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

NORTHERN IRELAND

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 (Northern Ireland information only)**
1.2 Habitat code	**8240 - Limestone pavements**

2. Maps

2.1 Year or period	2013-2018
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	DEACON, J. 1997. Identification of limestone pavements in Wales and their flora. CCW Contract Science Report No. 159 CCW Bangor FOGG, T and KELLY, J. 1995. The Karst Geomorphology of Northern Ireland. A report to Environment Service, Department of the Environment for Northern Ireland. 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. Limestone Pavement Action Group. 2000. Managing our fragile heritage: Limestone Pavement. Limestone Pavement Action Group. Cumbria. Limestone Pavement Action Group. 2003. Our Fragile Heritage. Limestone Pavement Group. Cumbria Murphy, S. & Fernandez, F. (2009) The development of methodologies to assess the conservation status of limestone pavement and associated habitats in Ireland. Irish Wildlife Manuals, No. 43. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. NIEA. Internal Condition Assessment Reports (various sites and years). NIEA. Internal Survey Reports (various sites and years). Pendry, S. and Allen, C. (Eds.) 1999. On stony ground: an investigation into trade in water-worn limestone between the United Kingdom and Republic of Ireland. Countryside Agengy, The Heritage Council and TRAFFIC International. Rodwell, J.S. (ed), 1998. British Plant Communities Vol. 3 - Grassland and Montane Communities. University Press, Cambridge. WARD, S.D. & EVANS, D.F. 1976. Conservation assessment of British limestone pavements based on floristic criteria. Biological Conservation, 9, 217-233. WEBB, S. 1995. Conservation of limestone pavement. Cave and Karst Science. 21: 97-100. WEBB, S. & GLADING, P. 1998. The ecology and conservation of limestone pavement in Britain British Wildlife. 103-113. Webb, S and Ward, S. 1999. Limestone Pavement in the United Kingdom, Statistics prepared 1999 by Simon Webb and Stephen Ward for the biodiversity Action Plan Working Group

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	2013-2018		
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value 2.2
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	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	Complete survey or a statistically robust estimate		
5.9 Long-term trend Period	1994-2018		
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) 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 1.4	Maximum 1.4

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	b) Area in not-good condition (km²)	Minimum 0	Maximum 0
	c) Area where condition is not known (km²)	Minimum 0.8	Maximum 0.8
6.2 Condition of habitat Method used	Complete survey or a statistically robust estimate		
6.3 Short-term trend of habitat area in good condition Period	2007-2018		
6.4 Short-term trend of habitat area in good condition Direction	Stable (0)		
6.5 Short-term trend of habitat area in good condition Method used	Complete survey or a statistically robust estimate		
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
Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	M
Intensive grazing or overgrazing by livestock (A09)	M
Application of natural fertilisers on agricultural land (A19)	M
Application of synthetic (mineral) fertilisers on agricultural land (A20)	M
Abandonment of traditional forest management (B04)	M
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	M
Other invasive alien species (other then species of Union concern) (I02)	M
Mixed source air pollution, air-borne pollutants (J03)	H
Temperature changes (e.g. rise of temperature & extremes) due to climate change (N01)	M
Increases or changes in precipitation due to climate change (N03)	M

Threat	Ranking
Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	M
Intensive grazing or overgrazing by livestock (A09)	M
Application of natural fertilisers on agricultural land (A19)	M
Application of synthetic (mineral) fertilisers on agricultural land (A20)	M
Abandonment of traditional forest management (B04)	M
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	M

Other invasive alien species (other then species of Union concern) (I02)	M
Mixed source air pollution, air-borne pollutants (J03)	H
Temperature changes (e.g. rise of temperature & extremes) due to climate change (N01)	H
Increases or changes in precipitation due to climate change (N03)	H

7.2 Sources of information

7.3 Additional information

8. Conservation measures

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

8.5 List of main conservation measures

Maintain existing extensive agricultural practices and agricultural landscape features (CA03)
Adapt mowing, grazing and other equivalent agricultural activities (CA05)
Manage the use of natural fertilisers and chemicals in agricultural (plant and animal) production (CA09)
Maintain existing traditional forest management and exploitation practices (CB02)
Adapt/manage extraction of non-energy resources (CC01)
Management, control or eradication of other invasive alien species (CI03)
Reduce impact of mixed source pollution (CJ01)
Implement climate change adaptation measures (CN02)

8.6 Additional information

9. Future prospects

9.1 Future prospects of parameters	a) Range b) Area c) Structure and functions
9.2 Additional information	

10. Conclusions

10.1. Range

10.2. Area

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

10.4. Future prospects

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

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 0.9
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	Stable (0)
11.5 Short-term trend of habitat area in good condition within network Method used	Complete survey or a statistically robust estimate
11.6 Additional information	

12. Complementary information

12.1 Justification of % thresholds for trends	
12.2 Other relevant information	

Distribution Map

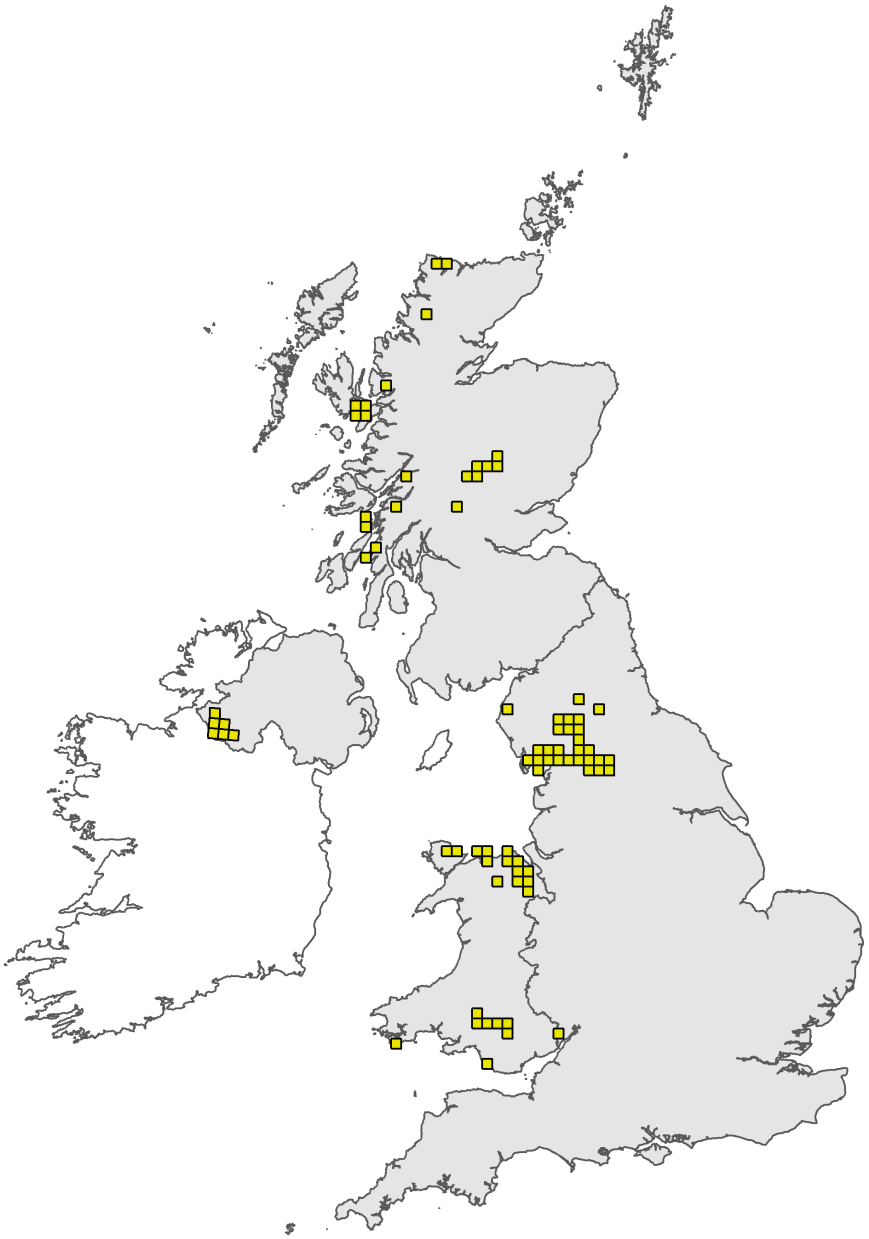

Figure 1: UK distribution map for H8240 - Limestone pavements. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

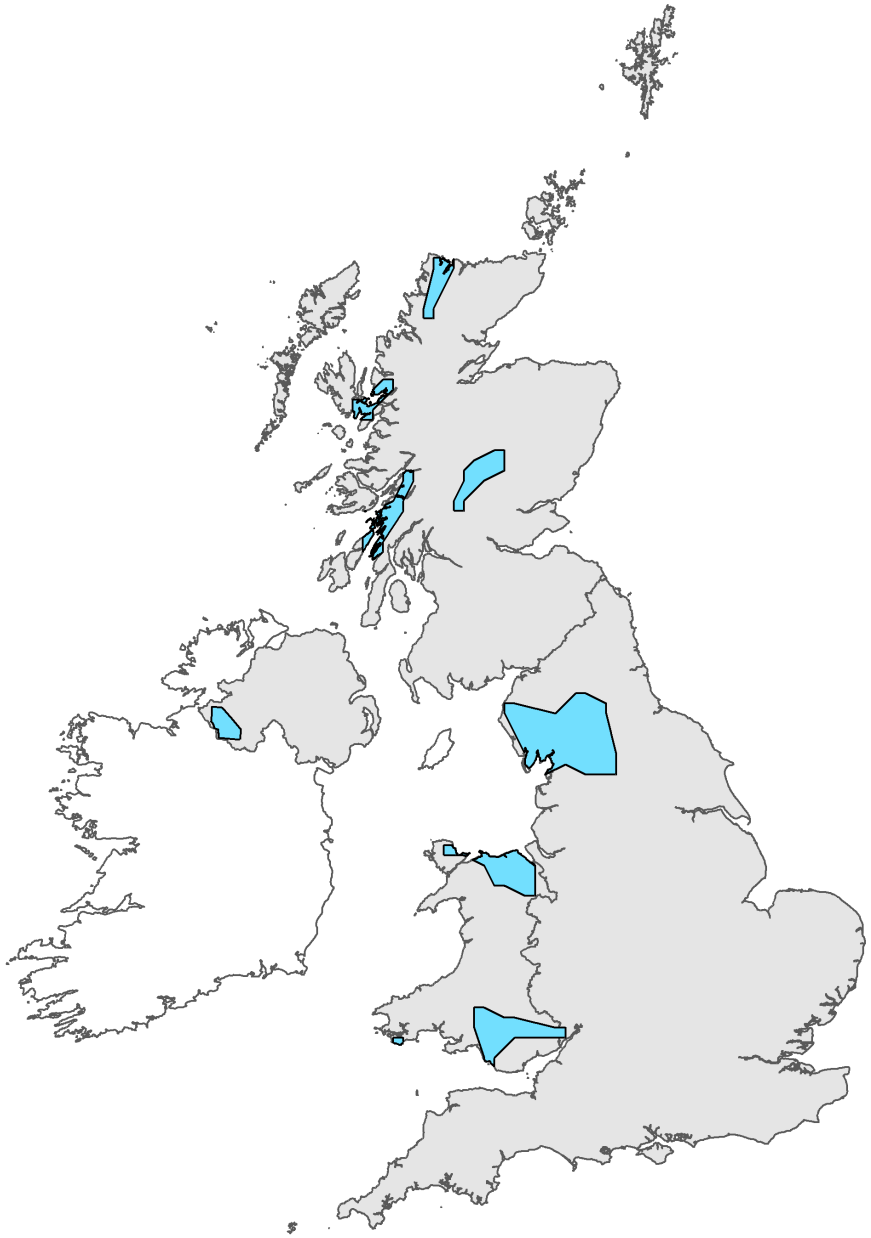

Figure 2: UK range map for H8240 - Limestone pavements. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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
2.2 Distribution map	Within the EC, limestone pavements occur in the UK, Ireland and Sweden. In the UK limestone pavement is uncommon, covering only 2,000 ha. The vegetation of limestone pavements is unusual because of the combinations of floristic elements, including woodland species, such as hart's-tongue fern Phyllitis scolopendrium and dog's mercury Mercurialis perennis, and plants of rocky habitats, such as wall-rue Asplenium ruta-muraria and maidenhair spleenwort A. trichomanes. Limestone pavement is restricted in NI to the Carboniferous Limestones of County Fermanagh, in particular the Marlbank area and the West Fermanagh Scarplands. The NI resource is generally of poorer quality - in terms of specialised species - than much of the pavement in the rest of the UK. It is also less extensive and less well-developed floristically than examples from the Republic. However, NI has a comparatively large proportion of the resource in UK terms and is also important in extending the UK range for the habitat. Limestone pavement is a selection feature on West Fermanagh Scarplands SAC and Marlbank ASSI. Although there are other outcrops of limestone bedrock in other parts of Fermanagh and within a small area in Co Armagh, pavement development here is either absent or poor.
2.3 Distribution map; Method used	Map based upon fieldwork by NIEA staff at SACs, ASSIs and other locations. During the reporting period, NIEA staff have generally visited SACs and ASSIs; the habitat is absent or very rare outside of these areas.

Habitat code: 8240 Region code: ATL

Field label	Note
10.6 Overal trend in Conservation Status	Deteriorating assessment based upon the potential impacts of aerial Nitrogen deposition, despite the current Favourable condition of the habitat.
4.1 Surface area	Survey work has covered the main areas of Limestone pavement in NI. The habitat is rare and restricted to a very narrow environmental range in NI - i.e. bare and weather-worn Carboniferous Limestone . There is no reason to believe that there has been a loss in range; certainly no loss in range has been recorded in the habitat on SACs or ASSIs since the condition assessment programme was introduced in 2002.
4.5 Short term trend; Method used	Based upon regular condition monitoring of the habitat in West Fermanagh Scarplands SAC and Marlbank ASSI. It is believed that these include virtually all of the habitat in NI.

5.2 Surface area	The figure for NI of 220 ha of Limestone Pavement is an estimate based upon survey work by NIEA staff. According to Webb and Ward (1999) the total extent of limestone pavement in the UK is 2916 ha of which 220 ha occur in Northern Ireland (Northern Ireland Earth Science Conservation Review (Fogg and Kelly, 1995)). As the 2007 Report states: The Northern Ireland data is an estimate of the Northern Ireland Earth Science Review, Environment and Heritage Service (EHS). This is derived from field mapping but pavement was not mapped as a feature. The largest units of pavement have been visited by Webb 2006 and the 220 ha is considered to be a significant over-estimate. Recent air photo imagery should allow more accurate measurement of the distribution in Northern Ireland. The difficulty in mapping pavement is referred to in the NI HAP - i.e. Most of the pavement ..... is quite fragmented and occurs as part of a natural habitat mosaic comprising bare pavement, pockets of mineral soils and peat which has subsequently covered some of the limestone. It also generally lacks the deeply developed grikes found on pavements over much of the rest of the UK, possibly due to the intensity of glacial action during the last phase of the ice age. As a consequence, identifying and delimiting areas of limestone pavement can present difficulties. Recent mapping has illustrated these difficulties, with figures of between 140 ha and 356 ha estimated; this variation is the result of variability in the openness of the vegetation and the scale of development of clints and grykes. Until more detailed mapping is undertaken, it is suggested that 220 ha remains the extent figure for NI.
5.4 Surface area; Method used	See 5.2.
5.6 Short term trend; Direction	Assessment of stable based upon recent condition assessment work undertaken by NIEA staff at Limestone Pavement sites in West Fermanagh Scarplands SAC and Marlbank ASSI. No change in extent noted.
5.8 Short term trend; Method used	Assessment of stable based upon recent condition assessment work undertaken by NIEA staff at Limestone Pavement sites in West Fermanagh Scarplands SAC and Marlbank ASSI. No change in extent noted.
5.10 Long term trend; Direction	Long term trend believed to be stable.
5.12 Long term trend; Method used	Long term trend believed to be stable - based upon fieldwork at the main sites for the habitat, West Fermanagh Scarplands SAC and Marlbank ASSI. These sites are the only known sites for the habitat and no loss has been noted during site visits over the past, although relevant historical aerial photos have not been consulted. Hence Based mainly on extrapolation from a limited amount of data.
6.1 Condition of habitat	The habitat was recorded as favourable for West Fermanagh Scarplands SAC in 2014, and was judged to be favourable at Marlbank ASSI (survey work undertaken 2009-2011).
6.2 Condition of habitat; Method used	Condition has been assessed from data taken from the most recent Common Standards Monitoring of Limestone Pavement at West Fermanagh Scarplands SAC and Marlbank ASSI. These two sites are believed to represent virtually all of the estimated resource resource in NI. However, in combination, the area covered by CSM is only 140 ha compared to a total estimate of 220 ha for NI - an anomaly of 80ha. This is believed to be the result of difficulties in separating Limestone Pavement from Limestone grassland, as described in 5.2 above. Until the habitat has been more accurately mapped, we are recording this 80 ha as condition Unknown.
6.4 Short term trend of habitat area in good condition; Direction	Stable assessment based upon Condition Assessment of the habitat at West Fermanagh Scarplands and Marlbank.

7.1 Characterisation of pressures/ threats	The habitat in NI is generally in Favourable condition, but there are potential pressures and threats that could lead to the habitat becoming unfavourable. In some places, Limestone pavement has been affected by over-grazing, often with sheep. This has led to a reduction in the vegetation structure with a loss of clint-top and emergent vegetation (plants growing up and out of the grikes or cracks). The characteristic vegetation is therefore confined to deep within grikes or as trees growing above the browse line. Pavements become species poor, losing broadleaved herbs that are so characteristic of the habitat. Intensive agricultural management can lead to further problems with agricultural weeds, nutrient enrichment due to use of fertilisers and in some cases loss of areas to stock feeding. Use of fern-specific herbicide to control bracken is a threat to the species interests of upland pavements. In some places, pavements are threatened by under-grazing or abandonment of grazing. This can lead to scrub encroachment and canopy closure on species-rich pavements. In such cases grazing needs to be re-established, and grazing by cattle seems to be the key to optimal management of the habitat. Limestone Pavement is very sensitive aerial Nitrogen deposition, with an estimated critical threshold of 5-10 kg N/ha/yr. Both West Fermanagh Scarplands SAC, with an average predicted value of 9.2 kg/N/ha/yr, and Marlbank ASSI with a maximum predicted value of 13.3.kg/N/ha/yr exceed the critical loads thresholds. Aerial Nitrogen deposition therefore represents one of the most significant threats to the Structure and Function of Limestone Pavement. Pavements that have a woodland canopy are an important part of the ecological expression of the habitat. Woodlands with a uniform canopy or poor structure can lose diversity and reflect poor structure and function. Continued management practice (such as coppice management or or light grazing) is often required to maintain the interest of these sites, coupled with control or management of livestock grazing, feral goat browsing and deer populations. Removal of surface stone has affected the habitat in some areas, but there have no been no recent incidents of limestone pavement removal in NI. In some areas, non-native species are an increasing problem for limestone pavement management. Cotoneaster spp. are the most widespread but Buddleja sp. may also be a local problem. No invasive non-natives have been noted for NI sites yet.
7.2 Sources of information	Threats and pressures assessed from the most recent Common Standards Monitoring of Limestone Pavement at protected sites (SACs and ASSIs), in addition to expert judgement. Threats based upon current pressures and expert judgement on future trends.
8.1 Status of measures	Although recent monitoring of Limestone Pavement at SACs and ASSIs has shown that the habitat is currently in Favourable condition, measures are still required to ensure that this is maintained. A Conservation Management Plan is currently in preparation for West Fermanagh Scarplands SAC using RDP funding; it is anticipated that management measures for the habitat will be put in place under the Environmental Farming Scheme (EFS) as a result of this plan, and that further management under EFS will be put in place for Marlbank ASSI.
8.2 Main purpose of the measures taken	Measures aimed at reducing potential damaging impacts from current pressures and future threats. The habitat is very rare in NI and restricted to a very narrow environmental range (i.e. exposed Carbiniferous Limestone). There is therefore little opportunity to extend the range or extent of the habitat. The habitat is currently in Favourable condition. Hence, this is reported as Maintain the current range, surface area or structure and functions of the habitat type.
8.3 Location of the measures taken	Management measures required to ensure that Favourable condition is maintained at both sites - West Fermanagh Scarplands SAC and Marlbank ASSI - hence both inside and outside N2K network.

9.1 Future prospects of parameters	Stable for Range and Extent but judged to be Negative - slight/moderate deterioration for Structure and Function; despite current Favourable condition, this is set against a backdrop of high levels of aerial Nitrogen deposition NI, with critical thresholds exceeded.
10.1 Range	In NI, Limestone pavement is a scarce habitat limited to exposed, weather-worn Carboniferous Limestone. NIEA staff have visited most - if not all - of the resource over the last few years and there is no evidence that the range of the habitat has declined; therefore the current range is judged to be equal to the Favourable Reference Range - therefore Favourable assessment.
10.2 Area	In NI, Limestone pavement is a scarce habitat limited to exposed Carboniferous Limestone. Over the short and medium terms, there has been no evidence of loss in extent, and no records of recent quarrying or digging up of pavement. Hence extent reported as Favourable.
10.3 Specific structure and functions	The habitat has been recorded as being in Favourable condition - hence a Favourable assessment for structure and function.
10.4 Future prospects	The structure and function of Limestone pavement is currently Favourable, and management measures are in place, or will be in place, to ensure that this is maintained. However, Future prospects are uncertain in the light of potential impacts of climate change, and the added impact of atmospheric Nitrogen deposition on this sensitive habitat make this attribute Unfavourable Inadequate.
10.5 Overall assessment of Conservation Status	Range is Favourable; extent is Favourable; Structure and function is Favourable. Future prospects are Unfavourable inadequate, with climate change impacts currently unpredictable and atmospheric Nitrogen deposition a major potentialthreat. Hence an overall Unfavourable inadequate assessment.
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network	Limestone pavement is a feature on 1 SAC: West Fermanagh Scarplands, which covers an estimated 90 ha of the habitat.
11.3 Surface area of the habitat type inside the network; Method used	Extent of Limestone pavement at West Fermanagh Scarplands SACs has been estimated by field survey. CSM of SACs is undertaken on a regular basis and no recent loss in extent has been recorded. Note difficulties of separating Limestone pavement from limestone grassland described above (5.2).
11.4 Short term trend of habitat area in good condition within the network; Direction	Assessment of stable based upon recent condition assessment data (i.e. SAC is Favourable) and potential implementation of further management measures.
11.5 Short term trend of habitat area in good condition within the network; Method used	Assessment of stable based upon recent condition assessment data, in addition to the potential introduction of management measures that should ensure that the condition of the Limestone Pavement habitat is maintained as Favourable.