

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

**Second Report by the United Kingdom under
Article 17
on the implementation of the Directive
from January 2001 to December 2006**

**Conservation status assessment for :
H4060: Alpine and Boreal heaths**

Please note that this is a section of the report. For the complete report visit <http://www.jncc.gov.uk/article17>

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H4060 Alpine and Boreal heaths

Audit trail compiled and edited by JNCC and the UK statutory nature conservation agencies Upland Lead Co-ordination Network

This paper and accompanying appendices contain background and data used to complete the standard EC reporting form (Annex D), following the methodology outlined in the document entitled “Assessment, monitoring and reporting under Article 17 of the Habitats Directive, Explanatory Notes & Guidelines, Final Draft 5, October 2006.” The superscript numbers below cross-reference to the headings in the corresponding Annex D reporting form. This supporting information should be read in conjunction with the UK approach for habitats (see ‘Assessing Conservation Status: UK Approach’).

1. National-biogeographic level information

1.1 General description and correspondance with National Vegetation Classification (NVC) and other habitat types

Table 1.1.1 provides a summary description of H4060 and its relations with UK classifications.

Alpine heaths develop above the natural altitudinal tree-line. Boreal heaths develop below the tree-line in gaps among scrubby high-altitude woods or as replacements for those subalpine woods lost due to grazing and burning. On lower slopes, Boreal heaths may grade into floristically-similar H4030 European dry heaths.

The dominant plants in UK examples of H4060 are usually dwarf-shrubs of heather *Calluna vulgaris*, bilberry *Vaccinium myrtillus* or juniper *Juniperus communis*, which are low-growing or prostrate owing to exposure to high winds or prolonged snow cover at moderately high altitudes. Heaths dominated by the prostrate dwarf-shrub mountain avens *Dryas octopetala* are considered as H6170 Alpine and subalpine calcareous grasslands. H4060 occurs on acid rocks on mountains, both on exposed lower summits and ridges and on sheltered slopes. Exposure or snow-lie, which suppress the growth of dwarf-shrubs, also favours the growth of characteristic lichens and bryophytes. In the north and west of Scotland this type of vegetation can occur at lower altitudes than elsewhere in the UK. Rare species found in H4060 include arctic-alpine plants, such as trailing azalea *Loiseleuria procumbens* and mountain bearberry *Arctostaphylos alpinus*. Some forms of the habitat support Atlantic mosses and liverworts that are found with restricted world distribution, such as *Anastrophyllum donianum*, *Plagiochila carringtonii* and *Scapania ornithopodioides*.

Certain types of H4060 are particularly susceptible to disturbance, especially by fire. This applies to all heaths rich in bryophytes and also juniper-rich heaths. Similarly, lichen-rich heaths are susceptible to damage by fire or trampling. Rocky ground can be important in protecting heaths from fire.

This habitat comprises a wide range of heath types, with variation related to climate, local exposure and snow-lie. It includes seven alpine heath NVC types:

- H13 *Calluna vulgaris* – *Cladonia arbuscula* heath
- H14 *Calluna vulgaris* – *Racomitrium lanuginosum* heath
- H15 *Calluna vulgaris* – *Juniperus communis* ssp. *nana* heath
- H17 *Calluna vulgaris* – *Arctostaphylos alpinus* heath
- H19 *Vaccinium myrtillus* – *Cladonia arbuscula* heath
- H20 *Vaccinium myrtillus* – *Racomitrium lanuginosum* heath
- H22 *Vaccinium myrtillus* – *Rubus chamaemorus* heath

Also, five boreal heath NVC types:

- H10 *Calluna vulgaris* – *Erica cinerea* heath
- H12 *Calluna vulgaris* – *Vaccinium myrtillus* heath
- H16 *Calluna vulgaris* – *Arctostaphylos uva-ursi* heath
- H18 *Vaccinium myrtillus* – *Deschampsia flexuosa* heath
- H21 *Calluna vulgaris* – *Vaccinium myrtillus* – *Sphagnum capillifolium* heath

For several of these NVC types, only examples developed at higher altitudes are referable to H4060. Lower-altitude stands are referable to H4030 European dry heaths.

Floristically there are two broad types of H4060, dominated either by Heather *C. vulgaris* on exposed or more sheltered ground at lower altitudes, or Bilberry *V. myrtillus* and crowberry *Empetrum nigrum* ssp. *hermaphroditum* at higher altitudes beyond the limit of heather growth or in more sheltered localities where heather growth is suppressed by prolonged snow-lie.

On less-exposed, more sheltered ground at the lower altitudinal range of the habitat, *Calluna* generally dominates. *Calluna* is usually accompanied by other dwarf-shrubs, such as *V. myrtillus*, bell heather *Erica cinerea*, bearberry *Arctostaphylos uva-ursi* and crowberry *E. nigrum* ssp. *nigrum* (H10 *Calluna* – *Erica*, H12 *Calluna* – *Vaccinium*, H16 *Calluna vulgaris* – *Arctostaphylos uva-ursi*, H21 *Calluna* – *Vaccinium* – *Sphagnum*, and H22 *Vaccinium* – *Rubus* heaths). On more exposed and windswept ground, a range of dwarf-shrubs may dominate, forming an altitudinal progression. The first in the progression, and often the most extensive, are heaths dominated by *Calluna* growing in a prostrate form (H13 *Calluna* – *Cladonia* and H14 *Calluna* – *Racomitrium* heaths). Heather may also be combined with dwarf juniper *Juniperus communis* ssp. *nana* (H15 *Calluna* – *Juniperus* heath) or with *Arctostaphylos alpinus* and *Loiseleuria procumbens* (H17 *Calluna* – *Arctostaphylos alpinus* heath). At higher altitudes, where conditions are too extreme for heather, short or prostrate *Vaccinium* spp. and *E. nigrum* ssp. *hermaphroditum* dominate (H19 *Vaccinium* – *Cladonia* and H20 *Vaccinium* – *Racomitrium* heaths). On sheltered slopes where snow lingers, the dominant shrub is *V. myrtillus*, which is either the sole dominant (H18 *Vaccinium* – *Deschampsia* heath) or grows with *E. nigrum* ssp. *hermaphroditum*, dwarf cornel *Cornus suecica* and cloudberry *Rubus chamaemorus* (H22 *Vaccinium* – *Rubus* heath).

In addition to this altitudinal zonation, there are other lines of floristic variation within the habitat type. For example, in the east, favoured by a less oceanic climate, lichens may be abundant (especially those of the reindeer-moss group *Cladonia* spp.). These heaths achieve the nearest approach in the UK to the lichen heaths of Scandinavia and the Arctic (especially in the *Calluna* – *Cladonia* and *Vaccinium* – *Cladonia* communities), and often support rare montane species. Conversely, in the more oceanic climate of the north-west and north, woolly fringe-moss *Racomitrium lanuginosum*, bell heather *Erica cinerea* and Atlantic liverworts and mosses (especially the species of the northern Atlantic hepatic mat) may be abundant in *Calluna* – *Racomitrium*, *Calluna* – *Juniperus*, *Calluna* – *Arctostaphylos alpinus* and *Vaccinium* – *Racomitrium* heaths. In the northern Scottish Highlands and Northern Isles, favoured by a cooler climate, mountain bearberry *Arctostaphylos alpinus* and trailing azalea *Loiseleuria procumbens* are abundant (characteristically in *Calluna* – *Arctostaphylos alpinus* heath, but also in *Calluna* – *Racomitrium* and *Calluna* – *Juniperus* heath). In the Cairngorms, *L. procumbens* is also frequent (in *Vaccinium* – *Cladonia* heath), while bearberry *Arctostaphylos uva-ursi* is abundant (in *Calluna* – *Cladonia* and *Calluna vulgaris* – *Arctostaphylos uva-ursi* heaths). Different structural forms of heath also occur, owing to differences in exposure, giving rise to closed or open heaths with crescentic waves (wave-form).

In some stands of H4060 the action of solifluction (by creating unstable soils, which provide more plant nutrients and maintain open conditions) favours the growth of certain plants. These include mountain everlasting *Antennaria dioica*, carnation sedge *Carex panicea*, pill sedge *C. pilulifera*, sea plantain *Plantago maritima*, fir clubmoss *Huperzia selago* and viviparous sheep's-fescue *Festuca vivipara*, enriching the flora of the heaths.

Table 1.1.1 Summary description of habitat H4060 and its relations with UK vegetation/habitat classifications

Classification	Correspondence with Annex I type	Comments
EU Interpretation Manual	<p>31.45 - Boreo-alpine heaths Alpine heaths of the highlands and islands of Scotland, alpine and lowland boreal heaths of Iceland, alpine heaths of boreal mountains, in particular of the mountains of Scandinavia, of the Urals, of the mountains of Siberia, alpine heaths of Far Eastern mountains at, or just south of, the limits of the boreal zone, with <i>Juniperus nana</i>, <i>Loiseleuria procumbens</i>, <i>Empetrum hermaphroditum</i>, <i>Arctostaphylos uva-ursi</i>, <i>Arctostaphylos alpina</i> and elements of Alpine flora.</p> <p>31.49 - Mountain avens mats Dwarf heaths formed by mats of the woody <i>Dryas octopetala</i> in high Palaearctic mountains, in boreal regions and in isolated Atlantic coastal outposts.</p>	<p>These are the PAL.CLASS sub-types of H6170, found in the British Isles, based on CORINE classifications.</p> <p>In the UK, mountain avens mats have been interpreted as belonging to H6170 Alpine and subalpine calcareous grasslands.</p>
NVC	<p>H13 <i>Calluna vulgaris</i> – <i>Cladonia arbuscula</i> heath</p> <p>H14 <i>Calluna vulgaris</i> – <i>Racomitrium lanuginosum</i> heath</p> <p>H15 <i>Calluna vulgaris</i> – <i>Juniperus communis</i> ssp. <i>nana</i> heath</p> <p>H17 <i>Calluna vulgaris</i> – <i>Arctostaphylos alpinus</i> heath</p> <p>H19 <i>Vaccinium myrtillus</i> – <i>Cladonia arbuscula</i> heath</p> <p>H20 <i>Vaccinium myrtillus</i> – <i>Racomitrium lanuginosum</i> heath</p> <p>H22 <i>Vaccinium myrtillus</i> – <i>Rubus chamaemorus</i> heath</p> <p>H10 <i>Calluna vulgaris</i> – <i>Erica cinerea</i> heath</p> <p>H12 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath</p> <p>H16 <i>Calluna vulgaris</i> – <i>Arctostaphylos uva-ursi</i> heath</p> <p>H18 <i>Vaccinium myrtillus</i> – <i>Deschampsia flexuosa</i> heath</p> <p>H21 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> – <i>Sphagnum capillifolium</i> heath</p>	<p>For H10, H12, H16, H18 and H21 only alpine forms conform to H4060.</p>
BAP priority habitat type	<p>Proposed priority habitat – Mountain heaths and willow scrub.</p>	<p>Includes H4060 with other habitat types, including other Annex I habitats.</p>
JNCC CSM reporting categories, for SAC feature and ASSI/SSSI	<p>Montane grasslands and heaths.</p> <p>(See Williams 2006 www.jncc.gov.uk/page-3520)</p>	<p>A broader category which covers the following Annex I feature types:</p> <p>H4060 Alpine and boreal heaths</p> <p>H6170 Alpine and subalpine calcareous grasslands</p> <p>H6150 Siliceous alpine and boreal grasslands</p> <p>H4080 Sub-Arctic <i>Salix</i> spp. scrub</p>

feature types		
JNCC CSM Guidance feature types	Alpine dwarf-shrub heath (See JNCC 2005b www.jncc.gov.uk/page-2237)	Close correspondence to H4060

2. Range ^{2.3}

2.1 Current range

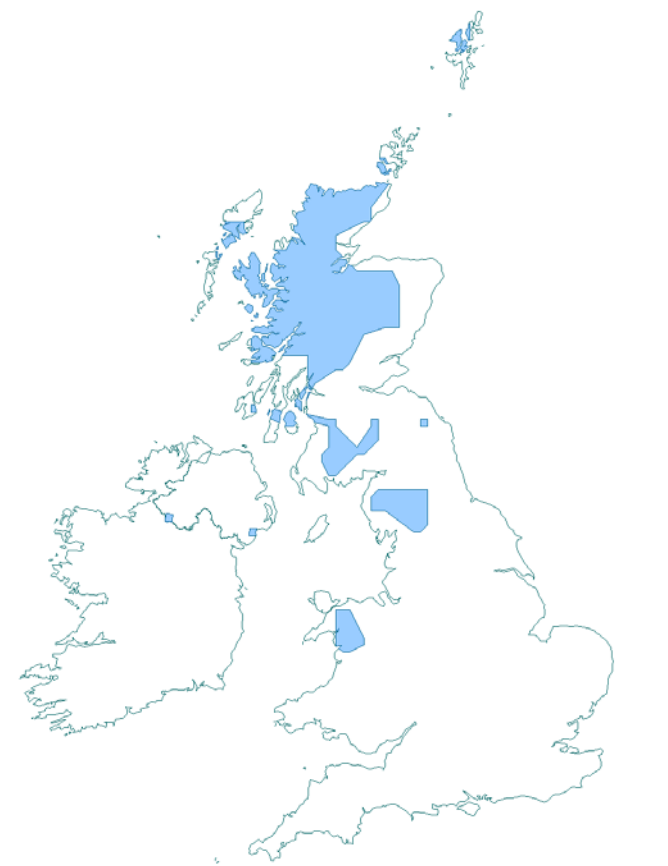
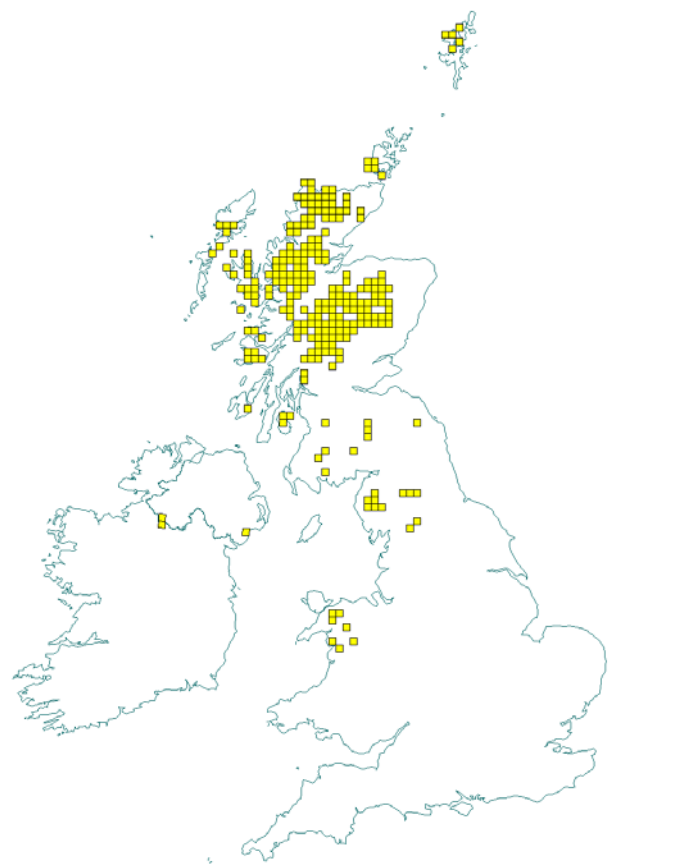
Range surface area ^{2.3.1}: **44,954 km²**

Date calculated ^{2.3.2}: **May 2007**

Quality of data ^{2.3.3}: **Moderate**

The surface area estimate was calculated within alpha hull software, using extent of occurrence as a proxy measure for range (see Map 2.1.1). The value of alpha was set at 25 km; the alpha was clipped to include inland areas only.

Maps 2.1.1 and 2.1.2 show the range and distribution of H4060 in the UK. Certain sub-types of H4060 heaths are known only from (or are best-developed in) the UK. These are especially those found in more exposed conditions, characterised by prostrate heather *Calluna vulgaris* and juniper *Juniperus communis* ssp. *nana*. The most extensive and best-developed examples of H4060 are found in the Scottish Highlands, with outliers on the Northern Isles and on the higher mountains of England, Wales and Northern Ireland.

Map 2.1.1 Habitat range map ^{1.1} for H4060	Map 2.1.2 Habitat distribution map ^{1.2} for H4060
	
Range envelope shown in blue/grey shade in above map is a minimum convex polygon constructed using JNCC Alpha Shapes tool (see Technical note I for details of methodology).	Each yellow square represents a 10x10-km square of the National Grid and shows the known and/or predicted occurrence of this habitat. 10-km square count: 251

See Section 7.1 for data sources

2.2 Trend in range since c.1994

Trend in range^{2.3.4}:	Stable
Trend magnitude^{2.3.5}:	Not applicable
Trend period^{2.3.6}:	1994-2006
Reasons for reported trend^{2.3.7}:	Not applicable

There is no readily available quantitative information on historic trends in range for H4060. Expert opinion is that there has been no significant change in range since 1994.

2.3 Favourable reference range

Favourable reference range^{2.5.1}: 45,000km²

Section 3.2.1.3 of 'Assessing Conservation Status: UK Approach' sets out how favourable reference range estimates for habitats have been determined in the UK. Based on this approach, the current surface area, 45,000 km², has been set as the favourable reference area. Reasons for this are discussed below.

In the UK the potential range of H4060 is only restricted by the requirements for at least moderately acidic bedrock in the uplands; the distribution of points shown in Map 2.1.2 show that in the north-west of the UK the habitat range can extend to sea level. Overall expert opinion is that the current range of H4060 as represented by the range envelope in Map 2.1.1 is viable and hence the current (and 1994) range equates to the favourable reference range for this habitat.

Information on the historic range of H4060 pre-1994 is not readily available. Expert judgement is that the trend since c.1950 for increasing numbers of sheep and deer in the UK uplands is likely to have led to a steady decline in the extent of H4060. The Southern Uplands and the southern Highlands (mainly the Breadalbanes) are considered to be the most affected areas in Scotland. The same may apply to all the higher hills of England and Wales, and other peripheral areas may be considered to be under threat such as the Outer Hebrides where stands are small and grazing pressures high. However, even in the Breadalbanes and the Southern Uplands where grazing pressure is heaviest the habitat is still recorded, albeit in a fragmented form, from most 10-km squares where hills exceed 750 m in altitude. Consequently, these declines in extent have not yet translated in to a true decline in range.

2.4 Conclusions on range

Conclusion^{2.6.1}: Favourable

Within the physical restrictions on its occurrence, H4060 is a relatively widespread habitat found across the uplands. There is no empirical information on any changes in range for H4060 since 1994, nor any previous historical data on extent or changes. Expert opinion suggests that there has been significant reductions in the historic range of H4060 due to increases in grazing levels since the 1800s. Although there are concerns about the viability of the habitat in outlying parts of the range in England and Wales, the current UK range is still relatively large, considered viable and to be close to favourable reference range; consequently the judgement on range for H4060 is 'favourable'.

3. Area^{2.4}

3.1 Current area

Total UK extent^{2.4.1}:	421km²
Date of estimation^{2.4.2}:	May 2007
Method^{2.4.3}:	1 = only or mostly based on expert opinion
Quality of data^{2.4.4}:	Poor

Table 3.1.1 provides information on the area of H4060 in the UK.

Information on the extent of H4060 in the UK is sparse. In Scotland, where most of the resource is located, about 22,000 ha of Alpine and boreal heath are known from designated sites and a few other

upland areas in Scotland where plant communities have been surveyed. Based on matching up known areas with unsurveyed ground similar in topography and geology a new estimate of between 37,000-45,000 ha for H4060 in Scotland has been made.

The habitat is much less extensive in the rest of the UK and the figures given in Table 3.1.1 for Northern Ireland, England and Wales are expert estimates by uplands experts from the relevant country conservation agencies on the Uplands Lead Co-ordination Network. Where a range of values for extent have been given, median values have been used as the basis for subsequent calculations in this assessment.

Table 3.1.1 Area of H4060 in the UK

	Area (ha)	Method ^{2.4.3}	Quality of data ^{2.4.4}
England	1000	1	Poor
Scotland	37000-45000 (41000)	1	Poor
Wales	50	1	Poor
Northern Ireland	60-80 (70)	1	Poor
Total UK extent ^{2.4.1}	c. 42,100	1	Poor

Method used to estimate the habitat surface area: 1 = only or mostly based on expert opinion; 2 = based on remote sensing data; 3 = ground based survey. Only the most relevant class is given if more than one applies.

Quality of habitat surface area data: 'Good' e.g. based on extensive surveys; 'Moderate' e.g. based on partial data with some extrapolation; 'Poor' e.g. based on very incomplete data or on expert judgement.

3.2 Trend in area since c.1994

Trend in area^{2.4.5}:

Decreasing

Trend magnitude^{2.4.6}:

<1% per annum

Trend period^{2.4.7}:

1994-2006

Reasons for reported trend^{2.4.8}:

4 – Indirect anthropogenic or zoogenic influence

There is no readily available quantitative evidence or information on any trend in area for H4060 since 1994.

Expert judgement suggests that the extent of H4060 is likely to have declined historically and especially since about 1800 due to increases in the numbers of sheep and deer in the uplands. This grazing pressure has continued since 1994 and is considered to have led to further losses in the extent of H4060. The losses are thought likely to be less than 1% p.a, certainly in Scotland which holds the majority of the resource of H4060.

3.3 Favourable reference area ^{2.5.2}

Favourable reference area: 463 km²

Section 3.2.2.3 of 'Assessing Conservation Status: UK Approach' sets out how favourable reference area estimates have been determined in the UK. Based on this approach, the favourable reference area has been identified as greater than the current extent, but not by a factor of more than 10%. Reasons for this are discussed below.

The potential extent of H4060 is only restricted by the requirements for at least moderately acidic bedrock in the uplands. The greatest extent of H4060 is in Scotland, where expert judgement is that the habitat remains viable across most of the country. Whilst there is likely to be a need to increase the extent of H4060 at a local or regional level in the UK to counteract fragmentation and reduced patch size and prevent local loss of the habitat, the favourable reference area needed is unlikely to be more than 110% of the current UK extent.

There is no readily available information on the historic area of H4060 before 1994. However, expert opinion suggests that the area occupied by H4060 has probably reduced historically with the replacement of the Annex I habitat by other, usually more species-poor *Nardus montane* grassland communities; in other places grazing has led to the replacement of more species-rich communities by more species-poor forms of *Vaccinium* heaths which may still correspond to H4060. Overall, both the total area and patch size of stands of H4060 are likely to have decreased (and fragmentation increased) due to increases in grazing intensity, with impacts most marked in particular areas such as the southern Highlands and the southern Uplands of Scotland; and in England and Wales. In some of these areas, particularly Wales and the southern Uplands of Scotland, the habitat may not be viable. Losses in some of these outlying areas could lead to the loss of important ecotypes of H4060.

3.4. Conclusions on area covered by habitat

Conclusion^{2.6.ii}: Unfavourable – Inadequate and deteriorating

Expert opinion is that there have been losses in extent of H4060 since 1994 due to grazing pressure, although at a rate of less than 1% p.a. of the UK area. These losses have led to reduced patch sizes and increased fragmentation, with impacts on viability in parts of the range, particularly England, Wales and the southern Highlands of Scotland. Although the habitat is not considered to attain favourable reference area at a UK level currently, it is not considered that favourable reference area needs to be more than 110% of the current UK extent to address the impacts of decreased patch size and fragmentation. As grazing pressure on this habitat (particularly outside statutory sites) continues to remain high, the judgement on area for H4060 is Unfavourable – Inadequate and deteriorating.

4. Specific structures and functions (including typical species)

4.1 Main pressures^{2.4.10}

The following list of main pressures for H4060 has been derived from the six year Common Standards Monitoring (CSM) results for Special Areas of Conservation (SACs) designated for their representation of H4060. The related EC codes are shown in brackets:

- **Grazing (140 Grazing)**

Over-grazing is the major reported pressure on stands of H4060, leading to loss of vegetation structure and the failure of more palatable or vulnerable species to reproduce and maintain themselves. It can also lead to the loss of plant species and associated fauna, and the spread of rank, unpalatable plant species. In extreme cases, very heavy grazing and trampling can lead to exposure of bare soil and erosion.

- **Burning (180 Burning)**

Accidental burning by fires spreading upslope from managed fires of submontane tall heaths is another widespread factor affecting the habitat.

- **Air pollution (702 Air pollution)**

Based on an assessment of the exceedance of relevant critical loads (see Technical note III), air pollution is considered to be a potentially significant pressure to the structure and function of this habitat.

4.2 Current condition

4.2.1 CSM condition assessments

Condition assessments based on CSM (see <http://www.jncc.gov.uk/page-2199>) provide a means to assess the structure and functioning of H4060 in the UK. The following attributes were examined for all CSM assessments relevant to the habitat:

- Feature (habitat) extent.

- Vegetation composition: frequency of taxa which are indicators of favourable condition; cover of taxa which are indicators of favourable condition, and others which are indicators of unfavourable condition.
- Vegetation structure: growth stages, burning, grazing, and disturbance.
- Physical structure: ground disturbance.

SAC condition assessments

SACs include about 36% (15,021 ha) of the extent of H4060 in the UK in a well dispersed network across its range.

Table 4.2.1 and Map 4.2.1 summarise the CSM condition assessments for UK SACs supporting habitat H4060. These data were collated in January 2007. The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the map are given in Section 7.2). The combined assessments show that of the SACs assessed:

- 63% of the area and 65% of the number of assessments was unfavourable; and
- at least 18% of the total UK habitat area was in unfavourable condition.

Table 4.2.1 CSM condition assessment results for UK SACs supporting H4060. See notes below table for details. Information on the coverage of these results is given in Section 7.2

Condition	Condition sub-categories	Area (ha)	Number of site features
Unfavourable	Declining	119	3
	No change	5,422	9
	Unclassified	52	2
	Recovering	1,936	3
	Total	7,529	17
	<i>% of all assessments</i>	63%	65%
	<i>% of total UK resource</i>	18%	unknown
Favourable	Maintained	4,493	9
	Recovered		
	Unclassified		
	Total	4,493	9
	<i>% of all assessments</i>	37%	35%
	<i>% of total UK resource</i>	11%	unknown

Notes

1. Data on features that have been partly-destroyed have been excluded from this table because they are not relevant to the consideration of present condition.
2. The data included are from CSM assessments carried out between April 1998 and December 2006. NB: these include additional and some up-date data from those used in the six year report produced by JNCC. (Williams, J.M., ed. 2006. *Common Standards Monitoring for Designated Sites: First Six Year Report*. Peterborough, JNCC).
3. Only assessments made for qualifying interest features on SAC have been included in this analysis.
4. Area figures for CSM assessments have been calculated using the data presented on the standard Natura 2000 data forms submitted to the EU.

Table 4.2.2 CSM condition assessment results for UK Sites of Special Scientific Interest (SSSIs)/Areas of Special Scientific Interest (ASSIs) that were judged to be either strongly or weakly indicative of the condition of H4060 on SSSI/ASSIs. See notes below table and Technical note II for further details

Condition	Condition sub-categories	Number of assessments	
		Strongly indicative assessments (Category 1)	Weakly indicative assessments (Category 2)
Unfavourable	Declining	2	7
	No change	1	30
	Unclassified	1	
	Recovering	7	44
	Total	11	81
	<i>% of all assessments</i>	73%	90%
Favourable	Maintained	4	
	Recovered		
	Unclassified		9
	Total	4	9
	<i>% of all assessments</i>	27%	10%

Notes

1. Data on features that have been partly-destroyed have been excluded from this table because they are not relevant to the consideration of present condition.
2. The data included are from CSM assessments carried out between April 1998 and December 2006.

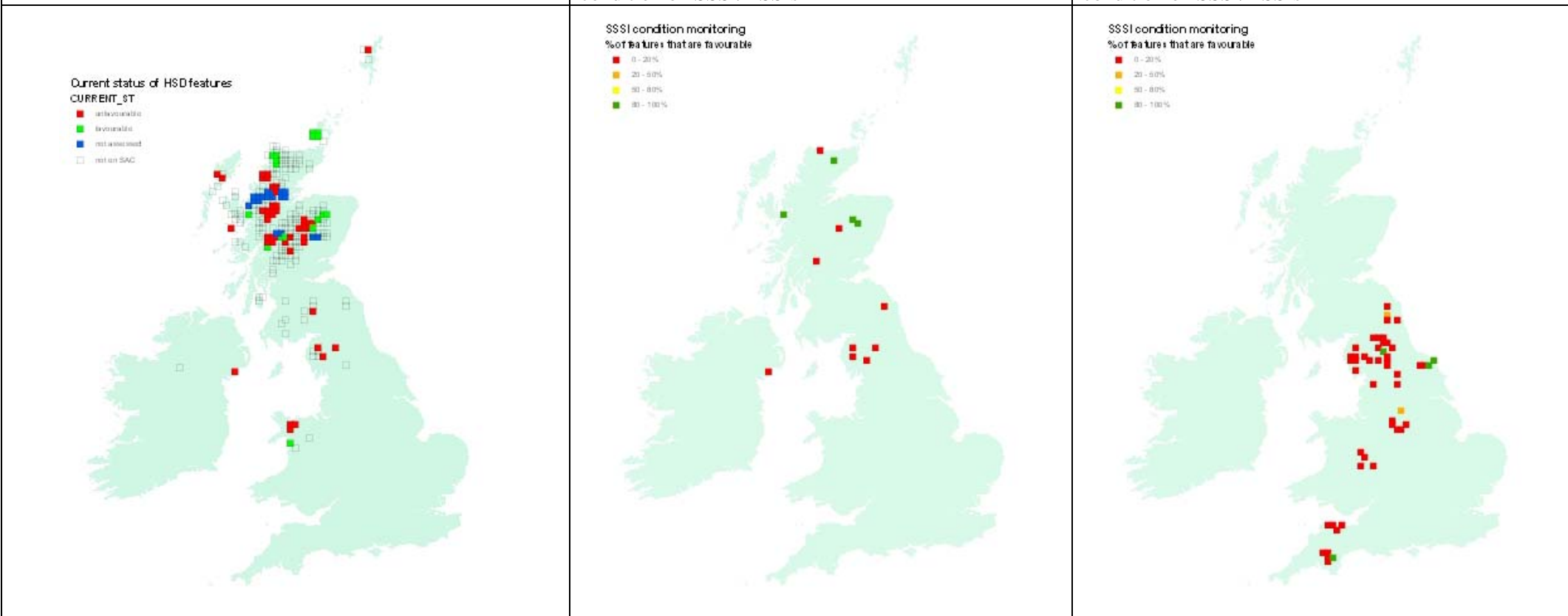
SSSI/ASSI condition assessments

Table 4.2.2 and Maps 4.2.2 and 4.2.3 summarise the CSM condition assessments that were judged to be either strongly or weakly indicative of the condition of the Annex I habitat on SSSI/ASSIs (see Technical note II for details of methodology behind this). These data were collated in January 2007. The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the maps are given in Section 7.2). The combined condition assessments show that of the SSSI/ASSI assessments considered:

- 73% of strongly indicative assessments and 90% weakly indicative assessments were unfavourable.

Current Condition of H4060 based on CSM condition assessments (See Sections 4.2 and 7.2 for further information)

Map 4.2.1 SAC assessments **Map 4.2.2** Assessments strongly indicative of the condition on SSSI/ASSIs **Map 4.2.3** Assessments weakly indicative of the condition on SSSI/ASSIs



Key
Red = unfavourable, i.e. the square contains at least one SAC where this habitat feature is present and has been judged to be unfavourable
Green = favourable, i.e. the square contains at least one SAC where this habitat feature is present and has been assessed as favourable but there are no unfavourable SAC features
Blue = SAC not assessed, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported
Transparent = SAC feature not present, i.e. the square does not contain any SAC features of this habitat type

Key*
Green – 80 – 100% of assessed features on 10-km square are favourable
Yellow - 50 – 80% of assessed features on 10-km square are favourable
Orange - 20 – 50% of assessed features on 10-km square are favourable
Red - 0 – 20% of assessed features on 10-km square are favourable
 *This is the same key as was used for JNCC CSM Report 2006

4.3 Typical species^{2.5.3 and 2.5.4}

Typical species^{2.5.3}: *Euphrasia micrantha*, *Arctostaphylos alpinus*, *Arctostaphylos uva-ursi*,
Loiseleuria procumbens, *Cornus suecica*

Typical species assessment^{2.5.4}: **Change in 10km square occupancy**

The UK trends of the following typical species are considered to indicative or informative on the structure and function of the UK resource of H4060:

Table 4.3.1 Trends and faithfulness of selected typical species for H4060

Typical species considered ^{2.5.3} :	Faithfulness to habitat H4060 (based on analysis of NVC synoptic tables)	Trend over last 25 years from BSBI atlas - based on change in 10 km square occupancy across UK (see < http://www.jncc.gov.uk/page-3254 >)
<i>Euphrasia micrantha</i>	Very high	Sig. decline, but <25% in 25yrs
<i>Arctostaphylos alpinus</i>	Very high	No sig. change
<i>Arctostaphylos uva-ursi</i>	High	Sig. decline, but <25% in 25yrs
<i>Loiseleuria procumbens</i>	High	Sig. decline, but <25% in 25yrs
<i>Cornus suecica</i>	High	Sig. decline, but <25% in 25yrs

None of the other species listed as characteristic of this habitat in the EU Interpretation Manual are particularly faithful to this habitat so available trend data at the UK-level is not particularly meaningful and has not been utilised here. Overall, the trends for these species indicate a decline in the condition of the wider resource of H4060; however there are no trends for the species specifically since 1994.

4.4 Conclusions on specific structures and functions (including typical species)

Conclusion^{2.6.iii}: **Unfavourable – Bad**

The EC Guidance states that where “more than 25% of the area of the habitat is unfavourable as regards its specific structures and functions”, the conclusion should be Unfavourable – Bad. In the UK this was generally taken to mean that more than 25% of the habitat area is in unfavourable condition.

CSM data for 2000-2006 for SACs supporting H4060 suggests that 63% of the area of assessed SACs supporting H4060 (and 65% of the features) are unfavourable. This equates to around 18% of the total UK resource. The main reason for this decline in condition has been overgrazing and associated impacts of high numbers of grazing stock in the UK uplands. Around 16% of the assessed SAC area is recovering, less than 1% declining, and 45% is not changing suggests little overall movement in the condition of H4060 on these sites.

For SSSI/ASSIs, the CSM assessments for features strongly and weakly indicative of H4060 suggest that 73% and 90% respectively of features are unfavourable with more of the features recovering than deteriorating.

Expert judgement is that perhaps 36% of the UK resource of H4060 lies within SACs. In the absence of data from sites outside the statutory site series, the figures from CSM data for SACs have been extrapolated as being representative of the UK resource overall and this suggests that at least 63% of the UK area for H4060 is in unfavourable condition. Extrapolating further, with more of the resource assessed as Unfavourable condition in the ‘no change’ category compared to recovering or declining unchanged, this suggests a judgement of Unfavourable – Bad for the structure and function parameter for H4060.

5. Future prospects

5.1 Main factors affecting the habitat

5.1.1 Conservation measures

- Protection within SACs

Around 36% of the known resource of H4060 lies within SACs with management measures specifically aimed at maintaining and enhancing the features for which they are designated, and to address some of the pressures listed within section 4.1 and the future threats listed in section 5.1.2. An unknown proportion of the resource of H4060 also lies within the SSSI/ASSI series where similar management measures are in place.

- Agri-environment measures

A suite of agri-environment measures are now in place in the uplands which are addressing more appropriate management, particularly grazing levels, for much of the resource of H4060, particularly within the statutory site series.

- UK BAP

H4060 has been put forward as part of a new priority habitat type - montane heath and willow scrub - but is not currently covered by any priority habitat action plan under the UK Biodiversity Action plan.

5.1.2 Main future threats^{2.4.11}

The most obvious major future threats to H4060 are listed below, several of which are referred to in section 4.1. The related EC codes are shown in brackets. The measures identified in section 5.1.1 are addressing some of these factors, with a greater proportion being addressed within the statutory site series:

- Grazing (**140 grazing**)
- Burning (**180 Burning**)
- Air pollution (**702 Air pollution**)

Based on an assessment of the exceedence of relevant critical loads (see technical note 3), air pollution is considered to be a potentially significant threat to the future condition of this habitat.

- Climate change (**750 Other pollution or human impacts/ activities**)

Based on the literature review (see Technical note IV) climate change is considered a major threat to the future condition of this habitat especially in the long term. However, there is a high degree of uncertainty in defining future climate threats on habitats and species due to uncertainty in: future greenhouse gas emissions; the consequential changes in climatic features (for instance temperature, precipitation CO₂ concentrations); the responses of habitats and species to these changes (for instance location, phenology, community structure) and the role of other socio-economic drivers of environmental change. The scale of change in habitats and species as a result of climate change will vary across ecosystems. Small changes in the climate are more likely to have a substantial impact on habitats and species which exist within a narrow range of environmental conditions. The future impacts of climate change on UK biodiversity will be exacerbated when coupled with other drivers of environmental change.

5.2 Future condition (as regards range, area covered and specific structures and functions)

5.2.1 CSM condition assessments

The CSM condition assessments reported in Sections 4.2.1-2 provide a basis to predict the potential future condition of H4060 in the UK. This involved treating all assessments currently identified as either favourable or unfavourable recovering as future-favourable: remaining categories were treated as future-unfavourable – see Table 5.2.1.1. There are a number of caveats to this approach, which are set out beneath this table.

SAC condition assessments

Table 5.2.1 and Map 5.2.1 summarise the predicted potential future condition of H4060 on UK SACs. This is based on the approach described above. The maps give an impression of the overall spread of where future-unfavourable and future-favourable sites are predicted to occur (summary statistics for the map are given in Section 7.2). The combined assessments show that of the SACs assessed:

- 53% of the area and 46% of the number of assessments fall within the future-favourable category; and
- at least 15% of the total UK habitat area falls within the future-favourable category.

Table 5.2.1 Predicted future condition of UK SACs supporting H4060 based on current CSM condition assessments. See notes below table for details. Information on the coverage of these results is given in Section 7.2

Future condition	Present condition	Area (ha)	Number of site features
Future-unfavourable	Unfavourable declining	119	3
	Unfavourable no change	5,422	9
	Unfavourable unclassified	52	2
	Total	5,593	14
	<i>% of assessments</i>	47%	54%
	<i>% of total UK extent</i>	13%	Unknown
Future-favourable	Favourable maintained	4,493	9
	Favourable recovered		
	Unfavourable recovering	1,936	3
	Favourable unclassified		
	Total	6,429	12
	<i>% of assessments</i>	53%	46%
	<i>% of total extent</i>	15%	Unknown

Note that the scenario presented above is based on the same information as used to construct the Table in section 4.1. It is based on the following premises:

- the unfavourable-recovering condition assessments will at some point in the future become favourable;
- all unfavourable-unclassified sites will remain unfavourable, which is probably overly pessimistic;
- sympathetic management will be sustained on sites already classified as favourable and these will not be seriously damaged by any unforeseen events.

IMPORTANT NOTE: We do not have information on the timescale of the predicted recovery, which may be influenced by many past, natural and human related factors. A sustained, sympathetic management regime is more likely to result in 'favourable' condition being attained.

SSSI/ASSI condition assessments

Table 5.2.2 and Maps 5.2.2 and 5.2.3 summarise the predicted potential future condition of H4060 on UK SSSI/ASSIs. This is based on the approach described above and utilises condition assessments that were judged to be either strongly or weakly indicative of the condition of the Annex I habitat on SSSI/ASSIs (see Technical note II for details of methodology behind this). The maps give an impression of the overall spread of where unfavourable and favourable sites exist (summary statistics for the maps are given in Section 7.2). The combined condition assessments show that of the SSSI/ASSI assessments considered:

- 73% of strongly indicative assessments and 59% weakly indicative assessments fall within the future-favourable category.

Table 5.2.2 Predicted future condition of H4060 on SSSI/ASSIs based on CSM assessments that were judged to be either strongly or weakly indicative of the condition. See notes below table and Technical note II for further details

Future condition	Present condition	Number of assessments	
		Strongly indicative assessments (Category 1)	Weakly indicative assessments (Category 2)
Future-unfavourable	Unfavourable declining	2	7
	Unfavourable no change	1	30
	Unfavourable unclassified	1	
	Total	4	37
	% of assessments	27%	41%
Future-favourable	Favourable maintained	4	
	Favourable recovered		
	Unfavourable recovering	7	44
	Favourable unclassified		9
	Total	11	53
	% of assessments	73%	59%

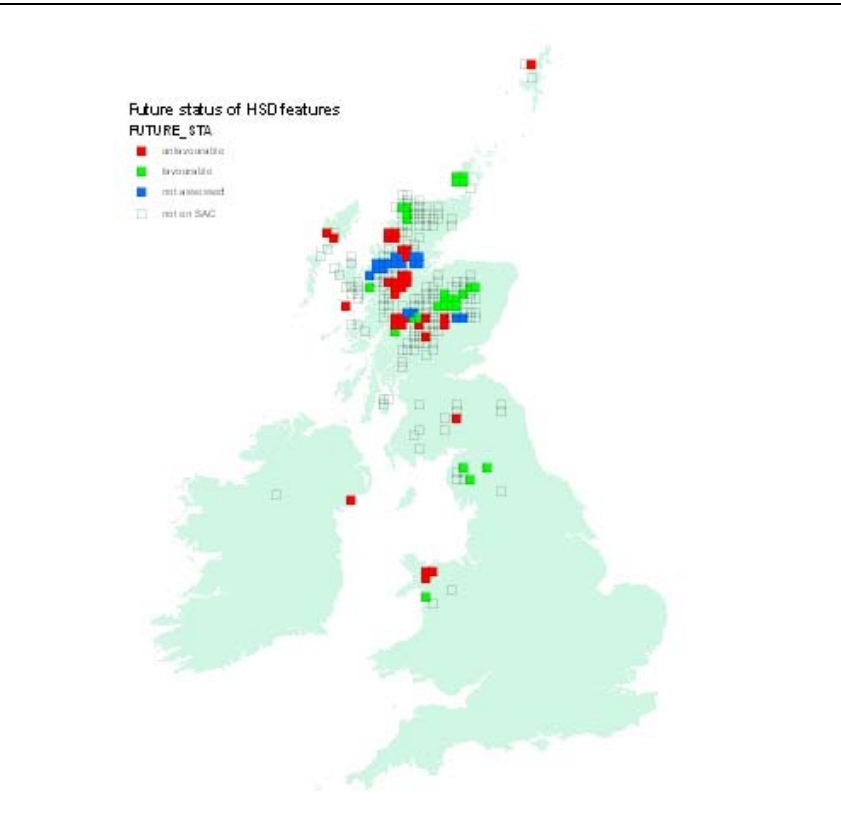
Note that the scenario presented above is based on the same information as used to construct the Table 4.2.2. It is based on the following premises:

- (i) the unfavourable-recovering condition assessments will at some point in the future become favourable;
- (ii) all unfavourable-unclassified sites will remain unfavourable, which is probably overly pessimistic;
- (iii) sympathetic management will be sustained on sites already classified as favourable and these will not be seriously damaged by any unforeseen events.

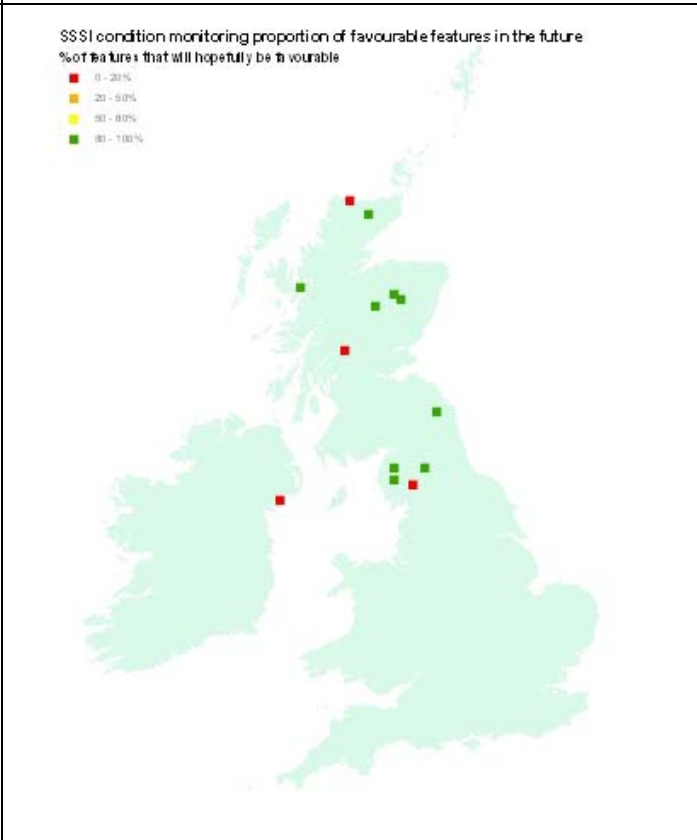
IMPORTANT NOTE: We do not have information on the timescale of the predicted recovery, which may be influenced by many past, natural and human related factors. A sustained, sympathetic management regime is more likely to result in 'favourable' condition being attained.

Predicted Future Condition of H4060 based on CSM condition assessments (See Sections 5.2 and 7.2 for further information on these maps)

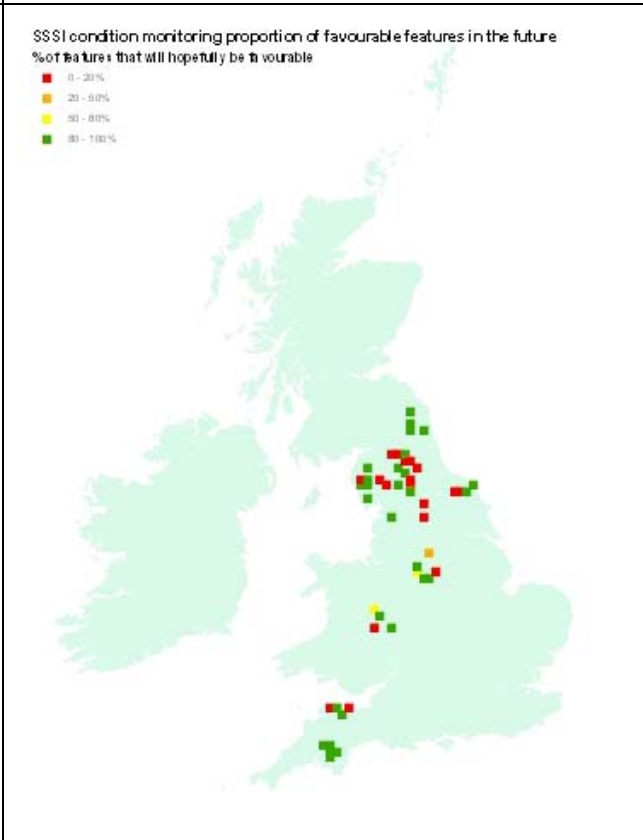
Map 5.2.1 SAC assessments



Map 5.2.2 Assessments strongly indicative of the condition on SSSI/ASSIs



Map 5.2.3 Assessments weakly indicative of the condition on SSSI/ASSIs



Key
Red = future-unfavourable, i.e. the square contains one or more SACs where this habitat feature is present and has been predicted to be future-unfavourable
Green = future-favourable, i.e. the square contains at least one SAC where this habitat feature is present and has been predicted to be future-favourable
Blue = SAC not assessed, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported
Transparent = SAC feature not present, i.e. the square does not contain any SAC features of this habitat type

Key*
Green – 80 – 100% of assessed features on 10-km square are favourable
Yellow - 50 – 80% of assessed features on 10-km square are favourable
Orange - 20 – 50% of assessed features on 10-km square are favourable
Red - 0 – 20% of assessed features on 10-km square are favourable
 *This is the same key as was used for JNCC CSM Report 2006

5.3 Conclusions on future prospects (as regards range, area covered and specific structures and functions)

Conclusion^{2.6.iv}: **Unfavourable – Bad**

The EC Guidance states that where “habitat prospects are bad, with severe impacts from threats expected and long-term viability not assured”, the judgement should be Unfavourable – Bad. In the UK, this was generally taken to mean that habitat range and/or area are in decline, and/or less than 75% of the habitat area is likely to be in favourable condition in 12-15 years.

Overgrazing and accidental burning by fires are likely to continue to occur in the near future. However, a lot of the resource of H4060 in the central, eastern and north-western Highlands of Scotland is in good condition and grazing levels are low. There are mechanisms such as management agreements for reducing grazing impacts and improving the standards of muirburn on the wider resource of H4060, which are likely to improve the condition on designated sites and more generally in the long run. There are uncertainties over the effective extent of changes to grazing and whether they will be sufficient and timely enough to arrest further loss.

Within the SAC series, 53% of the area of SAC and 46% of the sites for the feature are assessed by CSM for H4060 as “future – favourable”. For SSSI/ASSIs, the CSM assessments for features strongly and weakly indicative of H4060 suggest that 73% and 59% respectively of features are likely to become favourable in the foreseeable future.

These figures can be extrapolated to suggest that at least 53% of the total UK resource of H4060 is likely to achieve favourable condition in the foreseeable future. However, this means that at least 47% of the UK extent is likely to remain unfavourable. The future prospects for H4060 are, therefore, judged as Unfavourable - Bad.

6. Overall conclusions and judgements on conservation status

Conclusion^{2.6}: **Unfavourable – Bad**

On the basis of the Structure and Function and Future Prospects assessments, the overall conclusion is Unfavourable – Bad.

Table 6.1 Summary of overall conclusions and judgements

Parameter	Judgement	Grounds for Judgement	Confidence in judgement*
Range	Favourable	Range is stable and not less than the favourable reference range.	2
Area covered by habitat type within range	Unfavourable - Inadequate and deteriorating	Current extent is below the favourable reference area, but not by more than 10%. Further measures are required to address threats to extent for the overall UK resource.	2
Specific structures and functions (including typical species)	Unfavourable - Bad	More than 25% of the habitat area is considered to be unfavourable as regards its specific structures and functions.	2
Future prospects (as regards range, area covered and specific structures and functions)	Unfavourable – Bad	Habitat prospects over the next 12-15 years is considered to be bad, with severe impact from threats expected and long term viability not assured.	2

Overall assessment of conservation status	Unfavourable – Bad	At least one Unfavourable – Bad assessment.	2
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Key to confidence in judgement: 1 = High; 2 = Medium; 3 = Low

7. Annexed material (including information sources used 2.2)

7.1 References

JACKSON, D.L. 2000. Guidance on the interpretation of the Biodiversity Broad Habitat Classification (terrestrial and freshwater types): Definitions and the relationship with other habitat classifications. *JNCC Report, No. 307* JNCC, Peterborough.

JACKSON, D.L. & MCLEOD, C.R. (eds.) 2002. Handbook on the UK status of EC Habitats Directive interest features: provisional data on the UK distribution and extent of Annex I habitats and the UK distribution and population size of Annex II species. *JNCC Report No. 312*. Version 2. www.jncc.gov.uk/page-2447

JOINT NATURE CONSERVATION COMMITTEE. 2005a. *Common Standards Monitoring (CSM)*. Joint Nature Conservation Committee, Peterborough. www.jncc.gov.uk/page-2217

JOINT NATURE CONSERVATION COMMITTEE. 2005b. *Common Standards Monitoring Guidance for Upland Habitats* Version May 2005, Peterborough. www.jncc.gov.uk/page-2237

WILLIAMS, J.M. (ed.) 2006. *Common Standards Monitoring for Designated Sites: First Six Year Report*. Peterborough, JNCC. www.jncc.gov.uk/page-3520

Map Data Sources

JNCC International Designations Database. Joint Nature Conservation Committee.

Richard Weyl (personal communication) 1995. Environmental Heritage Service.

SNH Uplands Database, (18-12-98) 10KMVEG.XLS. Scottish Natural Heritage.

7.2 Further information on CSM data as presented in Sections 4.2 and 5.2

Table 7.2.1 Summary of the coverage of the data shown in Tables 4.2.1 and 5.2.1

Data	Value
Number of SACs supporting feature (a)	33
Number of SACs with CSM assessments (b)	26
% of SACs assessed (b/a)	79
Extent of feature in the UK – hectares (c)	43,070
Extent of feature on SACs – hectares (d)	15,021
Extent of features assessed – hectares (e)	12,022
% of total UK hectareage on SACs (d/c)	35
% of SAC total hectareage that has been assessed (e/d)	80
% of total UK hectareage that has been assessed (e/c)	28

Notes

1. Extent of features on SACs (d) includes only those features that have been submitted on the official Natura 2000 data form as qualifying features. This figure is based on the habitat extent figures presented on standard Natura 2000 data forms.

2. The data included are from CSM assessments carried out between April 1998 and December 2006. NB: these include additional and some up-date data from those used in the six year report produced by JNCC (Williams, J.M., ed. 2006. *Common Standards Monitoring for Designated Sites: First Six Year Report*. Peterborough, JNCC.

Table 7.2.2 Summary of grid square map data shown in Maps 4.2.1-3 and 5.2.1-3

Status	Number of squares	Proportion of all squares
Current – Unfavourable (red)	45	19%
Current – Favourable (green)	17	7%
On SAC but not assessed (blue)	18	8%
Not on SAC (transparent)	154	66%
Total Number of 10-km squares (any colour)	234	
Future – Unfavourable (red)	35	15%
Future – Favourable (green)	27	12%