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:

H8310 - Caves not open to the public

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	**8310 - Caves not open to the public**

2. Maps

2.1 Year or period	2007-
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	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. CARTER, J. 2010. Monitoring invertebrate features on SSSIs: Porrhomma rosenhaueri in Lesser Garth Cave, Cardiff. NSSG (Bangor HQ), Countryside Council for Wales. CARTER, J., FOWLES, A. & ANGELE, C. 2010. Monitoring the population of the linyphid spider Porrhomma rosenhaueri (L. Koch, 1872) (Araneae: Linyphiidae) in Lesser Garth Cave, Cardiff, UK. Cave and Karst Science 37: 3-8. CARTER, J. 2018. Monitoring invertebrate features on SSSIs - assessing and reviewing the status of the troglobitic spider Porrhomma rosenhaueri in Ogof y Ci and Lesser Garth Cave, South Wales in 2017. NRW Evidence Report No: 246, 20pp, Natural Resources Wales, Bangor. CAVING ASSOCIATION. 1995. Cave conservation policy. National Caving Association, London CIGNA, A.A. 1993. Environmental management of tourist caves. Environmental geology. 21:173-180. GOLDIE, H.S. 1997. Karst and caves of Great Britain. Geological Conservation Review Series, Joint Nature Conservation Committee, Chapman and Hall. GROBBELAAR, J.U.2000. Lithophytic algae: a major threat to the karst formation of show caves. Journal of Applied Phycology. 12:309-315. HARDWICK, P. & GUNN, J.1997. The conservation of Britain's limestone cave resource. Environmental Geology. 28:121-127. JEFFERSON, G.T., CHAPMAN, P., CARTER, J. & PROUDLOVE, G. 2004. The invertebrate fauna of the Ogof Ffynnon Dhu cave system, Powys, South Wales, UK. Cave and Karst Science, 2004. JOINT NATURE CONSERVATION COMMITTEE. 2007. Second report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough. http://www.jncc.gov.uk/article17. JOINT NATURE CONSERVATION COMMITTEE. 2013. Third Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2007 to December 2012. Peterborough. http://jncc.defra.gov.uk/article17 ROBERTSON, A.L., SMITH, J.W.N., JOHNS, T. & PROUDLOVE, G.S. 2009. The distribution and diversity of stygobites in Great Britain: an analysis to inform

groundwater management. Quarterly Journal of Engineering Geology and Hydrogeology. 42: 3, 359-368.
WALTHAM, A.C. SIMMS, M.J., FARRANT, A.R. & WATSON, J. HAMILTON-SMITH, E., GILLIESON, D. & KIERNAN, K. 1997. Guidelines for cave and karst protection. International Union for the Conservation of Nature and Natural Resources, Cambridge.
WOOD, P. J., GUNN, J. & RUNDLE, S. D. 2008. Response of benthic cave invertebrates to organic pollution events. Aquatic Conservation: Marine and Freshwater Ecosystems. 18: 6, 909-922.
WOOD, P.J. & PROUDLOVE, G.S. (2004). Britain and Ireland: biospeleology, in Gunn, J.(ed) Encyclopaedia of caves and karst science, Fitzroy Dearbon, London. 163-164.

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	1995-2018	
4.7 Long-term trend Direction	Stable (0)	
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	2007-2018		
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value
5.3 Type of estimate			
5.4 Surface area Method used	Insufficient or no data available		
5.5 Short-term trend Period	2007-2018		
5.6 Short-term trend Direction	Stable (0)		
5.7 Short-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.8 Short-term trend Method used	Based mainly on extrapolation from a limited amount of data		
5.9 Long-term trend Period			
5.10 Long-term trend Direction	Stable (0)		
5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used	Based mainly on extrapolation from a limited amount of data		
5.13 Favourable reference area	a) Area (km²)		

Report on the main results of the surveillance under Article 17 for Annex I habitat types (Annex D)

	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	Maximum
	b) Area in not-good condition (km²)	Minimum	Maximum
	c) Area where condition is not known (km²)	Minimum	Maximum
6.2 Condition of habitat Method used	Insufficient or no data available		
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	Unknown (x)		
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
Sports, tourism and leisure activities (F07)	H
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	M
Agricultural activities generating point source pollution to surface or ground waters (A25)	M
Agricultural activities generating diffuse pollution to surface or ground waters (A26)	M
Mixed source pollution to surface and ground waters (limnic and terrestrial) (J01)	M

Threat	Ranking
Sports, tourism and leisure activities (F07)	H
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	M
Agricultural activities generating point source pollution to surface or ground waters (A25)	M

Report on the main results of the surveillance under Article 17 for Annex I habitat types (Annex D)

Agricultural activities generating diffuse pollution to surface or ground waters (A26)	M
Mixed source pollution to surface and ground waters (limnic and terrestrial) (J01)	M

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, but none yet taken

8.2 Main purpose of the measures taken

8.3 Location of the measures taken

8.4 Response to the measures

8.5 List of main conservation measures

Reduce impact of outdoor sports, leisure and recreational activities (CF03)
Reduce/eliminate point pollution to surface or ground waters from agricultural activities (CA10)
Reduce diffuse pollution to surface or ground waters from agricultural activities (CA11)

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:

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 32.8
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

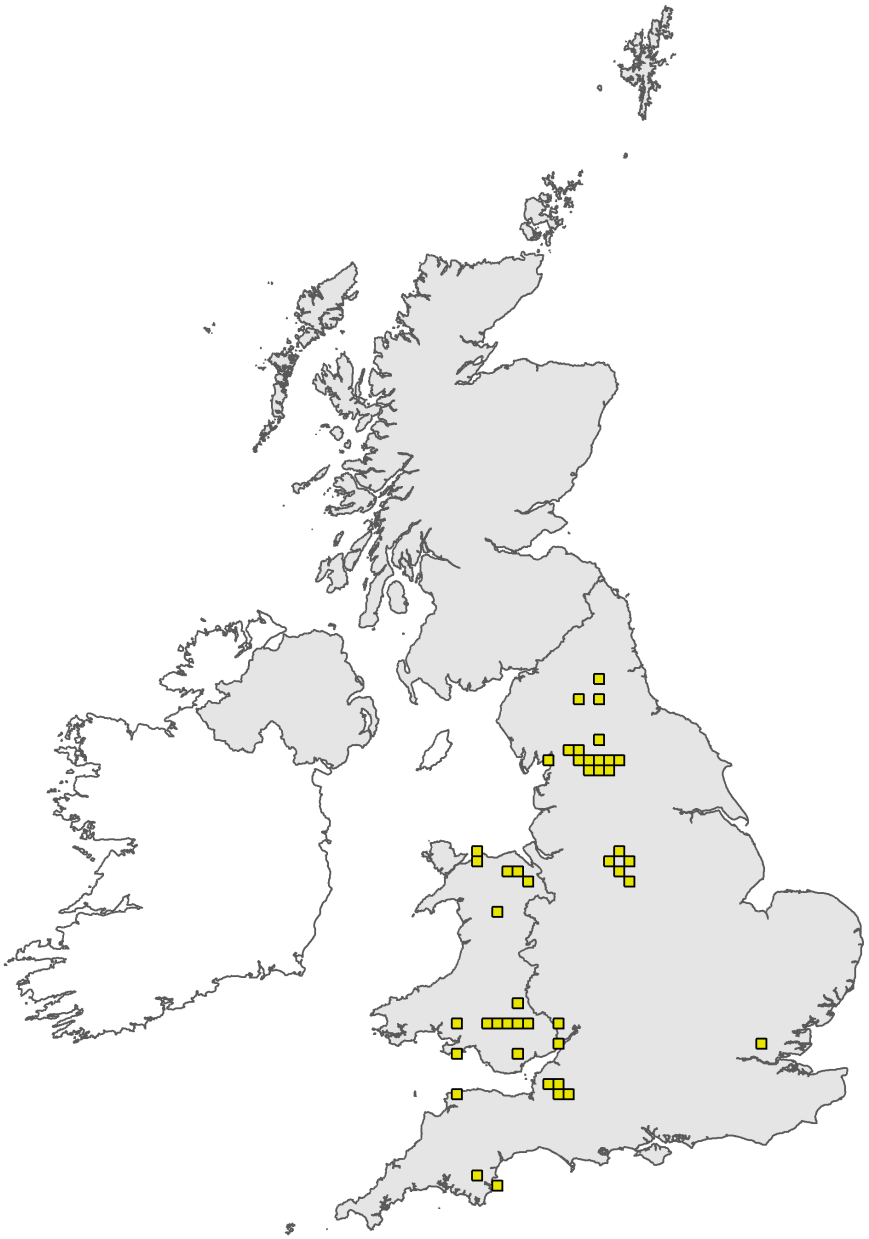

Figure 1: UK distribution map for H8310 - Caves not open to the public. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

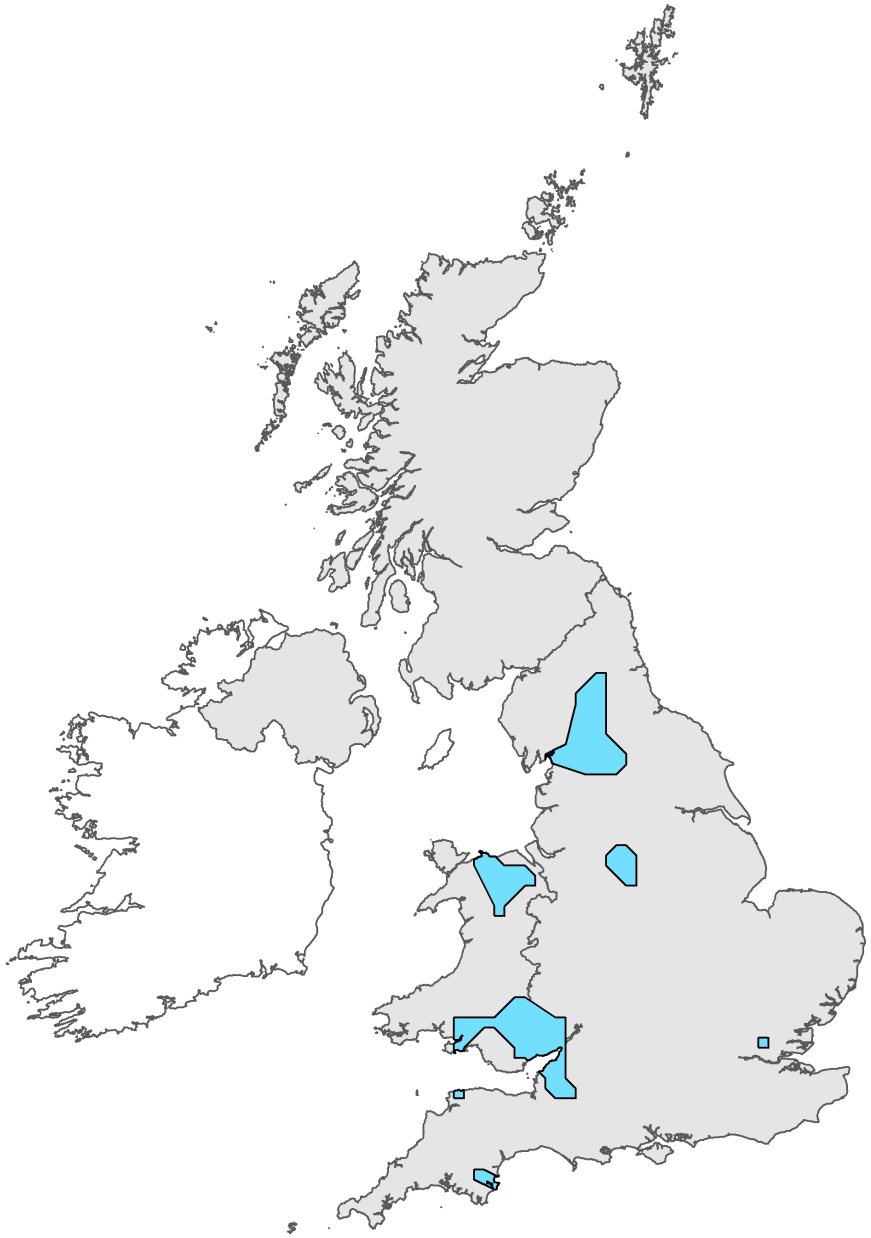

Figure 2: UK range map for H8310 - Caves not open to the public. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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: 8310

Field label	Note
2.3 Distribution map; Method used	Estimate based on data within Waltham et al, 1997. The underpinning distribution data is based on records from Waltham et al. (1997), these records were reviewed and confirmed in 2007.

Habitat code: 8310 Region code: ATL

Field label	Note
4.3 Short term trend; Direction	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 (JNCC,2007). Whilst some new passages may have been discovered in Wales, we cannot find any published values for this.
4.7 Long term trend; Direction	The physical range of caves has almost certainly remained unchanged since the Devensian glaciation and habitat corresponding to the Habitats Directive definition in Wales is little affected at any meaningful timescale by non-geological or geomorphological factors. The discovery of new cave passage continues at a slow rate but this is considered to have had no significant impact on range (JNCC,2007).
4.11 Change and reason for change in surface area of range	Is there a change between reporting periods? YES/NO 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 (JNCC,2007). Whilst some new passages may have been discovered in Wales, we cannot find any published values for this.
5.6 Short term trend; Direction	The range of this habitat is static for the purposes of Article 17 reporting; there is no evidence to suggest the trend has diverged from the previous reporting round. The natural processes that form caves corresponding to this habitat do not change over the time periods relevant to Article 17 reporting (JNCC, 2007). Whilst some new passages may have been discovered in Wales, we cannot find any published values for this.
5.10 Long term trend; Direction	Note this is 5.10 the drop down is incorrect. For this assessment period there is no evidence to suggest the trend has diverged from the previous reporting rounds. The physical range of caves has almost certainly remained unchanged since the Devensian glaciation and habitat corresponding to the Habitats Directive definition in Wales is little affected at any meaningful timescale by non-geological or geomorphological factors. The discovery of new cave passages continues at a slow rate but this is considered to have had no significant impact on area (JNCC,2007).
5.12 Long term trend; Method used	Estimate based on expert opinion with no or minimal sampling
6.1 Condition of habitat	The area within N2K sites has been estimated, but we have no data for the wider habitat on which to base an area calculation for the whole resource.
7.1 Characterisation of pressures/ threats	Pressure and Threat:C01: Quarrying/ 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 (Waltham et al., 1997) arising from associated activities on the surface. Air flow through cave systems can also be altered due to interference with entrances.

7.1 Characterisation of pressures/ threats	Pressure and Threat A25; A26; J01: Organic pollution of surface waters has both a direct effect 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. Pollution to groundwater through agricultural chemicals can both affect the hydrology and hydrochemistry within caves, the latter particularly through washout of pesticides into cave systems (Robertson et al., 2009). 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 et al (2008), which demonstrated the impact of contaminated agricultural runoff from the surface catchment on cave fauna in the English Peak District, are rare. An example of long term blanket bog erosion at Waun- Fignen-Felin in the Brecon Beacons that has resulted in sediment input to the limestone caverns below ground is being addressed through agri-environment measures (J.Sherry, CCW, pers com.).
7.1 Characterisation of pressures/ threats	Pressure and Threat: FO7:Outdoor sports : 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 & 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,2000), 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 & 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 &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 (Waltham 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.
8.1 Status of measures	Pressures/threats listed in 7.1 require the measures listed below in 8.5, however they are not recorded in the relevant site PIPS- Prioritised Improvement Plans (PIPs) are prioritised, costed plans which summarise the proposed actions needed by 2020 to help improve the condition of the designated habitat and species features of the site. Actions address high and medium priority issues and risks which are preventing the features from reaching favourable condition. PIPs are live documents, populated by information drawn from the Natural Resources Wales Actions Database (which holds all identified actions).

8.5 List of main conservation measures	Conservation measures:See last report (JNCC, 2013) where similar measures have been described. However, there does not seem to be a choice of protecting sites available this reporting round. Note that various measures are being taken for other site features on both sites (see PIPs), but not specifically identified as being for H8310. The situation in Wales is reflected in the original comments: 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: CF03 (to address Pressure and Threat F07) 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. A similar small but unknown proportion of the resource lies within SSSIs with similar measures in place. However, these measures are generally aimed at species interest (notably bats in SACs and SSSIs) or geological interests (in SSSIs).
8.5 List of main conservation measures	Conservation measures: CA10, CA11 (to address Pressures and Threats A25; A26; J01: 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.
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network	The total land area of the SACs in Wales is: Usk Bat Sites- 16.9km2 Limestone Coast of South and West Wales - 15.9km2. Total best single value = 32.80km2 Note, this is a measure of the land surface and includes areas that do not have cave systems underneath and no figures have been derived for the area of passages underneath the sites. It is highly likely that the passages of the numerous cave systems involved extend beyond the site boundaries.
11.4 Short term trend of habitat area in good condition within the network; Direction	See narrative in 11.1