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 :

H8310: Caves not open to the public

H8310 Caves not open to the public

Audit trail compiled and edited by Joint Nature Conservation Committee, the British Cave Research Association and the Loughborough University.

This paper and accompanying appendices contain background information and data used to complete the standard EC reporting form (Annex D), following the methodology outlined in the commission document "Assessment, monitoring and reporting under Article 17 of the Habitats Directive, Explanatory Notes and 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 H8310 and its relations with UK classifications. However the feature is poorly researched and described in the UK and there are few matches with other habitat classifications.

Caves are formed by the erosion of soluble rocks, such as limestones. They typically form the subterranean components of a distinctive 'karst' landscape, and are associated with various topographic features, including gorges, dry valleys, 8240 Limestone pavements, and dolines (surface depressions and hollows). Caves not open to the public is interpreted as referring to natural caves which are not routinely exploited for tourism, and which host specialist or endemic cave species or support important populations of Annex II species. Caves that are open to cavers but not exploited for tourism, or those sections of "show caves" (i.e. caves which are routinely exploited for tourism) which are not so exploited also correspond to this habitat. In most cases "show caves" occupy only a small percentage of the cave complexes of which they form part, this habitat includes the vast majority of naturally formed caves and cave passages in the UK.

Caves lack natural illumination, and therefore support species which are adapted to living in the dark. Microclimatic conditions vary widely within and between caves, and this determines the composition of the fauna and flora. Many species feed on detritus derived from the surface; others are carnivorous. Cave-dwelling species (cavernicoles) can be divided into the following categories:

Troglobites – obligate cave-dwellers which typically display morphological adaptations, such as reduced pigmentation and regressed eyes.

Troglophiles – facultative cave-dwellers which may have permanent populations in caves but which are also found in other suitable habitats.

Trogloxenes – species which are found in caves but only for part of their life cycle.

Stygobites – obligate aquatic cave-dwellers.

The cavernicolous flora and fauna of the UK and other parts of northern Europe is highly impoverished compared to southern Europe. Britain and Ireland supports few obligate subterranean species: most karst areas in the UK (except for parts of southern England) were glaciated during the Pleistocene, and many species are therefore believed to be relatively recent colonists; however there is some suggestion, particularly from the Crustacea, that some species may have survied in tundra or sub-glacial refugia (Proudlove and others 2003). Southern Europe escaped glaciation and consequently has a richer fauna of highly-specialised relict troglobites.

Cavernicoles in the UK include bacteria, algae, fungi and various groups of invertebrates (e.g. insects, spiders and crustaceans). Characteristic troglobites and troglophiles include *Porrhoma rosenhaueri* (a blind cave spider), *Trechus micros* (a ground beetle), *Niphargus glennei* (an amphipod, only known from Devon in the UK), and *Arrhopalites pygmaeus* (a springtail). In total 46 troglobitic/stylobitic taxa have been recorded from Britain and Irealnd (12 terrestrial, 15 aquatic and a further 19 interstitial forms). Although there are no stygobitic fish or amphibians recorded in the UK, some populations of stygophilic fish may exist (Wood and Proudlove 2004). Current records suggest that amphipods, particularly those of the family Niphargidae and Crangonyctidae, are the most widely distributed and diverse taxa in UK caves but subterranean habitats generally lack any systematic survey (Proudlove and others 2003).

Table 1.1.1 Summary description of habitat H8310 and its relations with UK vegetation/habitat classifications

Classification	Correspondence with Annex I type	Comments
CORINE code and/or previous name, as given in Directive 92/43/EEC (where different)	65	Caves not open to the public

2. Range [2.3]

2.1 Current range

Range surface area [2.3.1]: **15,836 km²**
Date calculated [2.3.2]: **May 2007**
Quality of data [2.3.3]: **Poor**

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.

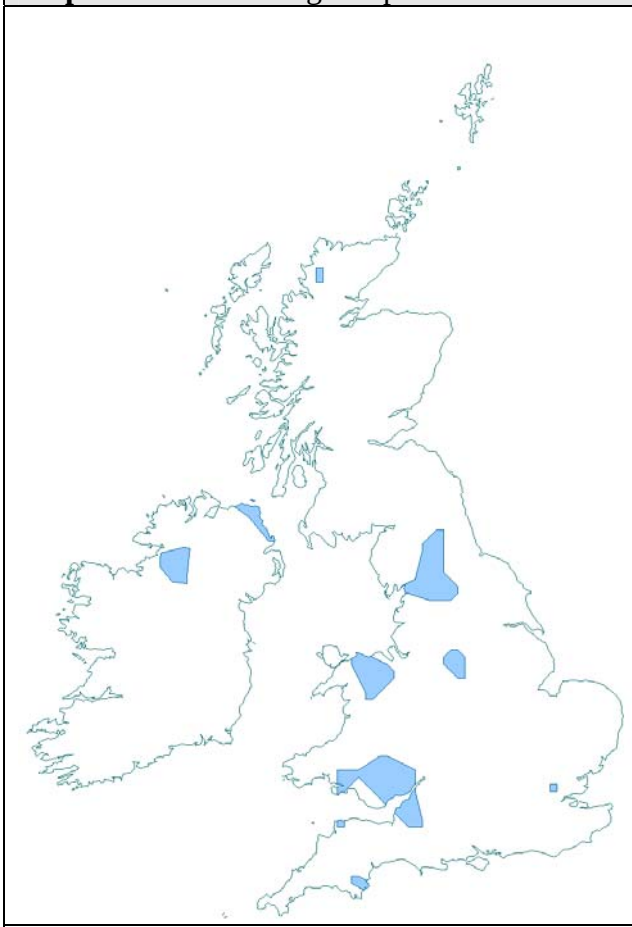
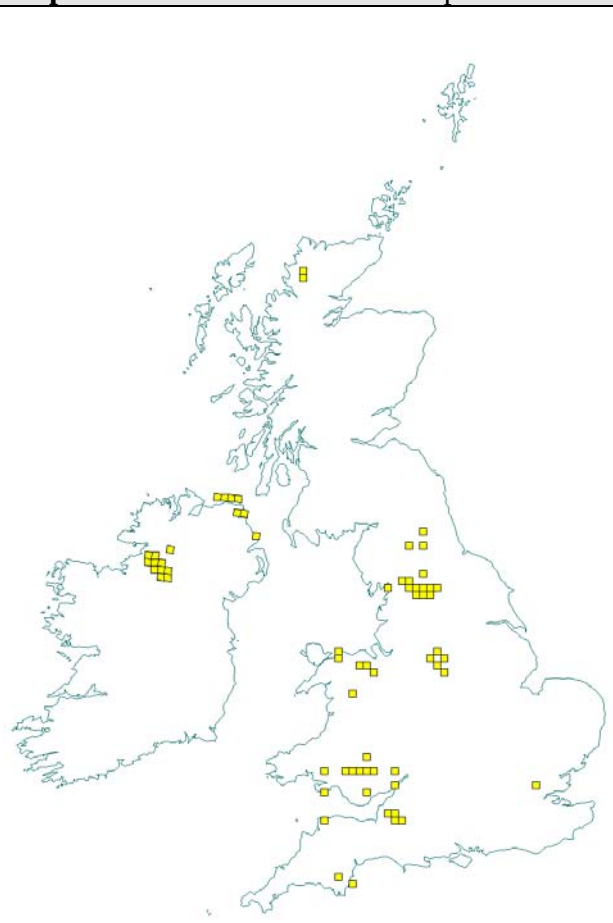
Maps 2.1.1 and 2.1.2 show the range and distribution of H8310 in the UK. The 11 Special Areas of Conservation (SACs) that have been identified in the UK for H8310 have been done so for their populations of bats rather than for truly hypogean taxa.

Caves corresponding to this habitat are formed over very long time periods by natural processes. Within the definition for this Annex I feature overall cave length (extent) can never be increased by man-made means.

In the UK, caves are particularly characteristic of the limestone areas of the north Pennines, the Peak District, the Mendips, south Wales, and County Fermanagh. Examples also occur in Devon, north Wales and Scotland.

The length of explored cave is increasing and the discovery of new cave passages continues, although it is not known whether the rate of discovery of new caves is increasing, static or decreasing.

Current range has been derived from Geological Conservation Review (GCR) data for cave passages of geological interest (see http://www.jncc.gov.uk/earthheritage/gcrdb/GCRblock.asp?block=19) and the Earth Science Conservation review for Northern Ireland, which is considered to provide a reasonable approximation to the likely range and distribution for the Annex I feature.

Map 2.1.1 Habitat range map [1.1] for H8310	**Map 2.1.2** Habitat distribution map [1.2] for H8310
	
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 10x10km square of the National Grid and shows the known and/or predicted occurrence of this habitat. 10-km square count: 65

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**

The range of this habitat is static for the purposes of Article 17 reporting. The natural processes that form caves corresponding to this habitat do not change over the time periods relevant to Article 17 reporting.

2.3 Favourable reference range

Favourable reference range[2.5.1]: **15,836 km²**

The range of caves is taken to be static and, by virtue of the Habitats and Species Directive definition and in light of the time taken for such habitats to form, the range of this habitat cannot be increased by man-made means. The current range must therefore correspond to the favourable reference range.

2.4 Conclusions on range

Conclusion[2.6.i]: **Favourable**

The physical range of caves has almost certainly remained unchanged since the Devensian glaciation and habitat corresponding to the Habitats Directive definition in the UK is little affected at any meaningful timescale by non-geological or geomorphological factors. The discovery of new cave passage continues at a slow rate (due to the limited resources allocated for survey and the limited number of active cavers in

the UK) but this is considered to have had no significant impact on range. Consequently,it is judged that the range for H8310 is Fvourable in the absence of any information to the contrary.

3. Area [2.4]

3.1 Current area

Total UK extent [2.4.1]: **Unknown**
Date of estimation [2.4.2]: **May 2007**
Method [2.4.3]: **Not applicable**
Quality of data [2.4.4]: **Poor**

There is c.700 km of cave passage known at the moment in the UK. (estimate by Professor John Gunn, Limestone Research Group, University of Huddersfield, *pers. comm.* 2007); area in km^2 is unknown at present.

The limestone caves of Great Britain are a non-renewable resource with considerable geological and recreational potential. The GCR undertaken by the former Nature Conservancy Council identified 48 cave Sites of Special Scientific Interest (SSSIs). These encompass approximately 30% of the caves in Great Britain and over 75% of the surveyed cave passage (Hardwick and Gunn 1993).

3.2 Trend in area since c.1994

Trend in area[2.4.5]: **Stable**
Trend magnitude[2.4.6]: **Not applicable**
Trend period[2.4.7]: **1994-2006**
Reasons for reported trend[2.4.8]: **Not applicable**

Although the discovery and exploration of caves has undergone significant growth in the last 200 years, caves corresponding to this habitat only form over very long periods of time and only a small percentage of the total area of newly discovered cave is "lost" to exploitation for tourism, and so the actual area of cave habitat corresponding to the Annex I definition has probably remained unchanged. The trend in area must therefore be taken to be static.

3.3 Favourable reference area

Favourable reference area[2.5.2]: **Unknown**

Given that, for the purposes of Article 17 reporting, the current area of cave habitat corresponding to H8310 is the same as the historic area of this habitat, the current area is considered to approximately equal the favourable reference area. However,the habitat is poorly understood and researched.

3.4 Conclusions on area covered by habitat

Conclusion[2.6.ii]: **Favourable**

The area covered by this habitat is considered Favourable because only a tiny fraction of known cave habitat corresponding to H8310 has been lost to tourism or to desire routes (used extensively by cavers). The current known area of this habitat is greater than the historic known area of this habitat, as a result of recent cave exploration, but the total area of this habitat is unchanged and unchanging for the purposes of Article 17 reporting.

4. Specific structures and functions **(including typical species)**

4.1 Main pressures [2.4.10]

The summary of main threats and pressures to H8310 is mainly derived from Wood and Gunn (2000). The related EC codes are shown in brackets:

- Quarrying/ mining (**301 Quarries, 320 Mines)**

  Quarrying and mining can lead to changes of aquatic habitats through changes in chemistry and hydrology as well as changes in erosion/ deposition regimes for sediments in cave passages. Cave ecosystems can also be significantly affected by changes to sediment loads, subsurface hydrology and both clastic (sediment) and chemical water quality (Watson *et al*. 1997) arising from associated activities on the surface.

- Waste disposal (**421 Disposal of household waste, 422 Disposal of industrial waste)**

Generation of gases from waste disposal can have impacts on both the aquatic and non-aquatic faunal elements of caves.

- Agriculture (**701 Water pollution**)

Agriculture can both affect the hydrology and hydrochemistry within caves, the latter particularly through washout of pesticides into cave systems.

- Groundwater abstraction (**850 Modification of hydrographic functioning general)**

Abstraction can lead to reduced volumes of water and changes in siltation patterns within cave systems.

- Pollution **(709 Other forms or mixed forms of pollution)**

Surface organic pollution has both a direct affect on obligate cave fauna but also often washes in surface fauna (the species may be the same as some found in caves but the latter are often genetically distinct forms) which (it is thought, more evidence and research on effects is needed) can out-compete and so denude the cave fauna. (*pers. comm.* Dr Paul Wood, Department of Geography, Loughborough University. Pollution incidents within cave systems are frequently undetected due to the difficulty of identifying the pollutant source and gaining access to monitor features. Studies such as that reported in Wood and others (2004), which demonstrated the impact of contaminated agricultural runoff from the surface catchment on cave fauna in the English Peak District, are rare.

- Recreation **(629 Other outdoor sports or leisure activities)**

A number of studies have shown that the greatest internal impacts on subterranean ecosystems come from intensive and uncontrolled tourism and from recreational caving. The impact of increased CO2 levels associated with respiration on delicate speleothems has been documented (Baker and Genty, 1998), although the human impact on subterranean fauna is poorly understood. The presence of lighting often leads to an elevation of temperature (Cigna 1993) and the development of floral communities in illuminated areas (Grobbelaar in press), while artificial ventilation to reduce cave radon concentrations may cause changes in temperature, humidity and hence evaporation from cave habitats, including standing water pools.

The 20th century saw a marked increase in the recreational use of caves both passively, in visits to ‘show caves’ opened to the public (Baker and Genty 1998), and actively with the growth of ‘sport’ caving and exploration of ‘wild caves’. In practice many show caves form the outer sections of more extensive wild caves, although the numbers of recreational cavers allowed to pass through may be limited.

Most of the important discoveries and extensions to existing cave systems have resulted from excavations (Hardwick and Gunn 1997), and this can result in passages having their sediment fill partially or totally removed and largely deposited into active streamways. Although this activity has increased the known cave resource, the impact on cave ecology is largely unknown. Guidelines have been developed to facilitate the sustainable development and conservation of cave and karst environments at national (National Caving Association 1995) and international (Watson *et al*. 1997) scales. However, these are difficult to apply to the ecology of British caves in general because of the dearth of information available on the fauna that utilise and/or may be dependent on subterranean environments.

- Air pollution

Based on an assessment of relevant literature and exceedence of critical loads (see Technical Note III), this habitat is not considered sensitive to air pollution or there is no relevant critical load available and the judgement is that it is unlikely to be at risk anyway.

4.2 Current condition

4.2.1 Common Standards Monitoring (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 H8310 in the UK. The following attributes were examined for all CSM assessments relevant to the habitat, which to date have only been for caves supporting important populations of bats:

- Site security.
- External and internal condition of roost.
- Site access.
- Disturbance.
- Use by bats (presence/absence; roost or population counts).

SAC condition assessments

Table 4.2.1 and Map 4.2.1 summarise the CSM condition assessments for UK SACs supporting habitat H8310. 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:

- 100% of the area and 100% of the number of assessments was unfavourable; and
- An unknown percentage of the total UK habitat area was in unfavourable condition.

However, only a small and unrepresentative part of the overall resource (caves used by bats) is captured by the definition for H8310 is within the SAC series.

Table 4.2.1 CSM condition assessment results for UK SACs supporting H8310. See notes below table for details. Information on the coverage of these results is given in Section 7.2

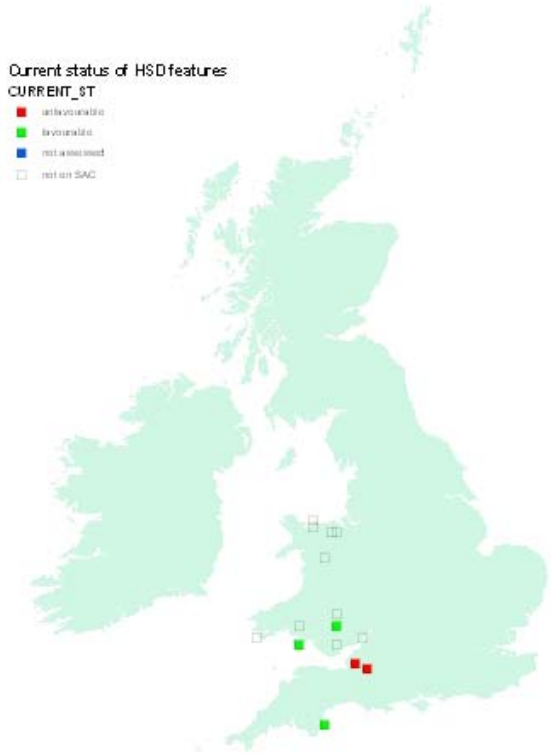
Condition	Condition sub-categories	Area (ha)	Number of site features
Unfavourable	Declining	10	1
	No change		
	Unclassified		
	Recovering	13	2
	Total	23	3
	% of all assessments	***100%***	***75%***
	% of total UK resource	***unknown%***	***unknown***
Favourable	Maintained		
	Recovered		
	Unclassified	00	1
	Total		1
	% of all assessments	***0%***	***25%***
	% of total UK resource	***unknown%***	***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 March 2005, as used for the JNCC Common Standards Monitoring Report 2006.

SSSI/Area of Special Scientific Interest (ASSI) condition assessments

There are no SSSI/ASSI assessments that are considered strongly or weakly indicative of the condition of the Annex I habitat on SSSI/ASSIs. Although a substantial part of the UK resource may be represented within the geological SSSI series, these have not been assessed for the interest of their subterranean fauna.

<table>
<tr><th colspan="3">Current Condition of H8310 based on CSM condition assessments (See Sections 4.2 and 7.2 for further information)</th></tr>
<tr><td>Map 4.2.1 SAC assessments</td><td>Map 4.2.2 Assessments strongly indicative of the condition on SSSI/ASSIs</td><td>Map 4.2.3 Assessments weakly indicative of the condition on SSSI/ASSIs</td></tr>
<tr><td> 
</td><td>Not applicable</td><td>Not applicable</td></tr>
<tr><td>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</td><td colspan="2">Key*
Green – 80 – 100% of assessed features on 10km square are favourable
Yellow - 50 – 80% of assessed features on 10km square are favourable
Orange - 20 – 50% of assessed features on 10km square are favourable
Red - 0 – 20% of assessed features on 10km square are favourable
*This is the same key as was used for JNCC CSM Report 2006</td></tr>
</table>

4.3 Typical species

Typical species[2.5.3]: None
Typical species assessment[2.5.4]: Not applicable
There are no typical species listed for this habitat in the EU interpretation Manual.

The lack of systematic research on this habitat has not allowed the identification of truly typical species for the feature, and hence any monitoring or surveillance of their trends that can be informative for this assessment. The bat species associated with the SAC element only use the habitat for part of their life cycle and so their trends cannot be considered indicative of any particular aspect of structure and function for this habitat.

There is a growing need to consider the groundwater quality within subterranean systems since it has major implications for obligate subterranean taxa, and may ultimately have a significant impact on surface waters and their ecology (e.g. see Boulton, 2005). However, the identification of indicator organisms and the development of biotic indices for groundwater-dominated ecosystems, including caves, are currently limited (e.g Hahn 2006).

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

Conclusion[2.6.iii]: Unknown
The EC Guidance states that where there is "no or insufficient reliable information available" as regards its specific structures and functions, the conclusion should be Unknown. In the UK this was generally taken to mean that no or insufficient reliable information on structure and function exists to draw a conclusion on the overall UK resource of the particular habitat.

Although 100% of the SAC assessments are marked as Unfavourable, this is only a small and unrepresentative part of the overall resource captured by the definition for H8310. Groundwater quality has major implementations for obligate subterranean taxa but only limited work has been done on the identification of indicators organisms. As a result little information on quality is available, and the impacts of disturbances and pollution on groundwater-dominated ecosystems are often ignored. The situation is even less well understood for other elements of this habitat and so the only reasonable judgement for this parameter is Unknown.

5. Future prospects

5.1 Main factors affecting the habitat

5.1.1 Conservation measures

Cave habitats corresponding to H8310 are poorly researched and understood in the UK, and there are few direct conservation measures in place. However, the following measures have some relevance:

- Protection within SACs

Only a small part of the known resource of H8310 is likely to lie 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. A similar small but unknown proportion of the resource lies within SSSIs with similar measures in place. However, these measures are generally aimed at particular species interest (notably bats in SACs) or geological interests (in SSSIs).

- Agri-environment measures

A suite of agri-environment measures are now in place in both the uplands and lowlands. For H8310 these may lead to some reductions in agricultural impacts and pollution.

- Water Framework Directive (WFD)

In addition to the drive for improvement generated by the SAC and SSSI network, the WFD is adding considerable impetus for widespread action on issues, particularly abstraction and aquatic pollution affecting the resource of H8310.

5.1.2 Main future threats[2.4.11]

The most obvious major future threats to H8310 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:

- Quarrying/ mining **(301 Quarries, 320 Mines)**
- Waste disposal **(421 Disposal of household waste, 422 Disposal of industrial waste)**
- Agriculture **(701 Water pollution)**
- Groundwater abstraction **(850 Modification of hydrographic functioning general)**
- Pollution **(709 Other forms of or mixed forms of pollution)**
- Recreation **(629 Other outdoor sports or leisure activities)**

- Air pollution

Based on an assessment of relevant literature and exceedence of critical loads (see Technical Note III), this habitat is not considered sensitive to air pollution or there is no relevant critical load available and the judgement is that it is unlikely to be at risk anyway.

5.2 Future condition **(as regards range, area covered and specific structres 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 H8310 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. 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 H8310 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:

- 57% of the area and 75% of the number of assessments fall within the future-favourable category; and
- an unknown percentage of the total UK habitat area falls within the future-favourable category.

Table 5.2.1 Predicted future condition of UK SACs supporting H8310 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

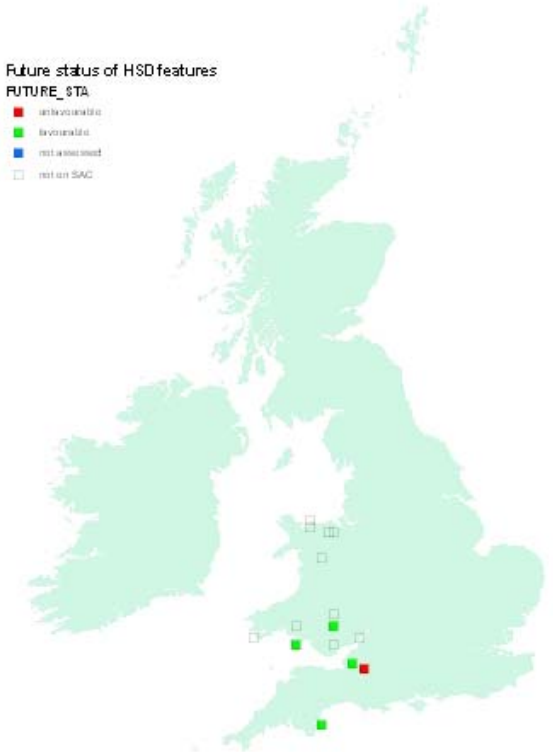
Future condition	Present condition	Area (ha)	Number of site features
Future-unfavourable	Unfavourable declining	10	1
	Unfavourable no change		
	Unfavourable unclassified		
	Total	10	1
	% of assessments	***43%***	***25%***
Future-favourable	Favourable maintained		
	Favourable recovered		
	Unfavourable recovering	13	2
	Favourable unclassified	00	1
	Total	13	3
	% of assessments	***57%***	***75%***

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:
(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.

However, only a small and unrepresentative part of the overall resource (caves used by bats) is captured by the definition for H8310 is within the SAC series.

SSSI/ASSI condition assessments

There are no SSSI/ASSI assessments that are considered strongly or weakly indicative of the future condition of the Annex I habitat on SSSI/ASSIs. Although a substantial part of the UK resource may be represented within the geological SSSI series, these have not been assessed for the interest of their subterranean fauna.

<table>
<tr><td colspan="3">Predicted Future Condition of H8310 based on CSM condition assessments (See Sections 5.2 and 7.2 for further information on these maps)</td></tr>
<tr><td>Map 5.2.1 SAC assessments</td><td>Map 5.2.2 Assessments strongly indicative of the condition on SSSI/ASSIs</td><td>Map 5.2.3 Assessments weakly indicative of the condition on SSSI/ASSIs</td></tr>
<tr><td> 
</td><td colspan="2">Not applicable</td></tr>
<tr><td>Key
<u>Red = future-unfavourable</u>, i.e. the square contains one or more SACs where this habitat feature is present and has been predicted to be future-unfavourable
<u>Green = future-favourable</u>, i.e. the square contains at least one SAC where this habitat feature is present and has been predicted to be future-favourable
<u>Blue = SAC not assessed</u>, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported
<u>Transparent = SAC feature not present</u>, i.e. the square does not contain any SAC features of this habitat type</td><td colspan="2">Key*
<u>Green</u> – 80 – 100% of assessed features on 10km square are favourable
<u>Yellow</u> - 50 – 80% of assessed features on 10km square are favourable
<u>Orange</u> - 20 – 50% of assessed features on 10km square are favourable
<u>Red</u> - 0 – 20% of assessed features on 10km square are favourable
*This is the same key as was used for JNCC CSM Report 2006</td></tr>
</table>

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

Conclusion[2.6.iv]: Unknown

The EC Guidance states that where there is "no or insufficient reliable information available" as regards future prospects, the conclusion should be Unknown. In the UK this was generally taken to mean that no or insufficient reliable information on future prospects exists to draw a conclusion on the overall UK resource of the particular habitat.

Although both area and range parameters are favourable, for current structure and function only a small and unrepresentative part of the overall resource has been assessed by the definition for H8310 is within the SAC series. Consequently it is not possible to reach a judgement other than Unknown for future prospects.

6. Overall conclusions and judgements on conservation status

Conclusion[2.6]: Unknown

On the basis that there are two unknown judgments combined with two Favourable judgments, the overall conclusion is Unknown.

Table 6.1. Summary of overall conclusions and judgements

Parameter	Judgement		Confidence in judgement*
Range	Favourable	Current range is stable and not less than the favourable reference range.	2
Area covered by habitat type within range	Favourable	The area covered by this habitat is considered Favourable because only a tiny fraction of known cave habitat corresponding to H8310 has been lost to tourism or to desire routes (used extensively by cavers). The current known area of this habitat is greater than the historic known area of this habitat, as a result of recent cave exploration, but the total area of this habitat is unchanged and unchanging for the purposes of Article 17 reporting.	2
Specific structures and functions (including typical species)	Unknown	No or insufficient reliable information available to draw a conclusion on structure and function for the overall resource of the habitat. Although 100% of the SAC assessments are marked as unfavourable, this is only a small and unrepresentative part of the overall resource captured by the definition for H8310. Groundwater quality has major implementations for obligate subterranean taxa but only limited work has been done on the identification of indicators organisms. As a result little information on quality is available, and the impacts of disturbances and pollution on groundwater-dominated ecosystems are often ignored. The situation is even less well understood for other elements of this habitat and so the only reasonable judgement for this parameter is Unknown.	1

Future prospects (as regards range, area covered and specific structures and functions)	Unknown	No or insufficient reliable information available to draw a conclusion on future prospects for the overall resource of the habitat. Although both area and range parameters are favourable, for current structure and function only a small and unrepresentative part of the overall resource has been assessed by the definition for H8310 is within the SAC series. Consequently it is not possible to reach a judgement other than Unknown for future prospects.	1
Overall assessment of conservation status	Unknown	Two Unknown judgments combined with two Favourable.	1

Key to confidence in judgement: 1 = High; 2 = Medium; 3 = Low

7. Annexed material **(including information sources used 2.2)**

7.1 References

BAKER, A. & GENTY, D. 1998. Environmental pressures on conserving cave speleothems: effects of changing surface land-use and increased tourism. *Journal of Environmental Management* **53**: 165–175.

BOULTON, A.J. 2005. Chances and challenges in the conservation of groundwaters and their dependent ecosystems. *Aquatic Conservation: Marine and Freshwater Ecosystems* **15**: 319-323.

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Map Data Sources

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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)	6
Number of SACs with CSM assessments (b)	4
% of SACs assessed (b/a)	67
Extent of feature in the UK – hectares (c)	Unknown
Extent of feature on SACs – hectares (d)	115
Extent of features assessed – hectares (e)	23
% of total UK hectarage on SACs (d/c)	Unknown
% of SAC total hectarage that has been assessed (e/d)	20
% of total UK hectarage that has been assessed (e/c)	Unknown

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)	2	13%
Current – Favourable (green)	1	7%
On SAC but not assessed (blue)	2	13%
Not on SAC (transparent)	10	67%
Total Number of 10km squares (any colour)	15	
Future – Unfavourable (red)	1	7%
Future – Favourable (green)	2	13%