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

2019-2024

Conservation status assessment for the habitat:

H4060 - Alpine and Boreal heaths

Wales

Cyfoeth Naturiol Cymru
Natural Resources Wales

JNCC

For further information please contact:

Natural Resources Wales, Welsh Government Offices, Cathays Park, King Edward VII Avenue, Cardiff, CF10 3NQ. https://naturalresources.wales

JNCC, Quay House, 2 East Station Road, Fletton Quays, Peterborough, PE2 8YY. https://jncc.gov.uk

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

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Important note - Please read

- The information in this document represents 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 habitat 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 habitat (section 11 National Site Network coverage for Annex I habitats).

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

Assessment Summary: Alpine and Boreal heaths

Distribution Map

Range Map

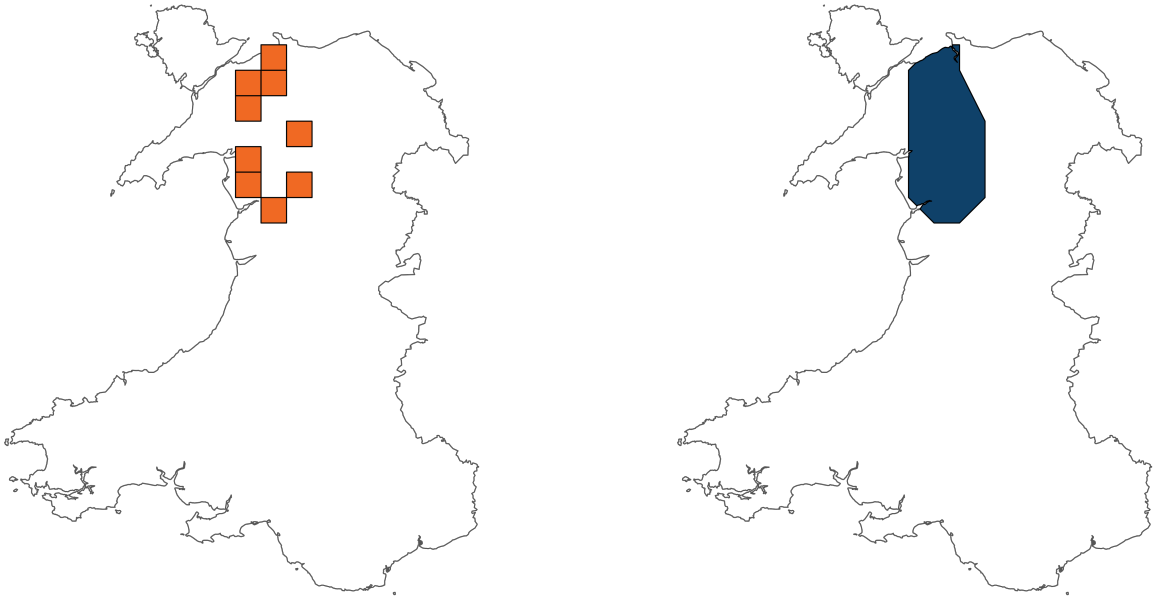

Figure 1: Wales distribution and range map for H4060 - Alpine and Boreal heaths. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority. The 10km grid square distribution map is based on available habitat records within the current reporting period.

Table 1: Table summarising the conservation status for H4060 - Alpine and Boreal heaths. Overall conservation status for habitat is based on assessments of range, area covered by habitat, structure and functions, and future prospects.

Overall Conservation Status (see section 10)

Unfavourable-bad (U2)

Breakdown of Overall Conservation Status

Range (see section 4)	**Favourable (FV)**
Area covered by habitat (see section 5)	**Unfavourable-inadequate (U1)**
Structure and functions (see section 6)	**Unfavourable-bad (U2)**
Future prospects (see section 9)	**Unfavourable-bad (U2)**

List of Sections

National Level

1. General information

1.1 Country	Wales
1.2 Habitat code	H4060 - Alpine and Boreal heaths

2. Maps

2.1 Year or period	1996-2019
2.2 Distribution map	Yes
2.3 Distribution map; Method used	Complete survey or a statistically robust estimate

2.4 Additional information

No additional information

Biogeographical Level

3. Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	ATL

3.2 Sources of information

See section 13 References

4. Range

4.1 Surface area (km²)	1,717.71
4.2 Short-term trend; Period	2017-2024
4.3 Short-term trend; Direction	Stable
4.4 Short-term trend; Magnitude	

a) Estimated minimum

b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
4.5 Short-term trend; Method used	Based mainly on expert opinion with very limited data
4.6 Long-term trend; Period	
4.7 Long-term trend; Direction	Stable
4.8 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Rate of decrease	
4.9 Long-term trend; Method used	Based mainly on expert opinion with very limited data

4.10 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

4.11 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	

4.12 Additional information

No additional information

5. Area covered by habitat

5.1 Year or period	1996-2020
5.2 Surface area (km²)	
a) Minimum	
b) Maximum	
c) Best single value	0.49
5.3 Type of estimate	Best estimate
5.4 Surface area; Method used	Complete survey or a statistically robust estimate
5.5 Short-term trend; Period	
5.6 Short-term trend; Direction	Unknown
5.7 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
5.8 Short-term trend; Method used	Insufficient or no data available
5.9 Long-term trend; Period	

5.10 Long-term trend; Direction	Unknown
5.11 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Confidence interval	
d) Rate of decrease	
5.12 Long-term trend; Method used	Insufficient or no data available
5.13 Favourable Reference Area (FRA)	
a) Area (km²)	
b) Pre-defined increment	Current area is between 2% and 10% smaller than the FRA
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

5.14 Change and reason for change in surface area of range

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

5.15 Additional information

No additional information

6. Structure and functions

6.1 Condition of habitat (km²)	
Area in good condition	
ai) Minimum	0
aii) Maximum	0.12
Area not in good condition	
bi) Minimum	0.37
bii) Maximum	0.37
Area where condition is unknown	
ci) Minimum	0
cii) Maximum	0
6.2 Condition of habitat; Method used	Complete survey or a statistically robust estimate
6.3 Short-term trend of habitat area in good condition; Period	2018-2024
6.4 Short-term trend of habitat area in good condition; Direction	Increasing
6.5 Short-term trend of habitat area in good condition; Method used	Complete survey or a statistically robust estimate
6.6 Typical species	
Has the list of typical species changed in comparison to the previous reporting period?	No
6.7 Typical species; Method used	

6.8 Additional information

Typical species were not used directly in the assessment of conservation status for habitat structure and function as a comprehensive list of typical species for each habitat was not available. However, the status of typical species was considered when the

condition of individual sites was assessed using Common Standards Monitoring Guidance. Common Standards Monitoring (CSM) data was used to assess the area of habitat in ‘good’ and ‘not good’ condition (field 6.1). Species were a component of the attributes assessed under CSM. Therefore, an assessment of species is considered to have formed part of the reporting under field 6.1 which supported the Habitats Structure and Function assessment (field 10.3).

7. Main pressures

7.1 Characterisation of pressures

Table 2: Pressures affecting the habitat, 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
PA07: Intensive grazing or overgrazing by livestock	Ongoing and likely to be in the future	High (H)
PF05: Sports, tourism and leisure activities	Ongoing and likely to be in the future	Medium (M)
PK03: Mixed source air pollution, air-borne pollutants	Ongoing and likely to be in the future	High (H)
PK04: Atmospheric N-deposition	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	High (H)

7.2 Sources of information

See section 13 References

7.3 Additional information

No additional information

8. Conservation measures

8.1: Status of measures

a) Are measures needed? Yes

b) Indicate the status of measures	Measures identified and taken
8.2 Main purpose of the measures taken	Maintain the current range, surface area or structure and functions of the habitat type
8.3 Location of the measures taken	Both inside and outside National Site Network
8.4 Response to measures	Medium-term results (within the next two reporting periods, 2025–2036)

8.5 List of main conservation measures

Table 3: 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
MA05: Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning)	High (H)
MA06: Stop mowing, grazing and other equivalent agricultural activities e.g. burning (incl. restore or improve habitats)	High (H)
MA11: Reduce/eliminate air pollution from agricultural activities	High (H)
ME03: Manage/reduce/eliminate air pollution from transport	Medium (M)
MF03: Reduce impact of outdoor sports, leisure and recreational activities (incl. restoration of habitats)	High (H)
MJ02: Implement climate change adaptation measures	Medium (M)

8.6 Additional information

No additional information

9. Future prospects

9.1a Future trends of parameters

ai) Range	Unknown

bi) Area	Unknown
ci) Structure and functions	Negative - slight/moderate deterioration

9.1b Future prospects of parameters

aii) Range	Unknown
bii) Area	Unknown
cii) Structure and functions	Bad

9.2 Additional information

No additional information

10. Conclusions

10.1 Range	Favourable (FV)
10.2 Area	Unfavourable-inadequate (U1)
10.3 Specific structure and functions (incl. typical species)	Unfavourable-bad (U2)
10.4 Future prospects	Unfavourable-bad (U2)
10.5 Overall assessment of Conservation Status	Unfavourable-bad (U2)
10.6 Overall trend in Conservation Status	Stable

10.7 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.

10.7 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.

10.8 Additional information

No additional information

11. UK National Site Network (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network (km²)

a) Minimum	
b) Maximum	
c) Best single value	0.49
11.2 Type of estimate	95% confidence interval
11.3 Habitat area inside the network; Method used	Complete survey or a statistically robust estimate
11.4 Short-term trend of habitat area within the network; Direction	Uncertain
11.5 Short-term trend of habitat area within the network; Method used	Insufficient or no data available
11.6 Short-term trend of habitat area in good condition within the network; Direction	Increasing
11.7 Short-term trend of habitat area in good condition within the network; Method used	Complete survey or a statistically robust estimate

11.8 Additional information

No additional information

12. Complementary information

12.1 Justification of percentage thresholds for trends

No justification information

12.2 Other relevant information

No other relevant information

13. References

Biogeographical and marine regions

3.2 Sources of information

Averis, A.B.G. and Averis, A.M. (2000). Vegetation survey of Cadair Idris National Nature Reserve, Gwynedd Wales: August - September, 1999. CCW/NWA/6.

Averis, A. (2001). Vegetation survey of selected proposed extensions to the Eryri SAC comprising parts of the Glyderiau and Carneddau SSSI, Gwynedd, Wales. CCW Science Report 448.

Averis, A. (2002). Vegetation survey of the eastern part of the Carneddau SSSI and cSAC, Conwy, Summer 2001. CCW Science Report 535.

Averis, B. and Averis, A. (2002). Vegetation survey of the western part of the Carneddau, Eryri Site of Special Scientific Interest and candidate Special Area of Conservation NW Wales 2002. CCW Science Report 577

Baddeley, J.A., Thompson, D.B.A & Lee, J.A. (1994) Regional and historical variation in the nitrogen content of Racomitrium lanuginosum in Britain in relation to atmospheric nitrogen deposition. Environmental Pollution 84, 189-196.

Britton, A.J & Fisher, J.M. (2007) Interactive effects of nitrogen deposition, fire and grazing on diversity and composition of low-alpine prostrate Calluna vulgaris heathland. Journal of Applied Ecology 44, 125-135.

Britton, A.J. & Pearce, I.S.K. (2004) Studies into the condition and conservation of montane heath and summit heath vegetation in Wales. CCW Contract Science Report No. 643. Countryside Council for Wales, Bangor.

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Jones, M.L.M., Oxley, E.R.B. & Ashenden, T.W. (2002) The influence of nitrogen deposition, competition and desiccation on growth and regeneration of Racomitrium lanuginosum. Environmental Pollution 120, 371-378.

Miller, G., Geddes, C. & Mardon D. . (2010). Effects of excluding sheep from an alpine dwarf-herb community. Plant Ecology & Diversity Vol 3 No1. 87-93.

Natural England (2013). Climate Change Adaptation Manual - Evidence to support nature conservation in a changing climate (NE546). Chapter 25 Montane Habitats

NRW (2015). Survey Data Llwytmor Exclosure. Internal NRW Dataset.

NRW (2017a). Actions Database. Internal NRW database.

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NRW (2018). SAC and SPA Monitoring Programme Results 2013-2018. Internal Dataset.

NRW (2024). National Programme Tracker.

NRW SAFLE Database 2024.

SNPA (2015). Snowdonia State of the Park Report. Available online at: https://eryri.gov.wales/wp-content/uploads/2022/04/Snowdonia-State-of-the-Park-Report.pdf

Stevens, J., Sherry J. and Turner, A. (2012). H4060 Alpine and Boreal Heath Inventory.

Turner, A. (1996-1998). Glyderiau. Internal CCW GIS dataset no

Turner, A. (2012). Changes in the composition of low-alpine grassland and heath on the Carneddau Mountain Group, North Wales over the period 1951-2011. CCW Staff Science Report 12/7/1.

Turner, A.J. (2020). An assessment of the status of priority montane habitats in Wales - 2019. NRW Evidence Report No: 684, Natural Resources Wales, Bangor

Turner, A.J. and Harrison, T. (2022). Monitoring of montane grassland and heath on the Carneddau, Eryri SSSI in 2021. NRW Evidence Report No: 627, Natural Resources Wales, Bangor

UK Government (2010). The Air Quality Standards Regulations 2010. Available from: https://www.legislation.gov.uk/uksi/2010/1001/contents

Wales Audit Office (2012). Annual Improvement Report Snowdonia National Park.

Welsh Government (2023). The Agriculture (Wales) Act 2023. Available from: https://www.gov.wales/agriculture-wales-act-2023

Welsh Government (2024a). The Clean Air Plan for Wales 2024. Available from: https://www.gov.wales/clean-air-plan-wales-healthy-air-healthy-wales

Welsh Government (2024b). The Environment (Air Quality and Soundscapes) (Wales) Act 2024. Available from: https://www.legislation.gov.uk/asc/2024/2/contents

Main pressures

7.2 Sources of information

No sources of information

14. Explanatory Notes

Field label	Note
2.3: Distribution map; Method used	H4060 habitat has been mapped based on the occurrence of the following NVC plant communities: H14, H15, H19, H20 and H22. Records for two additional vegetation types, HY - Calluna prostrate heath and HV - species-poor montane Vaccinium heath, which are not readily assignable to any NVC community but conform to the annex I habitat description were also included (Turner 2012). Distribution of H4060 has been derived from two data sources; the mapped polygon information has been collated from a series of Upland NVC Survey reports (see published sources) undertaken between 1996 to 2004; three additional 10 km square records were provided by Alex Turner (Arenig Fach, Aran Fawddwy Cader Idris; personal observation Alex Turner, CCW 2012). The data collated are a mixture of polygon and point records. A revised GIS- based inventory for the habitat was produced using both of these data in 2012 (Stevens, Sherry and Turner 2012). All areas of H4060 Alpine and Boreal heath (excluding a small fragmented areas) were surveyed and mapped in 2019 (Turner 2020). This survey has produced a better habitat map but does not alter the hectad distribution.
4.3: Short-term trend; Direction	Regular surveillance of H4060 across its Welsh range is not currently undertaken. However, changes to the 10km square distribution and linked range over the last 12 years are considered to be unlikely, requiring either the loss of all examples within a given hectad or the establishment of the habitat in a previously unoccupied square.
5.4: Surface area; Method used	All areas of H4060 Alpine and Boreal heath (except some highly fragmented patches) were surveyed and mapped in 2019 (Turner 2020). The new mapping has provided a

	more accurate figure for extent which has increased from 0.42 km2 to 0.49 km2
5.6: Short-term trend; Direction	The change in extent is due to better mapping rather than an actual change in habitat extent.
5.8: Short-term trend; Method used	Due to inconsistent mapping pre-2019 it is difficult to assess changes in the extent of the habitat. The 2019 mapping (Turner 2020) should provide a baseline for the future comparison of extent.
5.12: Long-term trend; Method used	Insufficient data on habitat extent pre-1996.
6.2: Condition of habitat; Method used	The 2019 survey (Turner 2020) states that overall the H4060 is in unfavourable recovering condition although there are specific locations where the habitat was assessed as favourable; Rhinog Fawr (Rhinog SSSI/SAC), Craig Cau (Cader Idris SSSI/SAC), Y Lliwedd and Creigiau Gleision (Eryri SSSI/SAC). The extent of habitat in favourable condition is not given within the report (estimate <0.12 km2). The rest of the habitat is recorded as being unfavourable except for Rhinog Fach which is reported as borderline but would be reported as unfavourable. Monitoring on the Carneddau (Eryri SAC) recorded the habitat to be in unfavourable uncertain condition (Turner and Harrison 2022). There is no additional data recorded within the NRW National Programme Tracker spreadsheet (NRW 2024). An assessment of habitat change in the Carneddau (Eryri SAC) shows a relatively complex pattern of change in vegetation structure since the 1950's with a significant decline in habitat quality followed by a partial recovery (Turner 2012). The cover of Racomitrium has shown a slight but statistically not significant increase at Pen yr Ole Wen between 1993 and 2011 following a significant decrease between 1953 and 1993; macro-lichens have decreased significantly since 1951 (some recovery – but not of characteristic low-alpine - Cetraria species and Cladonia subgenus Cladonia species); decrease in Vaccinium myrtillus and Vaccinium vitas-idea but a

	subsequent recovery of V. vitis-idea; initial increase in bare ground and rock and a subsequent decline. No consistent change in graminoid cover or other vascular plants was reported. A similar pattern of change has been seen at Craig Cau on Cader Idris with a change from lichen-rich vegetation in the 1960s, to lichen-poor in the 1990s, returning in part to lichen-frequent in 2019 (Turner 2020)
6.4: Short-term trend of habitat area in good condition; Direction	In the 2018 reporting round no H4060 habitat was reported as being in favourable condition (NRW 2018). The 2019 survey reports the habitat to be in unfavourable recovering condition overall although there are specific locations where the habitat is assessed as favourable (Turner 2020).
7.1: Characterisation of pressures	Pressures: 1. NRW SAFLE database 2024. The major issues recorded on the SAFLE database for H4060 are: • Inappropriate grazing is recorded as an issue on 1 sites and 8 units. Over grazing (PA07) is an issues on 2 units. Grazing type/or timing is an issues on 6 units. • Recreation and access (PF05) is recorded as an issue on 1 unit • Fire is an issues on 1 unit but probably refers to the sub-montane heath in the unit. 2. The NRW Life N2K dataset shows that 69% of issue risks identified for Alpine and Boreal Heath are of high priority and 57% are of high urgency. Of the high priority and high urgency risks 80% and 100% respectively relate to grazing issues (NRW 2017). 3. Study of the Carneddau (Turner 2012) identify 3 principal pressures; grazing, air pollution and recreation, the first two of these are considered to have a high impact the third a

moderate impact. The impact of high grazing levels on montane heath has been studied widely and an interaction between grazing and atmospheric nitrogen deposition has been identified (Armitage et al. 2005, Britton and Pearce 2004, Britton and Fisher 2007). Armitage et al. 2005 identified that the combined impact of nitrogen deposition and grazing pressure appeared to correlate best with changes in the cover of Racomitrium lanuginosum. The combined impact of intensive grazing and nitrogen impacts are considered to be unsustainable in the 2019 survey (Turner 2020) and recovery has occurred only where grazing has been reduced to low or very low levels. Evidence from the basket exclosures on the Carneddau (Turner and Harrison 2022) suggest that the thickness of the Racomitrium carpet can increase under low grazing pressure and that grazing remain too high outside the exclosures to allow recovery.

4. Recreational pressure has been reported as an issue by landowners. As a test, a camera was set up, over a 24 hour period during the August Bank Holiday in 2011, to record walker behaviour across an area of montane grassland from Bwlch yr Ole Wen towards Carnedd Dafydd (Turner, 2012). The conclusion drawn from examining the output was that hillwalkers are relatively 'conservative' and tend to follow paths, where they exist, fairly closely, so that trampling damage is localised. This is in contrast to sheep which range freely across the habitat, and have hooves which deliver a higher pressure than a human foot. Recreational pressures seem to be fairly site specific one example is the path from Llyn y Cŵn to Y Garn in the Glyderiau where an area of montane habitat has been partially destroyed.

5. Air Pollution - nitrogen deposition alone can have a deleterious impact on alpine and boreal heath and particularly on Racomitrium (Baddeley 1991, Baddeley et al. 1994, Pearce et al. 2003, Jones et al. 2003). Sulphur deposition and tropospheric ozone are also identified as

potential pressures on alpine and boreal heath. Sulphur deposition has undergone a significant decrease across the UK, the situation for ozone is more complex although a slight but significant decrease has been recorded in Snowdonia. (Turner 2012).

6. The nitrogen critical load (NCL) for H4060 has been set at 5kg/ha/yr by JNCC. 100% of the habitat extent lies within an area where the NCL has been exceeded

7. Climate change in the form of temperature is discounted as a major factor in vegetation change in the Carneddau (Turner 2012) but is a future threat (PJ10).

Threats:

1. Grazing remains the key threat although it has been shown that the habitat can recover if grazing levels are reduced even with current levels of nitrogen deposition. (Turner and Harrison 2022)

2. The picture for recreational pressure on key areas for the H4060 habitat is mixed. (PF05). In Eryri National Park figures for visitor numbers on Y Wyddfa show a decline on some paths whilst there is an increase in visitor numbers on all paths on Cader Idris (Parc Cenedlaethol Eryri 2022). Unfortunately no data are available for the Carneddau where most of the resource is found.

3. Climate change is likely to have an increasing impact on the habitat (PJ10). Increasing mean temperatures can lead to increased growth of ericoids and grasses which outcompete montane species. Hotter drier summers make the habitat more prone to wildfire (Turner 2020). Wetter, warmer winters can result in more surface run-off and erosion and impact on species which thrive under snow cover (Natural England 2013). Many arctic-alpine species have a minimum altitude above which they are viable. An increase in mean temperature could result in rise in

	minimum altitude for certain species thus reducing the area within which they can survive (Turner 2020). 4. As the entire habitat resource lies within areas where the NCL is exceeded, nitrogen deposition will continue to be a threat to habitat structure and function.
8.5: List of main conservation measures	1. NRW SAFLE Database shows only 1 action relevant too the H4060 habitat has been completed since 2019. 2. The emission of atmospheric pollutants is controlled by both national regulations and local controls. These have been highly successful in reducing the levels of some pollutants (notably sulphur) but have been insufficient to prevent continued high levels of N deposition nationally. Air quality limit values set out in the Air Quality Strategy (AQS) are transposed into national legislation by the Air Quality Standards Regulations 2010. Nitrogen deposition continues to impact semi-natural habitats in Wales. These regulations are not habitat-specific, however with introduction of The Environment (Air Quality and Soundscapes) (Wales) Act 2024 in Wales, brings in new national targets for air quality pollutants, with the potential of directly influencing habitat protection. This key legislative advancement requires mandatory targets for fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) to be established by February 2027, including new powers for Welsh Ministers to set pollutant-specific targets in future years (e.g., ammonia, nitrogen dioxide) linked to biodiversity outcomes, potentially enabling future habitat-sensitive thresholds. Welsh Government have also introduced The Agriculture (Wales) Act in 2023. It aims to establish a framework of Sustainable Land Management (SLM) objectives to underpin agricultural support, including the Sustainable Farming Scheme (SFS). The Act provides Welsh Ministers with the power to provide support (financial or otherwise)

	for or in connection with 15 purposes, including 'Improving air quality'. Welsh Government published a consultation on the SFS which closed in March 2024. Welsh Ministers will not be making final scheme design decisions until further stakeholder work is undertaken. 3. The Eryri National Park Recreation Strategy 2022-2027 has an action to ensure upland paths are well maintained to manage the impact of erosion and prioritise work based on the number of footpath users (MF03)
9.1:Future trends and prospects of parameters	Range: The future trend in the range of alpine and boreal heath in Wales is uncertain. Losses to the 10km2 distribution of the habitat in its core range in north-west Wales are considered to be relatively unlikely, although the highly fragmentary nature of outlying stands such as those at Aran Fawddwy & Aran Benllyn (Turner 2012) make the distribution more vulnerable in these areas. The recovery of areas of montane grassland on Pumlumon, some of which may be developing towards H4060, would, if it were to happen, represent a significant range expansion. Area: There is some evidence that the habitat may be able expand to former areas where grazing pressures are reduced. However continued erosion from recreation and impacts of nitrogen deposition and climate change could further reduce the habitat in some areas. Structure and function: 1. Monitoring data suggest that whilst the habitat remains in unfavourable condition overall it has started to recover in specific areas primarily as a result of grazing reductions (Turner 2020) 2. Atmospheric deposition of reactive nitrogen is above the

	Critical Load in all areas, and exceedance is predicted to continue until at least 2030 (JNCC, 2018). This is likely to restrict the scope for complete recovery of structure and function even in areas where suitable management is achieved. As the entire habitat resource lies within areas where the NCL is exceeded, nitrogen deposition will continue to be a threat to habitat structure and function. 3. Climate change may result in the migration of the habitat up hill due as a result of increasing temperature, increasing rainfall and reducing snow cover. As a result of upward migration the area of suitable terrain for the habitat will be reduced.
10.1: 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.
10.2: Area	Conclusion on Area reached because:(i) the short-term trend direction in Area is unknown; (ii) the current Area is not more than 10% below the Favourable Reference Area and iii) the change in distribution pattern is unknown.
10.3: Specific structure and functions	Conclusion on Structure and function reached because: i) habitat condition data indicates that more than 25% of the habitat is in unfavourable (not good) condition; ii) short-term trend in area of habitat in good condition is increasing; and iii) expert opinion determines that there are significant issues for this habitat.
10.4: Future prospects	Conclusion on Future prospects reached because: (i) the Future prospects for Range are unknown; (ii) the Future prospects for Area covered by habitat are unknown; and (iii) the Future prospects for Structure and function are bad.
10.5: Overall assessment of Conservation Status	Overall assessment of Conservation Status is Unfavourable-bad because two of the conclusions are Unfavourable-bad.
11.4: Short-term trend of habitat area within the network; Direction	Due to inconsistent mapping pre-2019 it is difficult to assess the overall trend in habitat area in the short-term.

	The 2019 Survey (Turner 2020) should provide a better baseline for monitoring future trend.
11.5: Short-term trend of habitat area within the network; Method used	Due to inconsistent mapping pre-2019 it is difficult to assess the overall trend in habitat area in the short-term. The 2019 Survey (Turner 2020) should provide a better baseline for monitoring future trend.
5.13: Favourable Reference Area (FRA)	The UK-level FRV for surface area 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 habitat extent and trends.
4.10: 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.