stevens, C.J., Gowing, D.J., Henrys, P.A., Maskell, L.C. and Smart, S.M. 2011. Interpretation of evidence of nitrogen impacts on vegetation in relation to UK biodiversity objectives. JNCC Report. 449.

5. Range

5.1 Surface area (km²)

5.2 Short-term trend Period

5.3 Short-term trend Direction

Stable (0)

5.4 Short-term trend Magnitude

a) Minimum

b) Maximum

5.5 Short-term trend Method used

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5.6 Long-term trend Period

5.7 Long-term trend Direction

5.8 Long-term trend Magnitude

5.9 Long-term trend Method used

5.10 Favourable reference range

a) Minimum

b) Maximum

a) Area (km²)

b) Operator

c) Unknown

d) Method

5.11 Change and reason for change in surface area of range

No change

The change is mainly due to:

5.12 Additional information

As reported in 2013, *Leucobryum glaucum* is a common plant in Scotland with records from most areas but it is still scarce in the central belt and continues to be so in much of Aberdeenshire and Caithness. In the west it is locally common and sometimes abundant in both mire areas and in woodland, where there may be some confusion with *Leucobryum juniperoideum*.

6. Population

6.1 Year or period

1995-2017

6.2 Population size (in reporting unit)

a) Unit

number of map 1x1 km grid cells (grids1x1)

b) Minimum

c) Maximum

d) Best single value 527

6.3 Type of estimate

Best estimate

6.4 Additional population size (using population unit other than reporting unit)

a) Unit

number of map 10x10 km grid cells (grids10x10)

b) Minimum

c) Maximum

d) Best single value 459

6.5 Type of estimate

Best estimate

6.6 Population size Method used

Based mainly on extrapolation from a limited amount of data

6.7 Short-term trend Period

2007-2018

6.8 Short-term trend Direction

Uncertain (u)

6.9 Short-term trend Magnitude

a) Minimum

b) Maximum

c) Confidence interval

6.10 Short-term trend Method used

Insufficient or no data available

6.11 Long-term trend Period

1995-2017

6.12 Long-term trend Direction

Uncertain (u)

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6.13 Long-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval
6.14 Long-term trend Method used	Insufficient or no data available
6.15 Favourable reference population (using the unit in 6.2 or 6.4)	a) Population size b) Operator c) Unknown d) Method
6.16 Change and reason for change in population size	No change The change is mainly due to:
6.17 Additional information	There has been a slight increase in the number of recorded 1-km squares from 178 to 216, however the response for not reporting on this as a trend, in addition to not having any statistical basis, are given in the audit notes to 6.9.

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	a) Are area and quality of occupied habitat sufficient (to maintain the species at FCS)? b) Is there a sufficiently large area of occupied AND unoccupied habitat of suitable quality (to maintain the species at FCS)?	Unknown Unknown
7.2 Sufficiency of area and quality of occupied habitat Method used	Insufficient or no data available	
7.3 Short-term trend Period	2007-2018	
7.4 Short-term trend Direction	Unknown (x)	
7.5 Short-term trend Method used	Insufficient or no data available	
7.6 Long-term trend Period		
7.7 Long-term trend Direction		
7.8 Long-term trend Method used		
7.9 Additional information		

8. Main pressures and threats

8.1 Characterisation of pressures/threats

Pressure	Ranking
Extensive grazing or undergrazing by livestock (A10)	H
Burning for agriculture (A11)	H
Conversion to forest from other land uses, or afforestation (excluding drainage) (B01)	M
Mixed source air pollution, air-borne pollutants (J03)	M
Problematic native species (I04)	M
Threat	Ranking
Extensive grazing or undergrazing by livestock (A10)	H

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Burning for agriculture (A11)	H
Conversion to forest from other land uses, or afforestation (excluding drainage) (B01)	H
Mixed source air pollution, air-borne pollutants (J03)	M
Problematic native species (I04)	M

8.2 Sources of information

8.3 Additional information

This primarily relates to intentional and unintentional muirburn.
This primarily relates to nitrogen pollution and acidification.
Relates to localised impacts of bracken.

9. Conservation measures

9.1 Status of measures

a) Are measures needed? No

b) Indicate the status of measures

9.2 Main purpose of the measures taken

9.3 Location of the measures taken

9.4 Response to the measures

9.5 List of main conservation measures

9.6 Additional information

10. Future prospects

10.1 Future prospects of parameters

- a) Range
- b) Population
- c) Habitat of the species

10.2 Additional information

Leucobryum glaucum has a broad ecological range which makes it difficult/impossible to assess future prospects or to specify conservation measures. For this parameter, an option of 'Unknown' would have been preferable in field 9.1a).

11. Conclusions

11.1. Range

11.2. Population

11.3. Habitat for the species

11.4. Future prospects

11.5 Overall assessment of Conservation Status

11.6 Overall trend in Conservation Status

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11.7 Change and reasons for change in conservation status and conservation status trend

a) Overall assessment of conservation status

No change

The change is mainly due to:

b) Overall trend in conservation status

No change

The change is mainly due to:

11.8 Additional information

12. Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network (on the biogeographical/marine level including all sites where the species is present)

a) Unit

b) Minimum

c) Maximum

d) Best single value

12.2 Type of estimate

12.3 Population size inside the network Method used

12.4 Short-term trend of population size within the network Direction

12.5 Short-term trend of population size within the network Method used

12.6 Additional information

13. Complementary information

13.1 Justification of % thresholds for trends

13.2 Trans-boundary assessment

13.3 Other relevant Information

Distribution Map

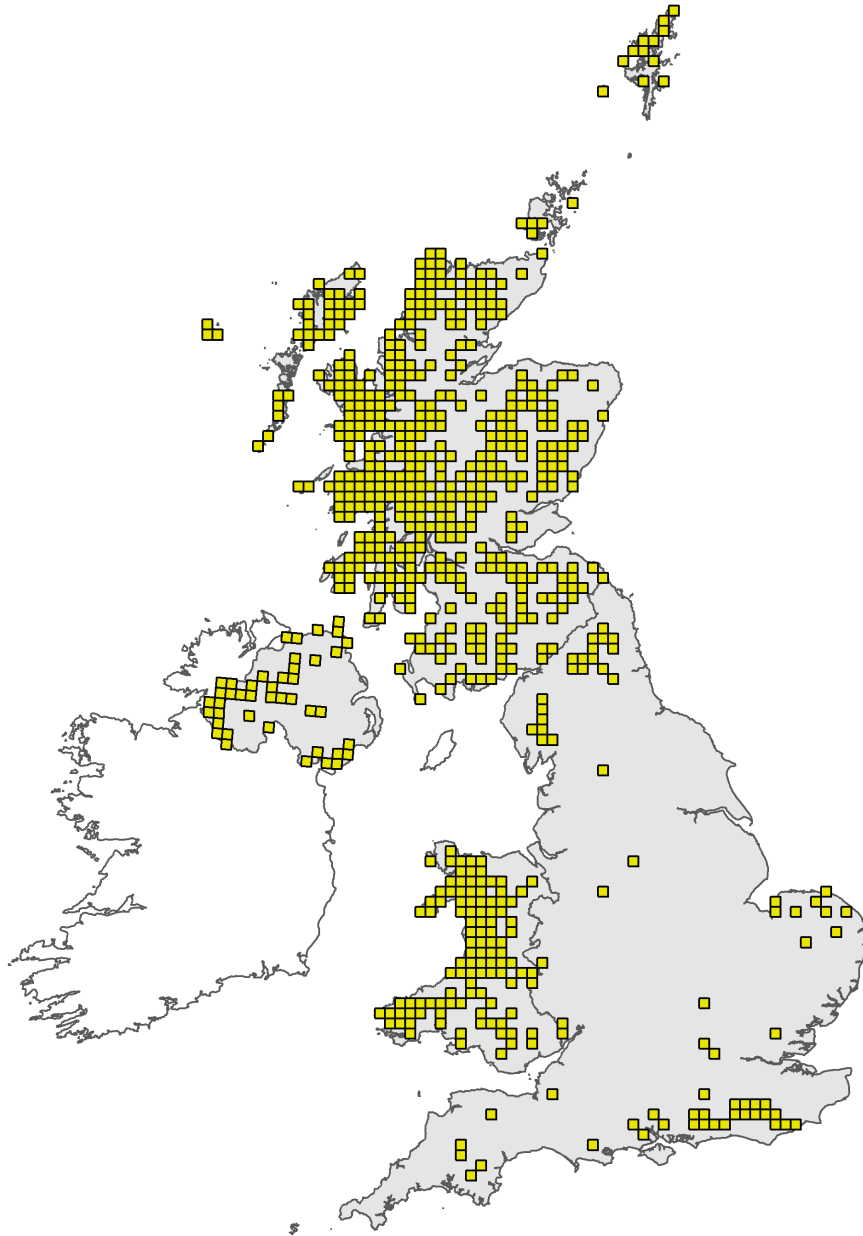


Figure 1: UK distribution map for S1400 - Large white-moss (*Leucobryum glaucum*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The 10km grid square distribution map is based on available species records within the current reporting period. For further details see the 2019 Article 17 UK Approach document.

Range Map

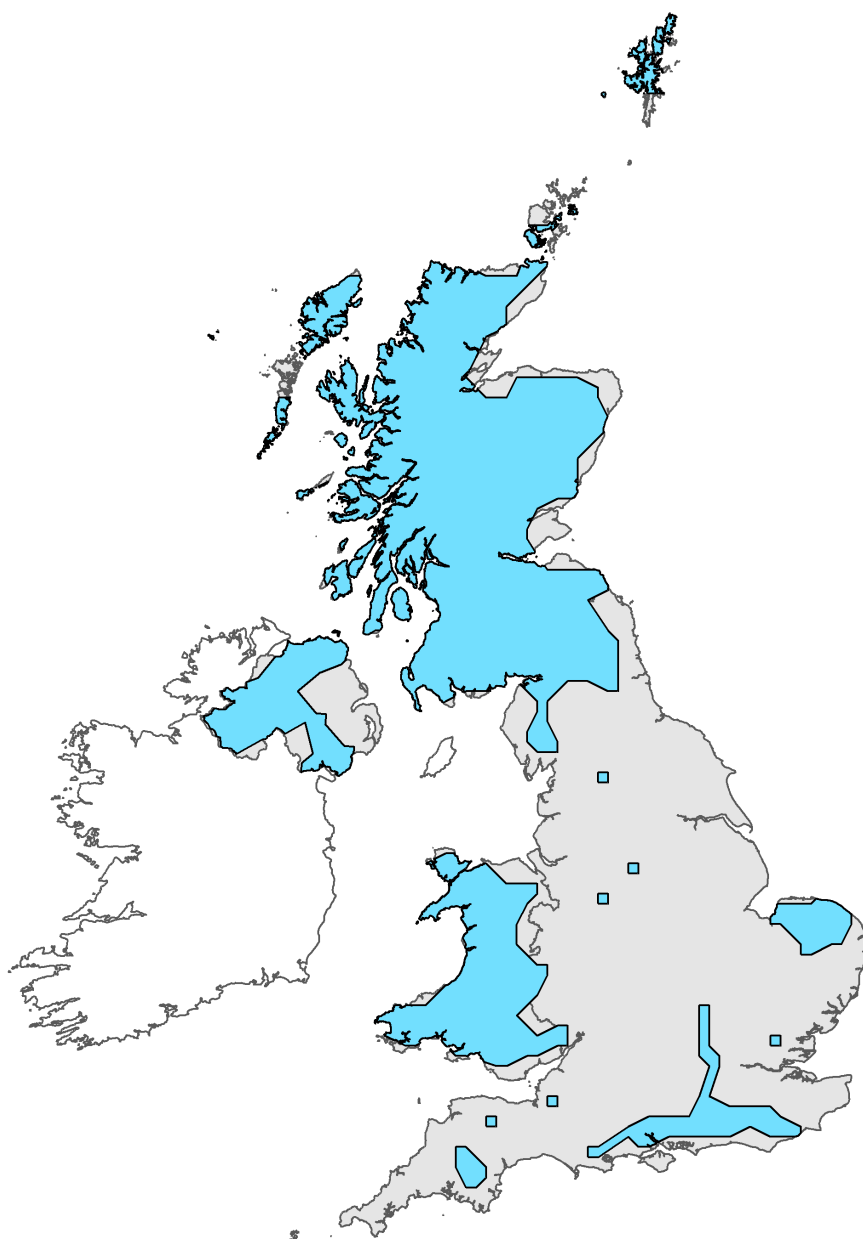


Figure 2: UK range map for S1400 - Large white-moss (*Leucobryum glaucum*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The range map has been produced by applying a bespoke range mapping tool for Article 17 reporting (produced by JNCC) to the 10km grid square distribution map presented in Figure 1. The alpha value for this species was 20km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Species name: Leucobryum glaucum (1400) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	By comparing the distribution map produced for the 2013 report with the map produced for the 2019 report there is no evidence of a change in range. There are small differences but these are within the variability in recording effort that we might expect for this species. General bryophyte recording was likely more extensive prior to the 2013 map because the British Bryological Society were targeting poorly recorded hectads for their 2014 Atlas.
6.2 Population size	The number of recorded 1-km squares equals the total number of 1-km square records plus the number of 10-km records that don't have 1-km records within them (386+92= 478). It may be that the additional 92 1-km square equivalents are not used for the UK assessment, in which case the 386 value should be used.
6.3 Type of estimate	Best estimate selected rather than minimum because there there's an unknown balance of unrecorded squares and losses of the plant (due to succession/damage/management
6.5 Type of estimate	Best estimate selected rather than minimum because there there's an unknown balance of unrecorded squares and losses of the plant (due to succession/damage/management
6.9 Short term trend; Magnitude	Short-term trend has not been reported because there hasn't been any systematic focussed survey for this species. As such the sort-term trend is constrained by the flow of recent records from recorders to databases. As an example, the total number of bryophyte records submitted to the British Bryological Society was 42393 in 2013, 6138 in 2014, 20344 in 2015 but only three in 2016 and no records from 2017 are on the database. However, it is interesting to note that while the ratio of total bryophyte records between 2007-2013 and 2014-2017(18) is about 4.5:8, the ratio of Leucobryum glaucum 1-km records is about 18:4. There are many possible recording reasons for this inverted ratio however and little confidence this reflects a genuine decline.
6.17 Additional information	This note relates to 6.18 - Age structure, mortality and reproduction. Leucobryum glaucum has not been recorded with reproductive capsules in Scotland in this reporting period. In general, capsule production is rare and mainly occurs in southern GB localities. This is thought to be due to a scarcity of male plants. Reproduction and dispersal is usually through vegetative means, either from leaf and shoot fragments or as detached moss balls. Recovery from disturbance or loss is slow. (British Bryological Society, 2014)
7.1 Sufficiency of area and quality of occupied habitat	Leucobryum glaucum has broad habitat requirements, although usually grows on acid organic soils. It occurs in acid woodland, heathland and in mires. With such a wide ecological range it would be inappropriate to try and quantify habitat area from broad habitat trends. Given the large area of apparently suitable habitat however, it is likely that there is sufficient habitat in Scotland to support a viable population of this moss.

8.1 Characterisation of pressures/ threats	<p>We do not have any evidence that this moss is exploited in Scotland. The 2013 report recorded 'hunting and collecting of wild animals' as a high pressure, however this does not relate to direct hunting and collecting of wild animals, rather to the damage done through burning for grouse moor management. To avoid confusion we have not included 'hunting and collecting of wild animals' in the current report. This is because we don't think that's what this pressure was intended for. We have retained 'A11: Burning for agriculture' since this is the closest pressure to represent burning for grouse moor and other burning management. The moss is not tolerant of burning. The 'Problematic native plants & animals' refers to bracken and the previous report notes apply: Bracken invasion affects H4010 in several locations, and although bracken will not generally invade waterlogged soils, some wet heath occurs on soils that are not permanently wet and which bracken can invade.</p>
8.2 Sources of information	Impact of nitrogen deposition on Leucobryum in Emmett et al. 2011.
10.1 Future prospects of parameters	<p>This moss is locally common and widespread. It is unlikely that pressures will act in such a way as to cause a change in range i.e. there is no evidence that pressures are more or less intense at the edge compared to the centre of the species' range. However, threats that act across the species range will have an unknown impact on local populations and habitat quality. We do not have enough data to predict the degree or extent of impact so these prospects have been assessed as unknown.</p>