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:

H8240 - Limestone pavements

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	**8240 - Limestone pavements**

2. Maps

2.1 Year or period	1979-2007
2.3 Distribution map	Yes
2.3 Distribution map Method used	Complete survey or a statistically robust estimate
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	Blackstock T. H., Howe E. A., Stevens J. P., Burrows C. R. & Jones P. S. 2010. Habitats of Wales. A comprehensive field survey 1979-1997. University of Wales Press, Cardiff. BRIG. 2007. A preliminary Assessment of the implications of climate change for the implementation of UK BAP targets. Report to UK Biodiversity Partnership Standing Committee. (Draft). British Geological Survey. 2003. Digital geology data layer DiGMapGB250. BGS dataset. Conway J. & Onslow E. 1999. The impact of grazing management on limestone pavements in Wales. CCW Science report 346. Deacon J. 1997. Identification of Limestone pavements in Wales and their Flora. CCW Science report 159. Ellis G. 2007. Brecon Beacons Limestone Pavement Survey. Brecon Beacons National Park Authority. Guest D. 2012 (a). Assessing pressures and threats for article 17 reporting based on information in CCW's Actions Database. CCW HQ internal document. Guest D. 2012 (b). Assessing N deposition as a pressure for Article 17 reporting on habitats. CCW HQ internal document. JNCC. 2007. 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: H8240: Limestone pavements. JNCC. http://jncc.defra.gov.uk/pdf/Article17/FCS2007-H8240-audit-Final.pdf Jones P.J., Stevens D.P., Blackstock T.H., Burrows C.R. and Howe E.A. 2003 Priority Habitats of Wales: a technical guide. CCW. NRW. 2012. Welsh supporting documentation for the Third Report by the United Kingdom under Article 17 on the implementation of the Directive from January 2007 to December 2012. Conservation status assessment for: H8240: Limestone pavements. Rodwell J.S. (ed.). 1991-2000. British Plant Communities (five volumes). Cambridge University Press, Cambridge. Stevens D. P. Smith S. L. N. Blackstock T. H. Bosanquet S. D. S. & Stevens J. P. 2010. Grasslands of Wales. A survey of lowland species-rich grasslands, 1987-2004. University of Wales Press, Cardiff. Stevens J. & Smith S. 2012. H8240 Limestone pavements: Wales GIS inventory. CCW HQ dataset.

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

4. Range

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

5. Area covered by habitat

5.1 Year or period	1979-2008		
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value 0.7532
5.3 Type of estimate	Best estimate		
5.4 Surface area Method used	Complete survey or a statistically robust estimate		
5.5 Short-term trend Period	2001-2012		
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 expert opinion with very limited data		
5.9 Long-term trend Period	1989-2012		
5.10 Long-term trend Direction	Decreasing (-)		
5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used	Based mainly on expert opinion with very limited data		
5.13 Favourable reference area	a) Area (km²) b) Operator c) Unknown No d) Method		
5.14 Change and reason for change in surface area of range	No change The change is mainly due to:		
5.15 Additional information			

6. Structure and functions

6.1 Condition of habitat	a) Area in good condition (km²)	Minimum	Maximum

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

	b) Area in not-good condition (km²)	Minimum		Maximum
	c) Area where condition is not known (km²)	Minimum	0.7532	Maximum 0.7532
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
Intensive grazing or overgrazing by livestock (A09)	H
Mixed source air pollution, air-borne pollutants (J03)	H
Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (L02)	H
Application of natural fertilisers on agricultural land (A19)	M
Application of synthetic (mineral) fertilisers on agricultural land (A20)	M
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	M
Conversion into agricultural land (excluding drainage and burning) (A01)	M

Threat	Ranking
Intensive grazing or overgrazing by livestock (A09)	H
Mixed source air pollution, air-borne pollutants (J03)	H
Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (L02)	H
Application of natural fertilisers on agricultural land (A19)	M
Application of synthetic (mineral) fertilisers on agricultural land (A20)	M
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	M
Conversion into agricultural land (excluding drainage and burning) (A01)	M

7.2 Sources of information

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

7.3 Additional information

8. Conservation measures

8.1 Status of measures	a) Are measures needed?	Yes
	b) Indicate the status of measures	Measures identified and taken
8.2 Main purpose of the measures taken		Maintain the current range, population and/or habitat for the species
8.3 Location of the measures taken		Only outside Natura 2000
8.4 Response to the measures		Medium-term results (within the next two reporting periods, 2019-2030)
8.5 List of main conservation measures		

Adapt mowing, grazing and other equivalent agricultural activities (CA05)

Manage the use of natural fertilisers and chemicals in agricultural (plant and animal) production (CA09)

Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures (CA04)

Adapt/manage extraction of non-energy resources (CC01)

Management, control or eradication of other invasive alien species (CI03)

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	

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

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

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network (in km² in biogeographical/ marine region)	a) Minimum b) Maximum c) Best single value 0.0313
11.2 Type of estimate	Best estimate
11.3 Surface area of the habitat type inside the network Method used	Complete survey or a statistically robust estimate
11.4 Short-term trend of habitat area in good condition within the network Direction	Unknown (x)
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

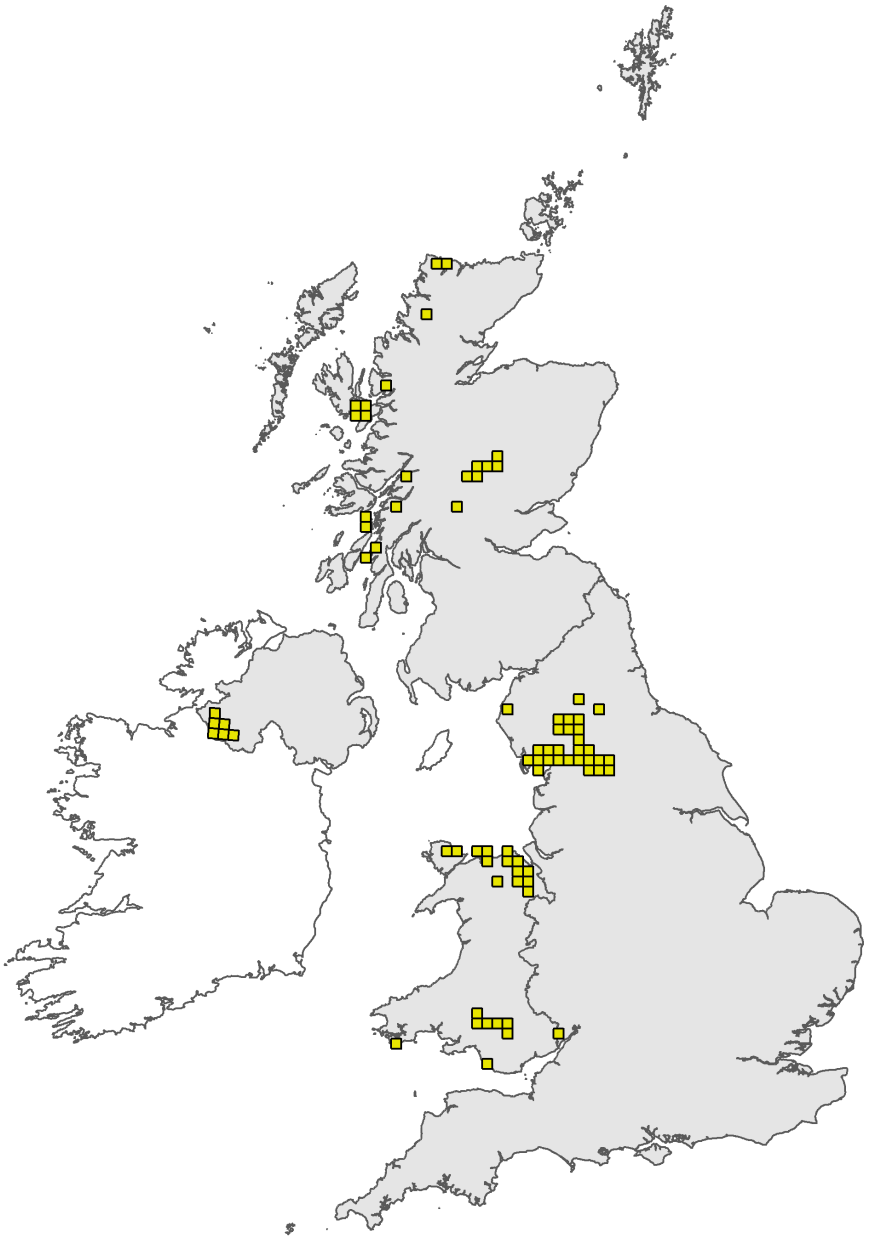

Figure 1: UK distribution map for H8240 - Limestone pavements. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

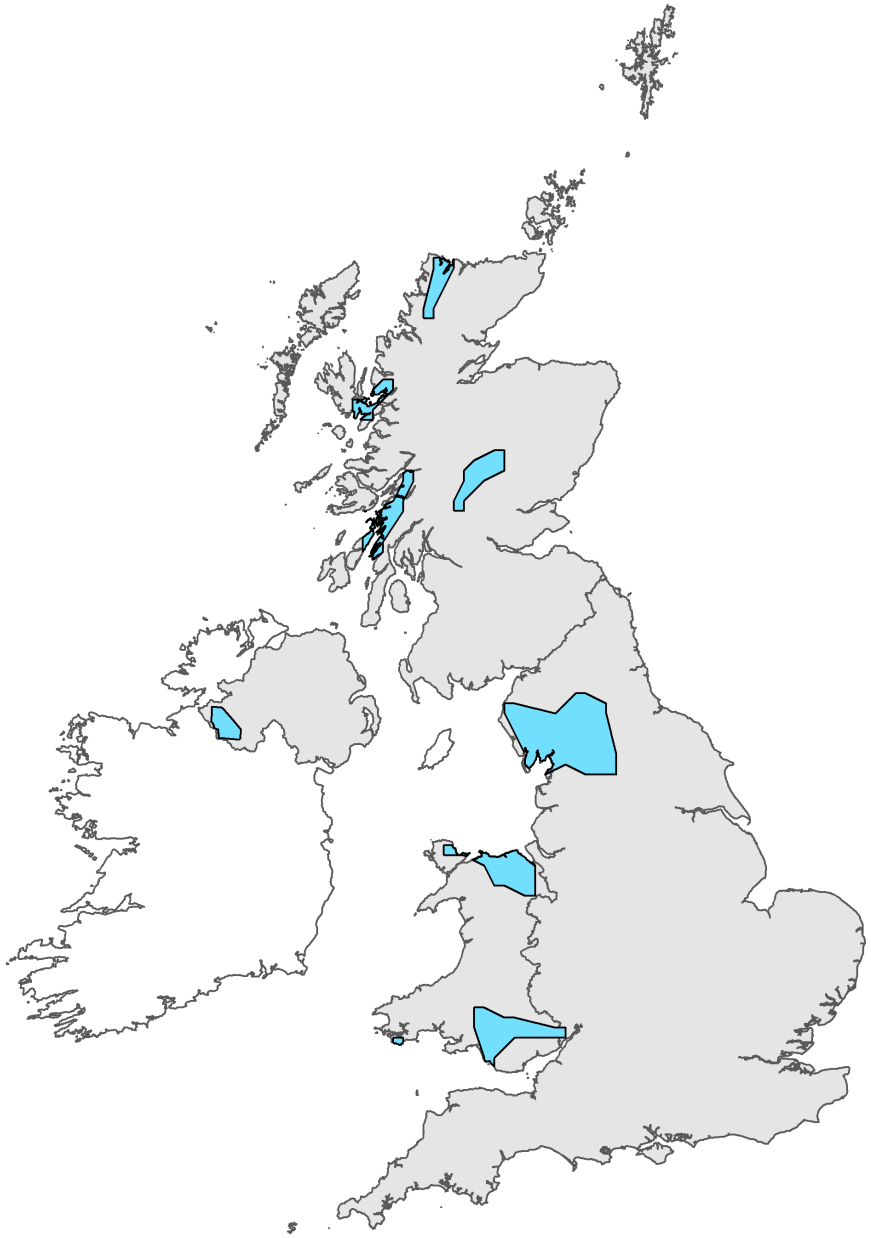

Figure 2: UK range map for H8240 - Limestone pavements. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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: 8240

Field label	Note
2.1 Year or period	Of the data sources used in the inventory for the habitat (see 2.3, only Ellis (2007) collected data from within this reporting period, but only from sites in the Brecon Beacons National Park (BBNP). Ellis visited eight sites where limestone pavement had been recorded by the Phase 1 survey (Blackstock et al., 2010) between 1988 and 1993 and re-found the habitat at each one; despite being a very small sample, this at least suggests that the pre-2007 data are likely to still represent occurrences of the habitat. The visits by Ellis confirmed the presence of the habitat in a total of six 10km squares in BBNP, and Stuart Smith has confirmed (during site visits) the presence of limestone pavement in six 10km squares in north Wales in this reporting round; these visits together confirm the presence of the habitat in 52% of the Welsh squares between 2007 and 2012.
2.3 Distribution map; Method used	The distribution (and extent) of H8240 has been calculated from a number of different data sources, ranging from detailed surveys focussed on the habitat, to broad habitat surveys and geomorphological surveys (see below). All known records have been incorporated into a GIS inventory for H8240 (Stevens & Smith, 2012). Most data is in the form of mapped areas of the habitat, which have been included in the inventory as polygons; these are supplemented by point and site locations, from surveys where the presence of the habitat was recorded but extent not mapped. Therefore only the mapped habitat polygons provide the extent data given in 2.4.1. The definition of limestone pavement is generally relatively straightforward (see 2007 audit JNCC, 2007), and most examples are clearly identifiable by eye. However, some examples, such as degraded/broken pavements with very limited clint-grike structure, are less clear, and different surveys have differed in their interpretation of the habitat to a degree. The habitat is not given separate treatment in the NVC (National Vegetation Classification; Rodwell (ed.), 1991- 2000) and examples can fall within a number of different NVC communities (see JNCC, 2007), ranging from woodlands, to grasslands and rock habitats, depending upon the character of the grike and clint flora. Pavements in wholly maritime situations (supporting no terrestrial flora) were excluded from the definition. Examples of the habitat were mapped by both the Habitat Survey of Wales (Blackstock et al., 2010), a comprehensive field-by-field survey of the region, and the Lowland Grassland Survey of Wales (Stevens et al., 2010), which focussed on lowland grasslands of conservation interest; examples mapped by these surveys generally had a well-defined clint-grike structure. A third survey, focussed specifically on the habitat within the Brecon Beacons National Park (Ellis, 2007), was more inclusive, mapping degraded/broken and largely soil-infilled areas of pavement in addition to more typical examples. These three surveys supply all of the mapped habitat areas included in the inventory. Additional surveys, noting the presence of the habitat but not mapping extent, provide point localities in the inventory (see data sources). These were checked against records in Deacon (1997), which also provides point locations, and CCW SSSI records. The distribution data sources together offer complete coverage of the region. There is, however, a likelihood of small areas of the habitat, especially examples within a dense woodland setting, having been overlooked, although it is unclear whether these would affect 10 km distribution. In addition, as explained above, some surveys may have under-recorded less well-characterised examples of the habitat.

Habitat code: 8240 Region code: ATL

Field label	Note

4.3 Short term trend; Direction	There is a lack of comprehensive trend data for the habitat in the short term. Ellis (2007) visited eight sites (in six 10km squares) where limestone pavement had been recorded by the Phase 1 survey (Blackstock et al., 2010) between 1988 and 1993 and re-found the habitat at each one. Similarly, Stuart Smith has confirmed the continued presence of the habitat in six 10 km squares in north Wales (see 2.3). In addition, there are no known examples of loss from a 10km square in the 2001-12 period. Overall it seems probable that the range is currently stable.
4.7 Long term trend; Direction	Deacon noted loss at two sites to quarry expansion in the mid 1990's (Deacon, 1997) and one further probable loss of the habitat is noted in CCW files. These losses suggest a long-term negative trend locally, but none has affected 10 km square distribution which is thus tentatively considered stable, based partly on the evidence mentioned in 2.3
4.11 Change and reason for change in surface area of range	No new data since the last (2007-2012) reporting period.
5.1 Year or period	No new data is available for the current reporting round and an assumption has been made that pre-2008 data is still representative of the habitat. There have been no reports of limestone pavement loss.
5.3 Type of estimate	The current total area is considered to be a fairly good reflection of the habitat's presence in the region. The habitat extent is derived from comprehensive survey coverage, although, as discussed in section 2.3, there may be additional unmapped areas of the habitat and a certain amount of under-mapping of poorly characterised examples of the habitat; also, a number of known localities are currently represented in the distribution (Stevens & Smith, 2012) only by point data. The current extent is therefore almost certainly an underestimate of the actual total, although the unmapped areas are likely to be individually small.
5.4 Surface area; Method used	See 2.3. Although data coverage is comprehensive, some records in the inventory (Stevens & Smith, 2012) are only presented as points or sites with no area of habitat. In addition, some examples of the habitat, especially those within a dense woodland setting, may have been overlooked or under-mapped. However, it is thought that the great majority of the habitat has been mapped and included in the extent figure (see 5.2).
5.5 Short term trend; Period	Visits to sites in the 2001-12 period (see 2.1) have confirmed continued presence of the habitat, but not mapped any changes in area. However, no actual losses in area of the habitat have been recorded in the period, which is therefore tentatively considered as stable.
5.6 Short term trend; Direction	See text under 5.5
5.8 Short term trend; Method used	See text under 5.5
5.10 Long term trend; Direction	There are no comprehensive data on change in the 1989-2012 period, but Deacon noted loss at two sites to quarry expansion in the mid 1990's (Deacon, 1997) and one further probable loss of the habitat is noted in NRW files. These losses suggest a small long-term negative trend.
6.2 Condition of habitat; Method used	H8240 is listed as a qualifying feature on four SSSI in Wales, but is not a feature on any SAC; there are no monitoring reports for the habitat in Wales.

7.1 Characterisation of pressures/ threats	Pressures: A09 - grazing (HIGH). Grazing is recorded as an issue for 61% of SSSI management units with the habitat. Overgrazing by sheep is prevalent in the Brecon Beacons (Ellis, 2007). J03 - air pollution, air-borne pollutants (HIGH). On a GIS system, the area of the habitat was overlaid onto Nitrogen exceedance data at 5 km resolution (2009 data): exceedance of the provisional Critical Load of 15kg N/ha/yr (see text below re method used) was then calculated as being across 96% of the habitat. L02 - scrub and tree invasion (HIGH). Recorded as an issue for 61% of SSSI management units with the habitat. A19 and A20 - fertilisation (MEDIUM). Enrichment remains a threat to the habitat (Ellis, 2007) and fertilisation could result in a permanent loss of characteristic species. Mainly non-SSSI. C01 - extraction of minerals (MEDIUM). Two examples of loss to quarry expansion in the mid 1990's (Deacon, 1997) and one probable loss around 2000 (CCW files). Apparently now much less of an issue (e.g. Ellis, 2007), but causes complete loss of the habitat. A01 - conversion into agricultural land (LOW). Agricultural intensification appears not to be a major pressure at present and will receive some protection from EIA (Agri) Regulations, but small unprotected lowland examples remain vulnerable. A14 - stock feeding (LOW). Farmers may view the habitat as providing good hard-standing for stock during winter. F07 - recreation damage (LOW). Highlighted for 16% of units, although effect localised and may not be on the H8240 habitat. J04 - waste dumping (LOW). Highlighted for 6% of units. I02 - invasive non- native species (LOW). Includes Cotoneaster spp and conifers. Mentioned as an issue for 13% of SSSI management units with the habitat, but mainly on associated areas of calcareous grassland. I04 - problematic native species (LOW). Bracken encroachment an issue on about 20% of SSSI management units, but mainly on deeper soils associated with the habitat. Also mentioned as an occasional issue by Ellis (2007). N05 - change in habitat quality due to climate change. Uncertain effects on species composition and ecological processes. Method used - pressures: Based exclusively or to a larger extent on real data from sites/occurrences or other data sources Data held in CCW's Special Sites 'Actions Database', which provides information on 'issues' affecting habitats and species within the protected sites series in Wales, were used to provide a basis for quantifying pressures/threats relating to the habitat within protected sites. Data are provided at a 'feature' level; examples of H8240 habitat fall within the 'natural inland rock exposures, screes & upland ledges' feature type, which also includes other rock formations such as scree. A list of all of the SSSI management units with 'natural inland rock exposures, screes & upland ledges' listed as a 'key habitat' or 'compatible feature' was obtained, and then abridged to include only those units where limestone pavement is known to occur (using Stevens and Smith, 2012). A list of all the issues affecting these units was then compiled and counts made of how frequently each issue was highlighted. Issues were considered for their relevance to the habitat, with reference to summary information held in the Database (see Guest (2012a) for more details). The 'special sites' (SSSI/SAC) account for 53% of the H8240 resource in Wales by area (where regarded as a 'feature'). To supplement information from the Actions Database, a range of other sources were checked, including Ellis (2007), Jones et al., (2003) and Conway and Onslow (1999). Air pollution (N deposition) is assessed separately using a defined approach (Guest, 2012 (b)). No critical load level has been assigned to this habitat and so a provisional load of 15kg N/ha/yr was adopted. Related habitats include H6210, which has a given load of 15kg N/ha/yr, H6230, which has a given load of 10kg N/ha/yr, and woodland habitats, which have loads ranging from 5 to 15kg N/ha/yr. The N depositions results for H8240 should therefore be considered a conservative estimate of pressure/threat. Threats: All the pressures listed above were considered to be also relevant as threats and were assessed at the same level. J03 - air pollution, air-borne pollutants (HIGH). 96% of the habitat falls in areas where the predicted deposition of N in 2020 exceeds 15kg N/ha/yr. While the overall depostion rate is expected to drop further over the next two reporting cycles, falls are likely to be small and are unlikely to result in a significant increase the area of habitat falling below the nominal Critical Load by 2030. Method used - threats: Expert opinion Threats were assessed as for pressures,

	and each issue judged as to whether it appears likely to still be relevant in the near future and at what level. Air pollution (N deposition) was assessed as detailed under pressures text above but using projected (2020) exceedance data.
8.5 List of main conservation measures	4% of the habitat is on SAC, but none is a SAC feature. 53% of the habitat resource by area is contained within SSSI. Notes specific to conservation measures: Overgrazing, with associated enrichment, and spread of scrub/trees (including non-native Cotoneaster and conifer species) appear to be the main issues needing addressing. Most sites are maintained by grazing management, which helps to limit successional change. Scrub/tree control has been undertaken on some sites. Tree clearance is undertaken on some woodland sites to maintain an open canopy. SSSI legislation, listing as Regionally Important Geological and Geomorphological Sites (RIGS), and implementation of EIA (Agri) Regulations largely protect the habitat from complete destruction by rock removal. See Guest, 2012a.
11.3 Surface area of the habitat type inside the network; Method used	The area figure given in 11.1 was produced by overlaying the H8240 GIS inventory (Stevens & Smith, 2012) with SAC boundaries.