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

2019-2024

Conservation status assessment for the species:

S1378 - Cladonia subgenus Cladina subgenus of lichens

(*Cladonia* subgenus *Cladina*)

Wales

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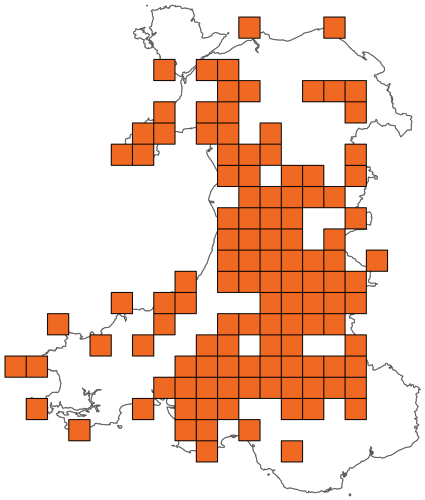
Important note - Please read

- 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: Cladonia subgenus Cladina subgenus of lichens

Distribution Map



Range Map

Figure 1: Wales distribution and range map for S1378 - Cladonia subgenus Cladina subgenus of lichens (*Cladonia* subgenus *Cladina*). 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 S1378 - Cladonia subgenus Cladina subgenus of lichens (*Cladonia* subgenus *Cladina*). 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-bad (U2)

Breakdown of Overall Conservation Status

Range (see section 5)	**Favourable (FV)**
Population (see section 6)	**Unfavourable-bad (U2)**
Habitat for the species (see section 7)	**Unfavourable-inadequate (U1)**
Future prospects (see section 10)	**Unfavourable-bad (U2)**

List of Sections

National Level

1. General information

1.1 Country	Wales
1.2 Species code	S1378
1.3 Species scientific name	*Cladonia* subgenus *Cladina*
1.4 Alternative species scientific name	
1.5 Common name	Cladonia subgenus Cladina subgenus of lichens
Annex(es)	V

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 information

No additional information

3. Information related to Annex V Species

3.1 Is the species taken in the wild / exploited?	No

3.2 What measures have been taken?

a) Regulations regarding access to property	No
b) Temporary or local prohibition on 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
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	-	-	-	-	-	-

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

3.5: Additional information

No additional information

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)	18,032.01
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 expert opinion with very limited 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	1990-2017

6.2 Population size (in reporting unit)

a) Unit	number of map 10x10 km grid cells
b) Minimum	118
c) Maximum	171

d) Best single value	118
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 extrapolation from a limited amount of 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 extrapolation from a limited amount of 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	Yes
c) Improved knowledge or more accurate data	No
d) Different method	No
e) No information	No
f) Other reason	No
g) Main reason	Genuine change

6.17 Additional information

No additional information

6.18 Age structure, mortality and reproduction deviation	Yes, 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?	Yes
c) If No or Unknown, is there a sufficiently large area of unoccupied habitat of suitable quality?	

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 extrapolation from a limited amount of data
7.6 Long-term trend; Period	2001-2024
7.7 Long-term trend; Direction	Decreasing
7.8 Long-term trend; Method used	

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	Medium (M)
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	High (H)
PC05: Peat extraction	In the past but now suspended due to measures	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
MA01: Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land	High (H)
MA04: Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures	Medium (M)
MA11: Reduce/eliminate air pollution from agricultural activities	High (H)
MA13: Manage agricultural drainage and water abstraction (incl. the restoration of drained or hydrologically altered habitats)	Medium (M)
MB01: Prevent conversion of (semi-) natural habitats into forests and of (semi-) natural forests into intensive forest plantation	High (H)
MC03: Adapt/manage renewable energy installation, facilities and operation (excl. hydropower and abstraction activities)	Medium (M)
MF05: Reduce/eliminate air pollution from industrial, commercial, residential and recreational areas and activities	High (H)

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	Bad
cii) Habitat for the species	Poor

10.2 Additional information

No additional information

11. Conclusions

11.1 Range	Favourable (FV)
11.2 Population	Unfavourable-bad (U2)
11.3 Habitat for the species	Unfavourable-inadequate (U1)
11.4 Future prospects	Unfavourable-bad (U2)
11.5 Overall assessment of Conservation Status	Unfavourable-bad (U2)
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

Some of the air pollution affecting Cladonia subgenus Cladina and the habitats that it occupies is derived from outside Wales, both from England and the EU (Nitrogen Futures, 2022). However, direct habitat damage and agricultural pollution are the primary pressures on the species and both can be controlled within Wales.

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 22nd January 2025]

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 lichen recorders has been as complete as possible, but many 10x10 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, for example by reference to habitat data layers. The distribution map is based on the British Lichen Society dataset, accessed via the NBN Gateway and includes all records of Cladonia subgenus Cladina from Wales made since 1990. 10 km squares that only have records of the subgenus made before 1990 might have lost Cladonia due to habitat loss and air pollution and not included. The most recent data on the NBN map dates from 2017 because of the lack of more recent updates.
3.1: Is the species taken in the wild/ exploited	There is no evidence that Cladonia subgenus Cladina is harvested commercially in Wales. Small quantities might be collected by foragers, but this is discouraged: “Consider whether you really need to harvest lichen. Ideally choose not to unless it is enormously abundant. This lichen grows 3 to 11 mm each year, meaning that what can be harvested in a couple of seconds may have taken a decade to form” (Totally Wild UK, 2025). Any small-scale foraging is considered highly unlikely to impact on the distribution of Cladonia subgenus Cladina in Wales, especially when compared with other Pressures.
3.2: Which of the measures in Art. 9a have been taken?	Although Cladonia subgenus Cladina is used for floristry, model making and perhaps medicine in Wales, there is no evidence that any is harvested commercially here. Sphagnum harvesters did not mention collecting Cladonia during interviews (Wong et al., 2016). It is inferred that the Cladonia used in Wales is imported from other countries, including Scotland (Highland Moss, 2025) where measures may or may not be in place to control harvest.
5.11: Change and reason for change in surface area of range	Expert opinion suggests that the overall range of Cladonia subgenus Cladinia has remained stable in Wales over the last 20 years. Losses from the south-easternmost, north-

	easternmost and north-westernmost parts of Wales, as shown in the range map, are likely to have occurred due to habitat loss and/or pollution prior to 2000.
6.2: Population size	The distribution map is based on the British Lichen Society dataset, accessed via the NBN Gateway and includes all records of Cladonia subgenus Cladina from Wales made since 1990. 10km squares that only have records of the subgenus made before 1990 might have lost Cladonia due to habitat loss and air pollution and were included in the map as 'remove'. These are concentrated in Glamorgan, Pembrokeshire, Ynys Môn and Clwyd: the areas of Wales where the pressures identified in 8.1 are most acute. If Cladonia subgenus Cladina remains in these pre-1990 10km squares then the population could be as large as 171 occupied squares, but a population closer to the 118 squares with post-1990 records is more likely. The most recent data on the NBN map dates from 2017 because of the lack of more recent updates.
6.12: Long-term trend; Direction	There is no evidence to indicate a decline in the number of occupied 10x10 km squares in Wales for Cladonia subgenus Cladina in the last 20 years, but the pressures listed in 8.1 make it reasonable to assume that there has been an overall slight decrease. It is considered possible (expert opinion based on field experience) that declines have led to loss of Cladina from some entire 10x10 km squares since 2001, but in general they are more likely to have led to loss of sites within 10x10 km squares that continue to be occupied. It is more likely that some of the 10x10 km squares with records from the 1990s might have been lost, but these are retained on the map because many have not been visited recently. British Lichen Society data suggest that some 10x10 km squares that were occupied in the 1960s and 1970s in the lowland extremities of Wales have lost Cladina, but losses there are considered to have occurred mostly prior to the long-term trend period.
6.18: Age structure, mortality and reproduction	Mortality is strongly deviating from normal in at least some parts of Wales where Cladonia 'bleaching' has been noted. This is likely to be the result of air pollution causing direct

	damage to the lichen (APIS, 2025), and is generally localised rather than affecting entire 10x10 km squares. There are no data on the reproductive success of Cladonia subgenus Cladina in Wales; apothecia are considered 'rather rare' or 'rare' in the UK as a whole (Smith et al., 2009) so the lack of records of apothecia in Wales is not necessarily an indication of a change in reproductive success.
7.1: Sufficiency of area and quality of occupied habitat	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 Cladonia subgenus Cladina 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 Cladonia subgenus Cladina 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 Cladonia subgenus Cladina in Wales so this is considered only a Moderate pressure. Undergrazing (PA08) and burning for agriculture (PA09) have localised impacts on Cladina, for example in Carmarthenshire where some lowland raised bogs that are burned regularly lack macrolichens (eg Bosanquet, 2008). Opencast mining (PC04) affects some heathland with Cladina on the Glamorgan Coalfield, whilst peat extraction (PC05) formerly removed Cladonia-rich bog surfaces but has now ceased in Wales. Wind turbine construction (PD01) and housing

	development (PF01) cause localised losses of Cladonia-rich habitat but are controlled by Measures. The direct impacts of Climate Change on Cladonia subgenus Cladina are unknown, but impacts on Cladonia-rich peatland habitat (PJ10) are expected.
9.5: List of main conservation measures	Measures to prevent loss of Priority Habitats that support Cladonia subgenus Cladina (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 Cladonia-rich 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 Cladonia lichens.
10.1: Future trends and prospects of parameters	There is no evidence at all of harvesting of Cladonia subgenus Cladina in Wales, but there are significant pressures on the species and its habitat. Evidence for damage to Cladonia from air pollution is robust, but confidence over whether Measures will actually control that air pollution is moderate at best (Nitrogen Futures, 2022). Theoretically, Measures to control direct damage to peatland and heathland will prevent some losses and air pollution remains the primary threat.
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 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 and (ii) the habitat quality is suitable for the long-term survival of the species; and (iii) the short-term trend in area of habitat is decreasing.
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 bad; 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-bad because two of the conclusions are Unfavourable-bad.
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.