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 habitat:

H4060 - Alpine and Boreal heaths

WALES

IMPORTANT NOTE - PLEASE READ

- The information in this document is a country-level contribution to the UK Report on the conservation status of this habitat, 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 habitat 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; and/or (iii) the field was only relevant at UK-level (sections 10 Future prospects and 11 Conclusions).
- For technical reasons, the country-level future trends for Range, Area covered by habitat and Structure and functions 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 17 for Annex I habitat types (Annex D)

NATIONAL LEVEL

1. General information

1.1 Member State	**UK (Wales information only)**
1.2 Habitat code	**4060 - Alpine and Boreal heaths**

2. Maps

2.1 Year or period	1996-2012
2.3 Distribution map	Yes
2.3 Distribution map Method used	Based mainly on extrapolation from a limited amount of data
2.4 Additional maps	No

BIOGEOGRAPHICAL LEVEL

3. Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	**Atlantic (ATL)**
3.2 Sources of information	APIS Nitrogen Deposition: Montane Heath http://www.apis.ac.uk/node/980 Armitage, H., Pearce, I.S.K. & Britton, A. (2005) The impact of grazing and nitrogen deposition on the condition of Racomitrium lanuginosum on the Carneddau Mountains, North Wales. CCW Contract Science Report No. 687. Countryside Council for Wales, Bangor 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. Guest, D. (2012). Assessing N deposition as a pressure for Article 17 reporting on habitats. CCW internal document. JNCC (2018). Nitrogen exceedance of Annex I habitats in SACs. Excel spreadsheet provided 29 May 2018. 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.

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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.
NRW (2017b). Alpine and Boreal Heath Life N2K data. Internal NRW dataset.
NRW (2018). SAC and SPA Monitoring Programme Results 2013-2018. Internal Dataset.
SNPA (2015). http://www.eryri.llyw.cymru/__data/assets/pdf_file/0006/659391/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.
Wales Audit Office (2012). Annual Improvement Report Snowdonia National

4. Range

4.1 Surface area (in km²)			
4.2 Short-term trend Period			
4.3 Short-term trend Direction	Stable (0)		
4.4 Short-term trend Magnitude	a) Minimum	b) Maximum	
4.5 Short-term trend Method used			
4.6 Long-term trend Period			
4.7 Long-term trend Direction			
4.8 Long-term trend Magnitude	a) Minimum	b) Maximum	
4.9 Long-term trend Method used			
4.10 Favourable reference range	a) Area (km²) b) Operator c) Unknown No d) Method		
4.11 Change and reason for change in surface area of range	No change The change is mainly due to:		
4.12 Additional information			

5. Area covered by habitat

5.1 Year or period	1996-2003			
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value	0.42
5.3 Type of estimate	Best estimate			
5.4 Surface area Method used	Based mainly on extrapolation from a limited amount of data			
5.5 Short-term trend Period	2007-2018			
5.6 Short-term trend Direction	Uncertain (u)			
5.7 Short-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval	
5.8 Short-term trend Method used	Insufficient or no data available			

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5.8 Short-term trend Method used			
5.9 Long-term trend Period	1994-2018		
5.10 Long-term trend Direction	Uncertain (u)		
5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used	Insufficient or no data available		
5.13 Favourable reference area	a) Area (km²) b) Operator c) Unknown: No d) Method		
5.14 Change and reason for change in surface area of range	No change The change is mainly due to:		
5.15 Additional information			

6. Structure and functions

6.1 Condition of habitat	a) Area in good condition (km²)	Minimum	0	Maximum	0
	b) Area in not-good condition (km²)	Minimum	0.39	Maximum	0.39
	c) Area where condition is not known (km²)	Minimum	0.03	Maximum	0.03
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	2007-2018				
6.4 Short-term trend of habitat area in good condition Direction	Uncertain (u)				
6.5 Short-term trend of habitat area in good condition Method used	Insufficient or no data available				
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					

7. Main pressures and threats

7.1 Characterisation of pressures/threats

Pressure	Ranking
Intensive grazing or overgrazing by livestock (A09)	H
Mixed source air pollution, air-borne pollutants (J03)	H
Sports, tourism and leisure activities (F07)	H

Threat	Ranking
Intensive grazing or overgrazing by livestock (A09)	H
Mixed source air pollution, air-borne pollutants (J03)	H
Change of habitat location, size, and / or quality due to climate change (N05)	H

7.2 Sources of information

7.3 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, population and/or habitat for the species
8.3 Location of the measures taken		Both inside and outside Natura 2000
8.4 Response to the measures		Medium-term results (within the next two reporting periods, 2019-2030)

8.5 List of main conservation measures

- Adapt mowing, grazing and other equivalent agricultural activities (CA05)
- Stop mowing, grazing and other equivalent agricultural activities (CA06)
- Reduce impact of outdoor sports, leisure and recreational activities (CF03)
- Reduce/eliminate air pollution from agricultural activities (CA12)
- Manage/reduce/eliminate air pollution from transport (CE03)
- Implement climate change adaptation measures (CN02)

8.6 Additional information

9. Future prospects

9.1 Future prospects of parameters

a) Range

b) Area

c) Structure and functions

9.2 Additional information

10. Conclusions

10.1. Range

10.2. Area

10.3. Specific structure and functions (incl. typical species)

10.4. Future prospects

10.5 Overall assessment of Conservation Status

10.6 Overall trend in Conservation Status

10.7 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:

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	b) Overall trend in conservation status No change The change is mainly due to:
10.8 Additional information	

11. Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network (in km² in biogeographical/ marine region)	a) Minimum b) Maximum c) Best single value 0.42
11.2 Type of estimate	Best estimate
11.3 Surface area of the habitat type inside the network Method used	Based mainly on extrapolation from a limited amount of data
11.4 Short-term trend of habitat area in good condition within the network Direction	Uncertain (u)
11.5 Short-term trend of habitat area in good condition within network Method used	Insufficient or no data available
11.6 Additional information	

12. Complementary information

12.1 Justification of % thresholds for trends	
12.2 Other relevant information	

Distribution Map

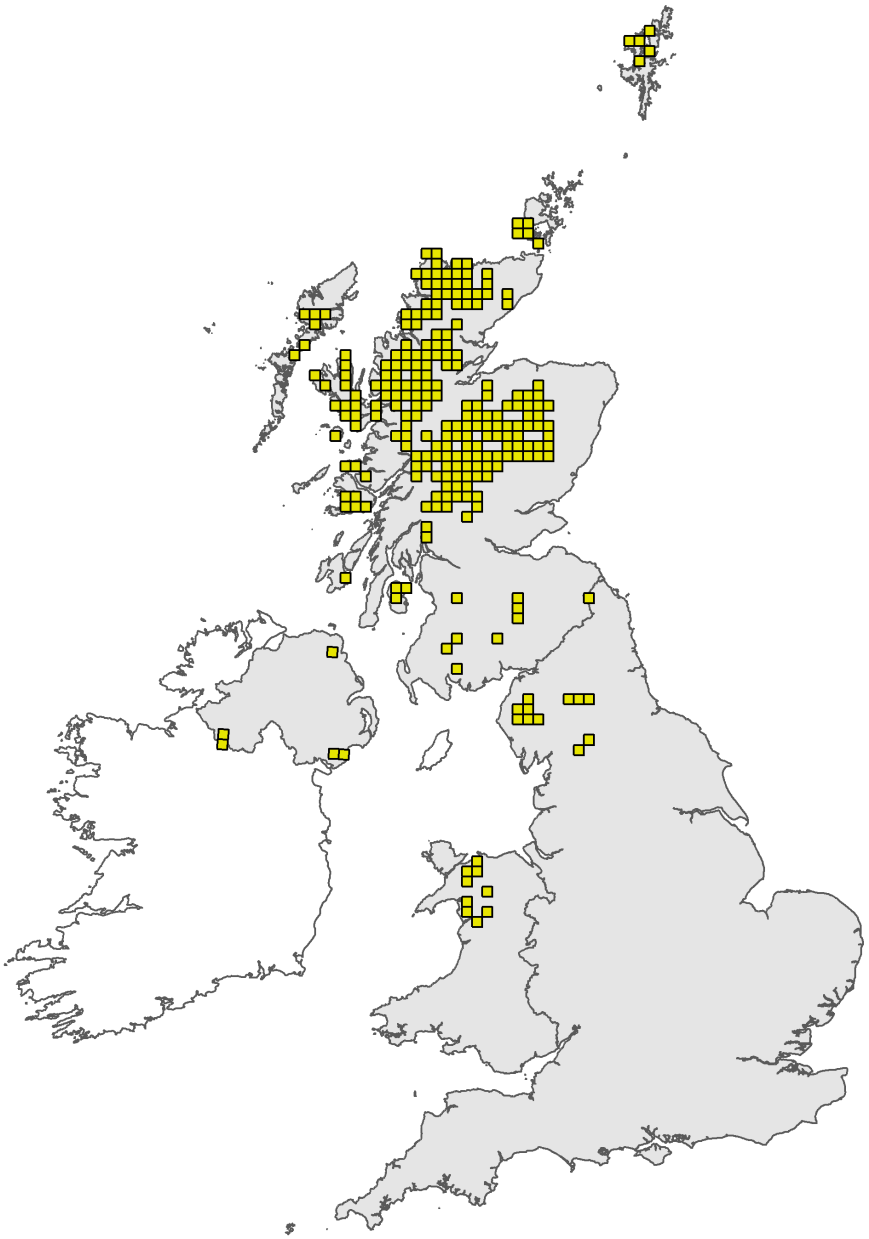

Figure 1: UK distribution map for H4060 - Alpine and Boreal heaths. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The 10km grid square distribution map is based on available habitat records which are considered to be representative of the distribution within the current reporting period. For further details see the 2019 Article17 UK Approach document.

Range Map

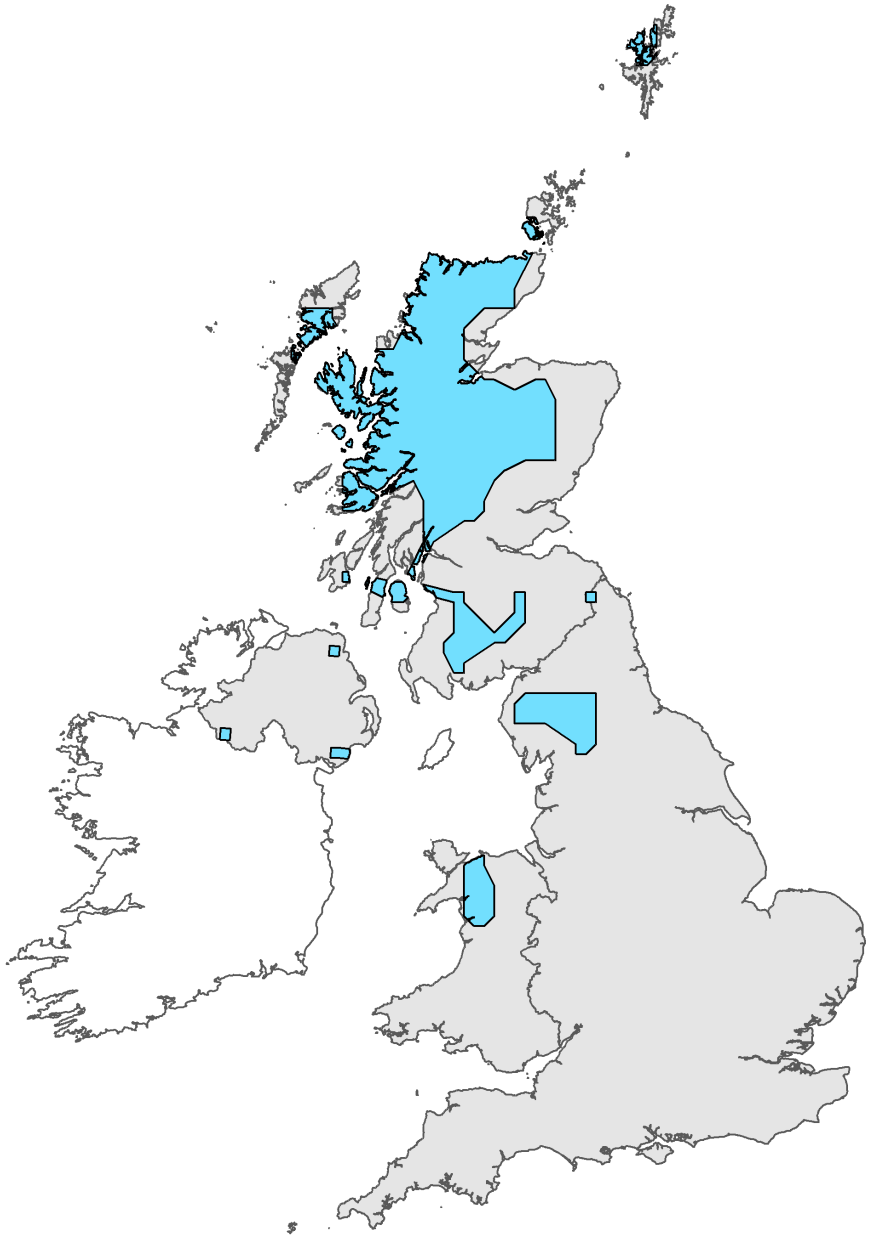

Figure 2: UK range map for H4060 - Alpine and Boreal heaths. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The 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 habitat was 25km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Habitat code: 4060

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 Cadair 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). No further information has been collated since 2012. As this is a part data set there remains a need for further survey to produce a comprehensive map and more accurate extent figure.

Habitat code: 4060 Region code: ATL

Field label	Note
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. There is anecdotal evidence of ericoid recovery in the montane grassland habitat on Pumlumon, following reduction in grazing pressure, but this is not as yet considered to have developed into H4060 (K Heppingstall NRW 2018).
4.11 Change and reason for change in surface area of range	The judgement is no change because habitat distribution data from the last reporting period have been used and no changes made.
5.4 Surface area; Method used	The estimated area of 42 hectares is taken from Turner 2012.
5.6 Short term trend; Direction	Anecdotal evidence only.
5.8 Short term trend; Method used	Losses and gain are poorly recorded. There is anecdotal evidence of erosion of habitat on sites in Carneddau and Glyderau (J Sherry pers observation 2017). Localised expansion of habitat which bears some characteristics of H4060 has occurred on Pumlumon (K Heppingstall NRW 2018), but expert opinion suggests this is not actually H4060 (A.J. Turner, pers.comm).
5.10 Long term trend; Direction	Anecdotal evidence only
5.12 Long term trend; Method used	Insufficient data on habitat extent pre-1996.
5.14 Change and reason for change in surface area	Whilst change may have occurred during the reporting period there is insufficient data to recalculate the surface area figure

6.2 Condition of habitat; Method used	Assessment of structure and function within SACs is based on the results of common standards monitoring visits undertaken between 2007 and 2012 and a report on vegetation change in the Carneddau (Turner, 2012). In summary, SAC Monitoring on the 2 sites on which it is a recognised feature (Eryri and Rhinog, which cover c. 92% of the resource [Turner, 2012]), has identified low cover of dwarf-shrubs, low cover of Racomitrium and lichen, high cover of graminoids and the presence of eroded bare ground. The Carneddau work 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. 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 Cladina 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.
6.4 Short term trend of habitat area in good condition; Direction	There is limited data on more recent trends in the condition of H4060 in Wales. Turner (2012) identified an improvement in the condition of some key components of the vegetation on the Carneddau (the key welsh locality) between 1993 and 2011, but other important attributes of the habitat showed no signs of recovery following significant declines post 1950. Common standards monitoring of the habitat feature on Eryri (including the Carneddau) concluded that the habitat was in unfavourable condition in both 2006 and 2011, while an apparent decline in the reported condition of the feature on Rhinog (from favourable in 2003 to unfavourable in 2011) (NRW 2018) may reflect a change in methodology and targets rather than actual feature condition.

7.1 Characterisation of pressures/ threats	Pressures: 1. Data held in NRW's Special Sites Database (NRW 2017), which provides information on issues needing action, was used to quantify pressures and threats relating to the habitat. Grazing is the most significant pressure with overgrazing impacting on 20 units and incorrect type or timing of grazing on 21 units (A09). Access and recreational pressures (F07) impact on 13 units. Recreational pressure refers primarily to erosion on footpaths and desire lines; whilst this can have localised impact most walkers follow defined paths which limits their impact on the wider habitat as illustrated by time-lapse photography on the Carneddau ridge (CCW 2012 unpublished). Path proliferation on the Glyderau and impact on the Alpine and Boreal Heath is currently under review (personal communication National Trust 2018). Fire was recorded as an issue on 2 units (A11). In general burning is carried out at lower altitudes and burning of alpine and boreal heath only occurs accidentally but can have very significant impacts. 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. 4.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). 5.Air pollution (N deposition) (J03) is assessed separately using a defined approach (Guest, 2012, using updated deposition data). Using a data overlay method in ARC GIS, 100% of the habitat by area was recorded at or above the relevant lower Critical Load limit (5kg/ha/yr.). 6.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 (N05). Threats: 1.The Actions database was used to determine the issues and actions which had not yet been addressed i.e. those which were not complete. 2.Grazing remains the key issue (A09). On most sites grazing levels remain too high to allow vegetation to recover sufficiently well on the summit ridges where sheep tend to gather. Evidence shows that control of grazing can lead to the recovery of the vegetation (Miller et al. 2010, Natural England 2013. Grazing levels on some sites have been reduced through grazing agreements, however the grazing agreement on Llanllechid (Eryri SAC) common has finished and stock number have increased. 3.Visitor pressure has continued to rise in recent years with an 18% increase in number walkers on the footpaths of Snowdon between 2009/10 and 2010/2011 (Wales Audit Office 2012). The Snowdonia State of the Park Report (2015) shows a 6% increase on Snowdon and 10% increase on Cadair Idris between 2010 and 2014 (SNPA 2015). It is highly likely recreational pressure on ridge footpaths will, at the least, remain the same but could continue to increase (F07). 4.Climate change is likely to have an increasing impact on the habitat (N05). 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. Wetter, warmer winters can result in more surface run-off and erosion and impact on species which thrive under snow cover (Natural England 2013).

8.5 List of main conservation measures	1.NRW Actions Database (NRW 2018) details what conservation actions have been identified to address issues; conservation actions have been identified on units containing Alpine and Boreal Heath on 2 SSSIs and 2 SACS. Only 1 unit with Alpine and Boreal Heath is considered to be in appropriate conservation management due to stock reduction but habitat is still considered in poor condition and the database records that further restoration measures are required. The database shows that conservation measures are implemented through a range of mechanisms including Glastir (commons, entry level and advanced), NRW Management Agreements, direct action by landowners and tenants, direct NRW management, enforcement, partnership working etc. Most of the actions which are either completed or underway relate to securing grazing reductions or changes to livestock type through Management Agreements or Agri-environment (CA05, CA06). 2.NRW Management Agreements cover approximately 16% of the habitat. Glastir Agreements cover 37% of the habitat with 6.93ha under Glastir Advanced prescriptions, 2ha under Glastir Entry prescriptions and 4.03ha under Glastir Entry Commons (CA05, CA06). 3.Control of grazing through agreement on Pumlumon has allowed vegetation with some characteristics of H4060 (though not formally accepted as such) to recover and expand (personal communication K Heppingstall NRW 2018) (CA06). 4.A small grazing exclosure was erected on Llwytmor (Eryri SAC), baseline survey was completed in 2015 by NRW and National Trust (NRW 2015) (CA06). 5.Footpath work to reduce pressure on the habitat on the Glyderau has been agreed but not yet implemented (CF03). 6.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 (CC10). The area of this habitat subject to critical load exceedance is not expected to reduce between now and 2030.
9.1 Future prospects of parameters	9.1a Future prospects of -range Future trend: Unknown. 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. 9.1b Future prospects of -area Future trend: Unknown. 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 grazing could further reduce the habitat in some areas. 9.1c Future prospects of -structure and function Future trend Negative. 1.On the designated sites 72% of actions identified to address the issues are complete but only one unit is in Appropriate Conservation Management. Within this unit despite actions being recorded as complete, the condition of the habitat is poor and further restoration actins is needed suggesting that the unit is not in appropriate management. (NRW Actions Database 2017). 2.Monitoring data show that of the 2 SACs with the Alpine and Boreal Heath Feature, shows that on one the feature is unfavourable declining and on the other it is unfavourable unchanged (NRW 2018). More than 90% of the feature lies within these SACs. 3.Turner 2012 has shown some recovery of structure and function is possible but further improvement is dependent on controlling grazing which is problematical on common land. 4.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.

11.4 Short term trend of habitat area in good condition within the network; Direction	There is insufficient evidence on which to assess the recent trend in habitat structure and function within the SAC series. Analysis of data from long-term monitoring plots on Carneddau (the key site for this habitat in Wales and part of Eryri SAC) by Turner (2012) showed some partial recovery in structure and function post 1993, following a significant decline in condition from the early 1950s. However, there is no evidence to indicate that this improving trend has persisted and resulted in the recovery of areas of habitat to the extent where they are considered to be in good condition. Common standards monitoring on the two welsh SAC on which the habitat is a recognised feature concluded that in 2011 both were in unfavourable condition.
11.5 Short term trend of habitat area in good condition within the network; Method used	While some information on trends in habitat structure and function within the SAC series was available it was insufficient to allow conclusions on any change in the area of good/not-good condition to be drawn.