Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A

2019-2024

Conservation status assessment for the species:

S1400 - Large white-moss

(*Leucobryum glaucum*)

Wales

Cyfoeth Naturiol Cymru
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This report was produced by JNCC in collaboration with Natural Resources Wales.

This document should be cited as:

Natural Resources Wales and JNCC. (2026). Conservation status assessment for the species: S1400 Large white-moss (*Leucobryum glaucum*).

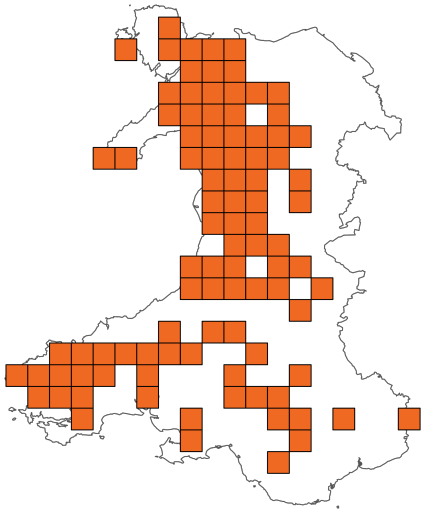
Important note - Please read

- The information in this document represents the Wales Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A, for the period 2019-2024.
- It is based on supporting information provided by Natural Resources Wales, which is documented separately.
- The Habitats Regulations reporting 2019-2024 Approach Document provides details on how this supporting information contributed to the UK Report and the fields that were completed for each parameter.
- Maps showing the distribution and range of the species are included.
- Explanatory notes (where provided) are included at the end. These provide additional audit trail information to that included within the assessments. Further underpinning explanatory notes are available in the related country reports.
- 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; and/or (iii) the field was not relevant to this species (section 12 National Site Network coverage for Annex II species).

Further details on the approach to the Habitats Regulations Reporting 2019-2024 are available on the JNCC website.

Assessment Summary: Large white-moss

Distribution Map



Range Map

Figure 1: Wales distribution and 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 10km grid square distribution map is based on available species records within the current reporting period.

Table 1: Table summarising the conservation status for S1400 - Large white-moss (*Leucobryum glaucum*). Overall conservation status for species is based on assessments of range, population, habitat for the species, and future prospects.

Overall Conservation Status (see section 11)

Unfavourable-inadequate (U1)

Breakdown of Overall Conservation Status

Range (see section 5)	**Favourable (FV)**
Population (see section 6)	**Unfavourable-inadequate (U1)**
Habitat for the species (see section 7)	**Unfavourable-inadequate (U1)**
Future prospects (see section 10)	**Unfavourable-inadequate (U1)**

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National Level

1. General information

1.1 Country	Wales
1.2 Species code	S1400
1.3 Species scientific name	*Leucobryum glaucum*
1.4 Alternative species scientific name	
1.5 Common name	Large white-moss
Annex(es)	V

2. Maps

2.1 Sensitive species	No
2.2 Year or period	2000-2024
2.3 Distribution map	Yes
2.4 Distribution map; Method used	Based mainly on extrapolation from a limited amount of data

2.5 Additional information

No additional information

3. Information related to Annex V Species

3.1 Is the species taken in the wild / exploited?	Yes

3.2 What measures have been taken?

a) Regulations regarding access to property	Yes
b) Temporary or local prohibition on the taking of specimens in the wild and exploitation	Yes
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
Other measures	No
Other measures description	

3.3: Hunting bag or quantity taken in the wild for Mammals and Acipenseridae (Fish)

a) Unit No unit - not reported

Table 2: Quantity taken from the wild during the reporting period (see 3.3a for units). For species with defined hunting seasons, Season 1 refers to 2018/2019 (autumn 2018 to spring 2019), and Season 6 to 2023/2024. For species without hunting seasons, data are reported by calendar year: Year 1 is 2019, and Year 6 is 2024.

	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
b) Minimum	-	-	-	-	-	-
c) Maximum	-	-	-	-	-	-
d) Unknown	No	No	No	No	No	No

3.4: Hunting bag or quantity taken in the wild; Method used

3.5: Additional information

There is no evidence that Leucobryum is harvested commercially in Wales. The moss harvesters interviewed by Wong et al (2016) only harvested Sphagnum. MellasJungle (2025) advertises Leucobryum for sale and states that it is “ethically picked from woodland in Wales”. However, discussion with the shop owner indicate that her

Leucobryum is actually imported from Holland because she “cannot source British Pillow Moss because it is protected”. Very small-scale harvesting by individuals may take place, but is considered unlikely to impact on the distribution of Leucobryum in Wales, especially when compared with other Pressures.

Biogeographical Level

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs	ATL

4.2 Sources of information

See section 14 References

5. Range

5.1 Surface area (km²)	15,061.48
5.2 Short-term trend; Period	2013-2024
5.3 Short-term trend; Direction	Stable
5.4 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	No
e) Type of estimate	Best estimate
f) Rate of decrease	
5.5 Short-term trend; Method used	Based mainly on expert opinion with very limited data
5.6 Long-term trend; Period	2001-2024
5.7 Long-term trend; Direction	Stable
5.8 Long-term trend; Magnitude	

a) Minimum	
b) Maximum	
c) Rate of decrease	
5.9 Long-term trend; Method used	Based mainly on extrapolation from a limited amount of data

5.10 Favourable Reference Range (FRR)

a) Area (km²)	
b) Pre-defined increment	Current range is less than 2% smaller than the FRR
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

5.11 Change and reason for change in surface area of range

a) Change	No
b) Genuine change	
c) Improved knowledge or more accurate data	
d) Different method	
e) No information	
f) Other reason	
g) Main reason	

5.12 Additional information

No additional information

6. Population

6.1 Year or period	2000-2024

6.2 Population size (in reporting unit)

a) Unit	number of map 10x10 km grid cells
b) Minimum	94
c) Maximum	110
d) Best single value	94
6.3 Type of estimate	Best estimate
6.4 Quality of extrapolation to reporting unit	moderate

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

a) Unit	
b) Minimum	
c) Maximum	
d) Best single value	
e) Type of estimate	

6.6 Population size; Method used	Based mainly on extrapolation from a limited amount of data
6.7 Short-term trend; Period	2013-2024
6.8 Short-term trend; Direction	Decreasing
6.9 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	Decreasing 0 - 12%
d) Unknown	No
e) Type of estimate	Pre-defined range
f) Rate of decrease	Decreasing <=1% (one percent or less) per year on average
6.10 Short-term trend; Method used	Based mainly on expert opinion with very limited data

6.11 Long-term trend; Period	2001-2024
6.12 Long-term trend; Direction	Decreasing
6.13 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Confidence interval	
d) Rate of decrease	Decreasing <=1% (one percent or less) per year on average
6.14 Long-term trend; Method used	Based mainly on expert opinion with very limited data

6.15 Favourable Reference Population (FRP)

ai) Population size	
aii) Unit	
b) Pre-defined increment	Current population is less than 5% smaller than the FRP
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

6.16 Change and reason for change in population size

a) Change	Yes
b) Genuine change	No
c) Improved knowledge or more accurate data	No
d) Different method	Yes
e) No information	No
f) Other reason	No
g) Main reason	Use of different method

6.17 Additional information

No additional information

6.18 Age structure, mortality and reproduction deviation	Yes, but not strongly deviating from normal

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat (for long-term survival)

a) Is area of occupied habitat sufficient?	Yes
b) Is quality of occupied habitat sufficient?	No
c) If No or Unknown, is there a sufficiently large area of unoccupied habitat of suitable quality?	No

7.2 Sufficiency of area and quality of occupied habitat; Method used

a) Sufficiency of area of occupied habitat; Method used	Based mainly on extrapolation from a limited amount of data
b) Sufficiency of quality of occupied habitat; Method used	Based mainly on extrapolation from a limited amount of data
7.3 Short-term trend; Period	2013-2024
7.4 Short-term trend; Direction	Decreasing
7.5 Short-term trend; Method used	Based mainly on expert opinion with very limited data
7.6 Long-term trend; Period	2001-2024
7.7 Long-term trend; Direction	Decreasing
7.8 Long-term trend; Method used	Based mainly on expert opinion with very limited data

7.9 Additional information

No additional information

8. Main pressures

8.1 Characterisation of pressures

Table 3: Pressures affecting the species, including timing and importance/impact ranking. Pressures are defined as factors acting currently and/or during the reporting period (2019–2024). Rankings are: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Pressure	Timing	Ranking
PA05: Abandonment of management/use of grasslands and other agricultural and agroforestry systems (e.g. cessation of grazing, mowing or traditional farming)	Ongoing and likely to be in the future	High (H)
PA08: Extensive grazing or undergrazing by livestock	Ongoing and likely to be in the future	High (H)
PA09: Burning for agriculture	Ongoing and likely to be in the future	Medium (M)
PA20: Live stock farming generating pollution	Ongoing and likely to be in the future	High (H)
PB01: Conversion to forest from other land uses, or afforestation (excluding drainage)	Ongoing and likely to be in the future	Medium (M)
PC05: Peat extraction	In the past but now suspended due to measures	Medium (M)
PD01: Wind, wave and tidal power (including infrastructure)	Ongoing and likely to be in the future	Medium (M)
PE06: Land, water and air transport activities generating air pollution	Ongoing and likely to be in the future	Medium (M)
PF09: Residential, commercial and industrial activities and structures generating air pollution	Ongoing and likely to be in the future	High (H)
PJ10: Change of habitat location, size, and / or quality due to climate change	Only in future	Medium (M)

8.2 Sources of information

See section 14 References

8.3 Additional information

No additional information

9. Conservation measures

9.1: Status of measures

a) Are measures needed?	Yes
b) Indicate the status of measures	Measures identified and taken
9.2 Main purpose of the measures taken	Maintain the current range, population and/or habitat for the species
9.3 Location of the measures taken	Both inside and outside National Site Network
9.4 Response to measures	Medium-term results (within the next two reporting periods, 2025–2036)

9.5 List of main conservation measures

Table 4: Key conservation measures addressing current pressures and/or anticipated threats during the next two reporting periods (2025–2036). Measures are ranked by importance/impact: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Conservation measure	Ranking
No conservation measures	

9.6 Additional information

No additional information

10. Future prospects

10.1a Future trends of parameters

ai) Range	Overall stable
bi) Population	Negative - decreasing <=1% (one percent or less) per year on average

ci) Habitat for the species	Negative - slight/moderate deterioration

10.1b Future prospects of parameters

aii) Range	Good
bii) Population	Poor
cii) Habitat for the species	Poor

10.2 Additional information

No additional information

11. Conclusions

11.1 Range	Favourable (FV)
11.2 Population	Unfavourable-inadequate (U1)
11.3 Habitat for the species	Unfavourable-inadequate (U1)
11.4 Future prospects	Unfavourable-inadequate (U1)
11.5 Overall assessment of Conservation Status	Unfavourable-inadequate (U1)
11.6 Overall trend in Conservation Status	Deteriorating

11.7 Change and reason for change in conservation status

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

11.7 Change and reason for change in conservation status trend

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

11.8 Additional information

No additional information

12. UK National Site Network (pSCIs, SCIs, SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network

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 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Direction	
12.7 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Method used	

12.8 Additional information

No additional information

13. Complementary information

13.1 Justification of percentage thresholds for trends

No justification information

13.2 Trans-boundary assessment

No trans-boundary assessment information

13.2 Other relevant information

No other relevant information

14. References

Biogeographical and marine regions

4.2 Sources of information

APIS. 2025. Ammonia::Bogs. https://www.apis.ac.uk/node/866 [Accessed 4th February 2025]

Blockeel, T.L., Bosanquet, S.D.S., Hill, M.O. & Preston, C.D., 2014, Atlas of British and Irish bryophytes. Pisces Publications, Newbury.

British Bryological Society database, accessed 19th June 2024.

Mellasjungle. 2025. https://www.mellasjungle.com/product-page/leucobryum-glaucum-pillow-moss-chubby [Accessed 4th February 2025]

Nitrogen Futures. 2022. https://jncc.gov.uk/our-work/nitrogen-futures/

project-outputs [Accessed 4th February 2025]

Wong J.L.G., Dickinson B.G. & Thorogood A., 2016, Assessing the scale of Sphagnum moss collection from Wales. NRW Evidence Reports. Report No 185, 38pp, Natural Resources Wales,Bangor.

Main pressures

8.2 Sources of information

No sources of information

15. Explanatory Notes

Field label	Note
2.4: Distribution map; Method used	Coverage of Wales by bryophyte recorders has been as complete as possible, but many 10x10 km squares (let alone 1x1 km squares) will not have been surveyed since before 1990, so the map is no more than a best estimate. No attempt was made to produce a predictive map, either by reference to habitat data layers (because Leucobryum is not consistently present in any particular habitat) nor by converting 10km presence to 1km presence (more than half of all recorded 10km squares only include a record from a single 1km square, but there is massive variation in the number of recorded 1km squares per 10km). The distribution map is based on the British Bryological Society dataset, because identification difficulties with respect to Leucobryum albidum and L. juniperoideum were considered too complex to allow the use of non-specialist data providers.
3.2: Which of the measures in Art. 9a have been taken?	There are restrictions on moss harvesting on the Welsh Government Woodland Estate, but no restrictions on private land except within Sites of Special Scientific Interest.
5.11: Change and reason for change in surface area of range	Expert opinion suggests that the overall range of Leucobryum has remained stable in Wales over the last 20 years. Apparent losses are mostly from the eastern part of its range and are thought to have taken place before 2000.
6.1: Year or Period	The distribution map represents the population in the current reporting period (2019-2024) but also includes records made between 2000 and 2018 because it is considered likely that most populations recorded in the early 2000s are still present and that a map based solely on records made between 2019 and 2024 would very significantly under-represent the population.
6.6: Population size; Method used	The distribution map is based on the British Bryological Society dataset, accessed via the NBN Gateway and includes all records of Leucobryum glaucum from Wales

	made since 1970. 10 km squares that only have records made before 2000 might have lost Leucobryum due to habitat loss and air pollution and were not included. These are concentrated in eastern Wales and Llŷn – where the pressures identified in 8.1 are most acute – but include scattered locations in mid Wales where loss from an entire 10x10 km square would be surprising. If Leucobryum remains in these pre-2000 10 km squares then the population could be as large as 110 occupied squares, but a population closer to the 94 squares with post-2000 records is more likely.
6.14: Long-term trend; Method used	There is no strong evidence to indicate a decline in the number of occupied 10x10 km squares in Wales for Leucobryum, but the pressures listed in 8.1 make it reasonable to assume that there has been an overall slight decrease. However, it is considered unlikely (expert opinion based on field experience) that any decrease has led to loss of Leucobryum from a 10x10km square since 2000, merely from some sites within some 10x10 km squares. British Bryological Society data suggest that some 10x10 km squares that were occupied in the 1960s and 1970s in eastern Wales have lost Leucobryum.
6.16: Change and reason for change in population size	Differences in recorded squares between reporting periods is believed (expert opinion based on extensive fieldwork in Wales over 24 years) to be the result of differences in recorder coverage rather than any genuine change.
6.18: Age structure, mortality and reproduction	Sporophytes are very rarely found in Leucobryum in Wales, but are reported as 'rare' throughout Britain by Blockeel et al (2014) so there is not considered to be more than a small deviation from normal in reproduction in Wales.
7.2: Sufficiency of area and quality of occupied habitat; Methods used	There is probably enough heathland, bog and Atlantic woodland habitat in Wales to support a Favourable population of Leucobryum glaucum, but there are pressures on these habitats that mean their quality is probably not good enough. These expert opinions are based on field experience, as there are no surveys or reports explicitly considering Leucobryum in Wales (or UK).

7.7: Long-term trend; Direction	The Wales Lowland Peatland Survey shows that there has been some loss of heathland and peatland habitats in Wales since 2001 due to the pressures listed in 8.1, and also some deterioration in quality of those habitats due to air pollution and dereliction. Decreases in the habitat for Leucobryum are therefore assumed, although the scale of those decreases is largely unknown.
8.1: Characterisation of pressures	Commercial harvesting (PG10) (the focus of Annex V) is not considered to be a pressure for Leucobryum in Wales. However, there are other significant pressures on the species, notably from air pollution and habitat management (or the loss of grazing management). The pressures ranked as High are the removal of grazing from peatland and heathland habitats (PA05); the afforestation of peatland and heathland habitats (PB01) albeit controlled by measures to prevent planting on Priority Habitats; and air pollution generated by agriculture (PA20) and industry (PF09). Air pollution from road traffic (PE06) has been identified as a pressure in England, but there are few major roads in very close proximity to areas supporting Leucobryum in Wales so this is considered only a Moderate pressure. Undergrazing (PA08) and burning for agriculture (PA09) have localised impacts on Leucobryum. Peat extraction (PC05) formerly removed bog surfaces on which Leucobryum would have grown, but has now ceased in Wales. Wind turbine construction (PD01) and housing development (PF01) cause localised losses of Leucobryum-rich habitat but are controlled by Measures. The direct impacts of Climate Change on Leucobryum are unknown, but impacts on peatland habitat (PJ10) are expected.
9.5: List of main conservation measures	Measures to prevent loss of Priority Habitats that support Leucobryum (MA01, MB01, MC03) are written into UK and Welsh legislation and without them the habitat for the species could be severely impacted. Measures to reduce air pollution from industry (MF05) are working to some extent, whilst measures to reduce air pollution from agriculture (MA11) are planned as part of the Sustainable

	Farming Scheme and are urgently needed to prevent ongoing damage to Leucobryum habitats both close to farms and more remotely through 'wet deposition' of N compounds (APIS, 2025). Some measures to reinstate grazing (MA04) and reverse the impacts of peatland drainage (MA13) will be having localised positive impacts, for example as part of the LIFE Welsh Raised Bogs project (NRW, 2024). Measures to reduce N pollution from transport (ME03) might have some localised positive impacts on Leucobryum.
11.1: Range	Conclusion on Range reached because: (i) the short-term trend direction in Range surface area is stable; and (ii) the current Range surface area is approximately equal to the Favourable Reference Range.
11.2: Population	Conclusion on Population reached because:(i) the short-term trend direction in Population size is decreasing by 1% per year or less; (ii) the current Population size is approximately equal to the Favourable Reference Population; and iii) reproduction, mortality and age structure not strongly deviating from normal
11.3: Habitat for the species	Conclusion on Habitat for the species reached because: i) the area of occupied habitat is sufficiently large for the long-term survival of the species (ii) the quality of occupied habitat is not suitable for the long-term survival of the species; and iii) there is a not a sufficiently large area of occupied and unoccupied habitat of suitable quality for long term survival (iv) the short-term trend in area of habitat is decreasing; and v) expert opinion determines that the habitat quality of occupied and unoccupied habitat is not bad; and vi) expert opinion determines that the habitat area is insufficient, but not clearly so.
11.4: Future prospects	Conclusion on Future prospects reached because: (i) the Future prospects for Range are good; (ii) the Future prospects for Population are poor; and (iii) the Future prospects for Habitat for the species are poor.
11.5: Overall assessment of Conservation Status	Overall assessment of Conservation Status is Unfavourable-inadequate because three of the conclusion conclusions are Unfavourable-inadequate.

6.15: Favourable Reference Population (FRP)	The UK-level FRV for population was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current population trends and abundance.
5.10: Favourable Reference Range (FRR)	The UK-level FRV for range was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current distribution and trends.