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:

H7220 - Petrifying springs with tufa formation (*Cratoneurion*)

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	**7220 - Petrifying springs with tufa formation (Cratoneurion)**

2. Maps

2.1 Year or period	1990-2012
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	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. 229 pp. Cheffings C. M. & Farrell L. (2005). The vascular plant red data list for Great Britain. JNCC. European Commission. (2013). Interpretation Manual of European Union Habitats EUR28. European Commission DG Environment Nature ENV B.3. Farr, G., Graham, J. & Stratford, C. (2014). Survey characterisation and condition assessment of Palustriella dominated springs H7220 Petrifying springs with tufa formation (Cratoneurion). Centre for Ecology and Hydrology and the British Geological Survey (NERC) for Natural Resources Wales, Evidence Report No.136. Godfrey, A. 2009. Invertebrate survey of calcareous seepages in South Wales. Report to the Countryside Council for Wales. Graham, J. & Farr, G. (2014) Petrifying springs in Wales. Field Bryology (112). 19-29. Guest, D. 2012 (b). Assessing N deposition as a pressure for Article 17 reporting on habitats. CCW HQ internal document. Howe, M.A. (in prep.). A Dossier of Qualifying Terrestrial and Freshwater Invertebrate Species and Assemblages on Welsh SSSI. Natural Resources Wales, Bangor. JNCC (2018). Nitrogen exceedance of Annex I habitats in SACs. Excel spreadsheet provided 29 May 2018. Jones, P.S. (2018b). H7110_S6 Structure and functions, Excel s/s. Natural Resources Wales. Jones, P.S., Bosanquet, S.D.S., Reed, D.K., Birch, K.S., Stevens, J. & Turner, A.J. (2011). The habitat composition and conservation of Welsh lowland mires: preliminary results from the Lowland Peatland Survey of Wales. In: Proceedings of a Memorial Conference for Dr David Paul Stevens 1958-2007: Grassland Ecologist and Conservationist. Eds: Blackstock, T.H., Howe, E.A., Rothwell, J.P., Duigan, C.A & Jones, P.S. pp. 103-115. CCW Staff Science Report 10/03/05, Countryside Council for Wales, Bangor. Jones, P.S., Stevens, J., Bosanquet, S.D.S., Turner, A.J., Birch, K.S. & Reed, D.K. (2012). Distribution, extent and status of Annex I wetland habitats in Wales: supporting material for the 2013 Article 17 assessment. Countryside Council for

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Wales, Bangor.
Kay, L. (2018). N deposition extent of exceedance of CL for article 17 all habitats 2018, Excel s/s/. Natural Resources Wales, Bangor.
Milner, R. (2018). H7220_area_results_R-Millner_final. Excel s/s. Natural Resources Wales, Bangor.
Natural England and RSPB, 2014. Climate Change Adaptation Manual.
NRW (2018a). SAC and SPA Monitoring Programme Results 2013-2018. Internal NRW Dataset (Excel spreadsheet).
NRW (2018b). SAC & SPA Monitoring Programme planning spreadsheet 2013 - 2018. Internal NRW Dataset (Excel spreadsheet).
NRW (2018c). Actions Database. Internal NRW Database.
Stevens, D.P., Smith, S.L.N., Blackstock, T.H., Bosanquet, S.D.S. & Stevens, J.P. (2010). Grassland of Wales: A survey of lowland species-rich grasslands, 1987 - 2004. University of Wales Press, Cardiff.
Stevens, J. (2012a). GIS layer - data processing notes - A17 reporting 2012 H7220. Internal file note, Countryside Council for Wales.
Stevens, J., Jones, P.S. & Bosanquet, S.D.S. (2012b). Art17 2012 H7220 Petrifying springs with tufa.lyr. ARC GIS Data layer.

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	1990-2012			
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value	0.0566
5.3 Type of estimate	Best estimate			
5.4 Surface area Method used	Based mainly on extrapolation from a limited amount of data			
5.5 Short-term trend Period	2007-2018			
5.6 Short-term trend Direction	Unknown (x)			
5.7 Short-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval	
5.8 Short-term trend Method used	Insufficient or no data available			

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5.9 Long-term trend Period	1994-2018		
5.10 Long-term trend Direction	Unknown (x)		
5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used	Insufficient or no data available		
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	0	Maximum	0
	b) Area in not-good condition (km²)	Minimum	0	Maximum	0
	c) Area where condition is not known (km²)	Minimum	0.0566	Maximum	0.0566
6.2 Condition of habitat Method used	Based mainly on expert opinion with very limited data				
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
Extensive grazing or undergrazing by livestock (A10)	H
Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (L02)	H
Agricultural activities generating diffuse pollution to surface or ground waters (A26)	H
Drainage (K02)	M

Threat	Ranking
Intensive grazing or overgrazing by livestock (A09)	H

Mixed source air pollution, air-borne pollutants (J03)	H
Extensive grazing or undergrazing by livestock (A10)	H
Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (L02)	H
Agricultural activities generating diffuse pollution to surface or ground waters (A26)	H
Drainage (K02)	M
Abstraction from groundwater, surface water or mixed water (K01)	M
Droughts and decreases in precipitation due to climate change (N02)	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

Adapt mowing, grazing and other equivalent agricultural activities (CA05)
Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures (CA04)
Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes (CL01)
Reduce diffuse pollution to surface or ground waters from agricultural activities (CA11)
Manage drainage and irrigation operations and infrastructures in agriculture (CA15)
Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land (CA01)
Reduce impact of mixed source pollution (CJ01)
Manage/reduce/eliminate air pollution from resource exploitation and energy production (CC10)
Reduce/eliminate air pollution from agricultural activities (CA12)

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

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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 0.037
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	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

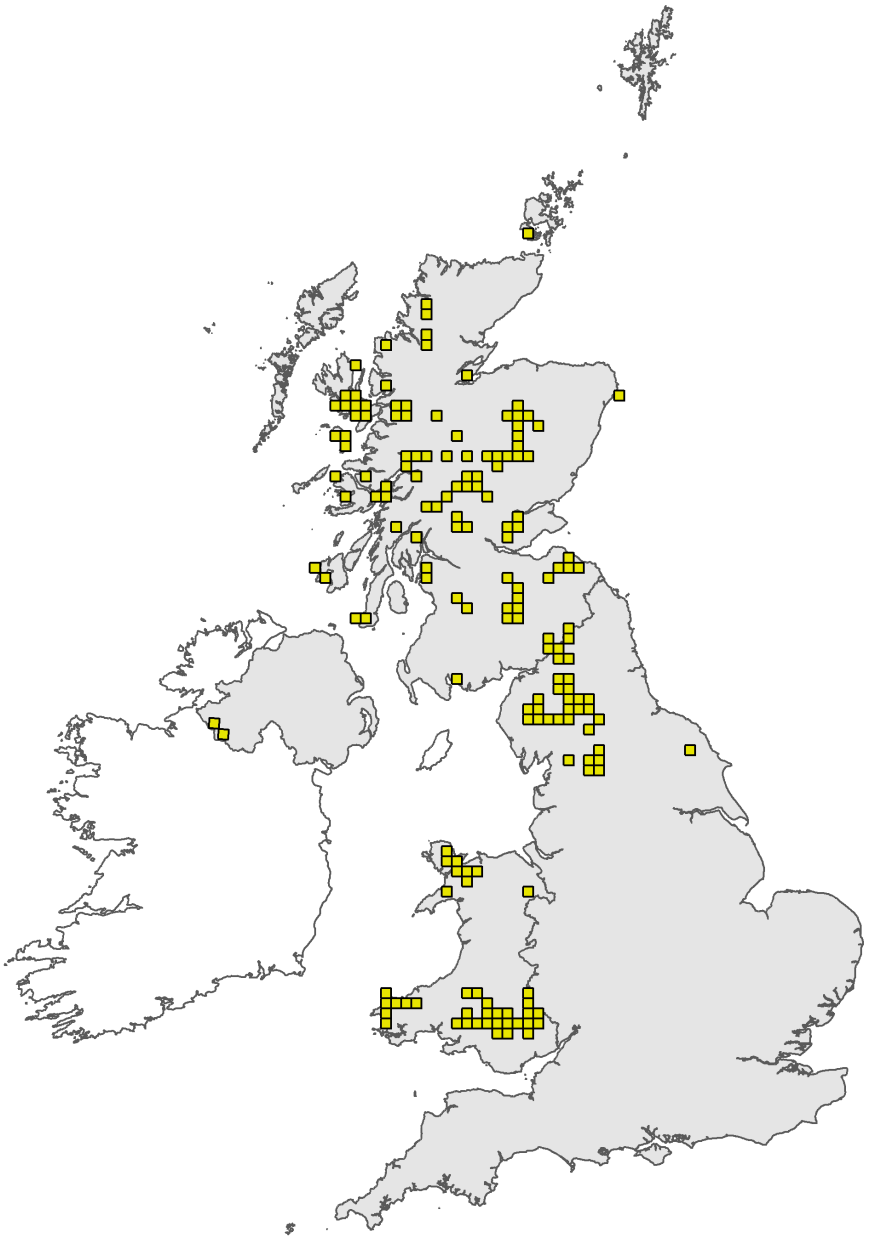

Figure 1: UK distribution map for H7220 - Petrifying springs with tufa formation (*Cratoneurion*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

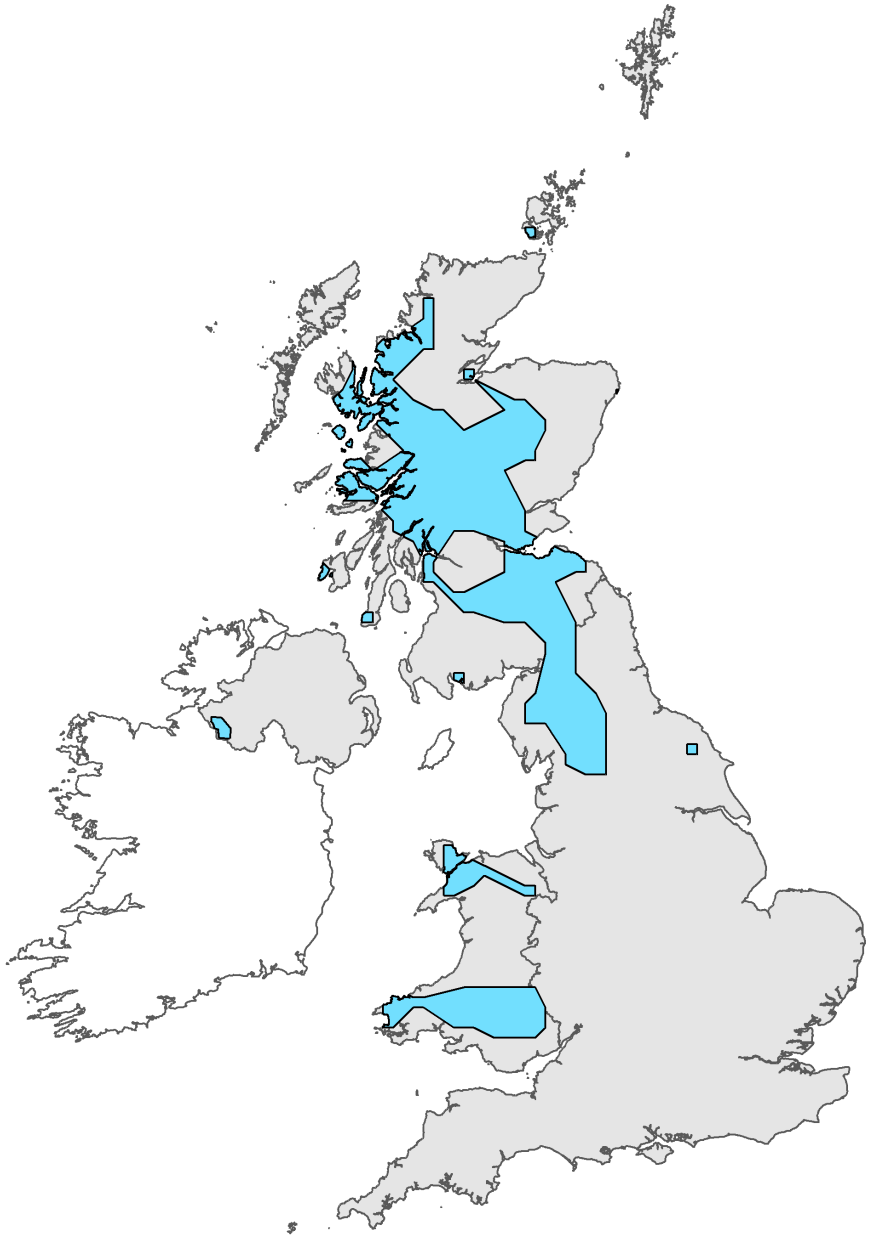

Figure 2: UK range map for H7220 - Petrifying springs with tufa formation (*Cratoneurion*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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: 7220

Field label	Note
2.3 Distribution map; Method used	The distribution map for this habitat is based entirely on the analysis undertaken for the 2012 reporting round (Stevens 2012a; Stevens et al., 2012b). This is based on a GIS analysis of Phase 2 (NVC) level data collected between 1996 and 2012; Phase 1 (Habitat Survey of Wales) data were not used. The NVC data result from records for M37 and M38 (including mosaics) from the following surveys: 1. NVC surveys of upland sites undertaken for the Brecon Beacons (2004, 14 records), Carneddau extensions (2001, 2 records), Eastern Carneddau (2002, 8 records), Glydeiriau (1996-1998, 11 records), Mynydd Eglwyseg (2002, 6 records), Mynydd Llangatwg_Mynydd Llangynidr (2003, 14 records), Mynydd Preseli SSSI (2004-2005, 10 records), and the Western Carneddau (2002, 4 records). Stevens (2012a) provides further details of these surveys, with external contractors undertaking all of these with the exception of Mynydd Preseli and Gylderiau which were undertaken by CCWs internal Lowland Peatland Survey of Wales team and Alex Turner respectively. Taken together, these sources provide 69 records all of which date from no earlier than 1996. 2. Lowland NVC survey records from the Lowland grassland survey 1987-2004 (Stevens et al., 2010), with one record dating from 1990 and the remaining 3 from 2003. 3. Lowland NVC records from the Lowland Peatland Survey of Wales (2004-ongoing; Jones et al., 2011), with 11 records dating from 2004 or later. 4. 55 records for this habitat made by NRW non-vascular plants specialist (Sam Bosanquet), all post-dating 2004. Taken together, these records provide confirmation of the presence of M37 and M38 across 38 10 km squares. No records date from earlier than 1990. No additional post 2012 records have been used.

Habitat code: 7220 Region code: ATL

Field label	Note
4.3 Short term trend; Direction	See 4.11
4.11 Change and reason for change in surface area of range	The distribution data submitted in 2013 has not been updated. Changes in surface area or range may actually have occurred since the last reporting period, but NRW has no system in place for monitoring or recording such changes.
5.2 Surface area	The extent estimate for H7220 is based wholly on the habitat inventory compiled for the second reporting round (Stevens et al., 2012b). Records resulting from the upland NVC surveys dominate the data-base with a combined area of 5.61 ha. Records from the two lowland NVC programmes (for grasslands and peatlands) amount to 0.044 ha. Distribution records collected by Sam Bosanquet were given a nominal area of 0.0001 ha as these are essentially point records; the resultant sum area is 0.0055 ha. Collectively these records are unlikely to provide a reliable impression of the extent of H7220 in Wales. Furthermore, it has not been possible to assess the findings of Farr et al. (2014) to determine if these add any area data.
5.6 Short term trend; Direction	There is no quantitative evidence on which to assess changes in range or surface area over the short or long term.
5.14 Change and reason for change in surface area	The assessment of 'no' is based on use of the 2012 data with no inclusion of recent survey data coupled with lack of evidence of genuine change due to lack of a system for monitoring and recording changes in the extent of Annex 1 habitats.

6.2 Condition of habitat; Method used	Assessment of structure and function within SACs is based on the results of common standards monitoring visits undertaken between 2007 and 2012 (NRW, 2018a). The spreadsheet cited as NRW (2018a) has been analysed to extract monitoring data for SAC sites for H7220. The related spreadsheet NRW (2018b) has then been checked to see if any monitoring results have been reported which do not figure in NRW (2018b). The only SAC monitoring data for this feature dates from the second round for the single site where this habitat occurs as a C feature (Eryri): this indicated a condition assessment of 'Unfavourable - no change' in August 2012. The assessment undertaken by Farr et al. (2014) (see also Graham & Farr, 2014) examined the condition of H7220 at 22 locations within a total of 12 sites across Wales. Their survey suggests the condition of H7220 was favourable at 21 of the 22 locations. However, the Farr study did not assess condition using Common Standards attributes and did not report habitat areas for H7220. Therefore, no entry of the area of habitat in good condition is possible under 6.1.
6.4 Short term trend of habitat area in good condition; Direction	Repeat monitoring of the single SAC supporting this habitat at a grade of C or above has only been undertaken once since the baseline assessment in 2004, with the most recent assessment in 2012. The overall condition of the feature has remained unchanged between the two visits. No other monitoring data are available.

7.1 Characterisation of pressures/ threats

Overview Analysis of Pressures and Threats has utilised a number of data sources, with NRWs Action Database (NRW, 2018c) serving as a critical resource. This provides information on 'issues' affecting habitats and species within the protected sites series in Wales, but for H7220 it only contains a total of 2 management issue entries against the Petrifying springs feature description, of which both remain current for a single Eryri SAC unit. The review by Farr et al. (2014) also contains some relevant information. NRWs Prioritised Implementation Plans (PIPs) for SAC sites (NRW, 2016a) have also been consulted. Pressures: A09 Intensive grazing or overgrazing by livestock Grazing type and/or timing is cited as a current issue for a single Eryri unit and also features as a high priority pressure for this feature in the relevant Prioritised Implementation Plan (NRW, 2016). JO3 Mixed source air pollution, air-borne pollutants Air pollution is not cited as a current issue for H7220 in NRWs Actions Database (NRW, 2018c) but it is recognised as a high priority pressure/medium priority threat in the relevant PIP. The extent of the H7220 resource in Wales subject to N deposition in excess of the critical load for this habitat (15 kg N/ha/yr) has been assessed using the approach of Guest (2012) and using updated deposition data. Using a data overlay method in ARC GIS (Kay, 2018), 100% of the habitat by area (polygon data) was recorded at or above the relevant lower Critical Load limit. NRWs Actions Database needs to be updated to ensure this issue is correctly recorded as a current issue for all SAC and SSSI units. A10 Extensive grazing or undergrazing by livestock & L02 Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) Management neglect is suspected to be a locally important issue for this habitat, typically leading to 'scrubbing up' of examples. However, this is based on personal observation rather than any actions database evidence. A26 Agricultural activities generating diffuse pollution to surface or ground waters The study by Farr et al. (2014) suggests generally good hydrological status for the 12 sites examined by their study, but there was evidence for enrichment by inorganic nitrogen at one of these (Cors Erddreiniog), with agricultural activities within the catchment the most likely causal factor. K02 Drainage There is currently no direct evidence for impacts posed by this pressure or the closely related K01, but several of the sites do occur in close proximity to drainage features and current impacts cannot be ruled out. N02 - Droughts and decreases in precipitation due to climate change There is no specific evidence indicating impacts due to these pressures at the present time. This was initially ranked as High as a threat but has been downgraded to Medium to meet reporting restrictions. Threats: These were assessed in a similar way to pressures. There were no issues in the Actions Database registered as 'completed' or 'underway'. All pressures are considered to continue at the same level or increase as their parent pressures. Threats related to intensive grazing (A09) and insufficient grazing (A10 & L02) will continue for the foreseeable future due to the following principal factors: (i) lack of resources for promoting and funding management agreements on statutory sites under third party management, and (ii) the inadequacy of current mechanisms for promoting and where necessary enforcing the sustainable management of examples outside the protected sites series, particularly where these occur as small elements within otherwise intensively farmed contexts. A26 Agricultural activities generating diffuse pollution to surface or ground waters Resolution of this threat requires comprehensive catchment-level integration of a range of existing and new measures aimed at reducing and mitigating nutrient inputs, coupled with much more intensive monitoring of groundwater and shallow marginal seepage pathways to determine the effectiveness of measures. This intervention is not currently underway or planned. JO3 Mixed source air pollution, air-borne pollutants Despite modest projected reductions in the overall deposition rates for atmospheric nitrogen in the UK, air pollution is expected to remain a High pressure (threat) to the habitat in Wales. A provisional analysis using projected exceedance data for 2030 indicates that the area of SAC (on which H7220 is a feature) which falls in areas where deposition is above the relevant critical load will not fall at all from the 2013-2015 estimate (JNCC, 2018). N02 -

	Droughts and decreases in precipitation due to climate change The sensitivity of lowland fens in general is classed as 'High' by Natural England & RSPB (2014). Visual estimation of spring-flow rates at the sites examined by Farr et al. (2014) yielded estimates of between<0.1 - 1 l/s, suggesting that even modest reductions in groundwater levels and/or flows could be significant.
8.5 List of main conservation measures	The majority of measures are not fully implemented. A total of 3.72 ha of this habitat is included within this SAC series (based on 2012 data), and in 2012 the area in SSSI with the feature 'Flush and spring - soligenous mire' and under a land agency agreement 3.73 ha. Data for 2018 (Milner, 2018) suggest 1.02 ha of this habitat is included within Glastir Advanced agreements, with only 0.22 ha included in Glastir Entry. CA05, CL01 & CA04. This concerns the need to address insufficient and over-grazing, including on sites under third party management, and critically to ensure that prescriptions for often large management units on which this habitat will occur as very much a minority component are effective. Targeted management aimed at individual stands will often be required to sustain their significant value for scarce and rare invertebrates and non-vascular plants. CA11 Reduce diffuse pollution to surface or ground waters from agricultural activities & CJ01 Reduce impact of mixed source pollution. This is the major measure required to reduce nutrient income to the sites supporting H7220 from both runoff and groundwater discharge - it is unknown how many sites this may need to apply to. Current mechanisms for including this on land outside the catchment of protected sites may not be sufficient. Measures to address diffuse terrestrial pollution could be an effective means of reducing the impact of air pollution (CJ01) by reducing overall nutrient loading. CA 15 This concerns the need to monitor and regulate any potential hydrological impacts within the immediate ground and surface water catchment of sites. CA01. There is no information on damage or habitat loss of H7220 but this remains a threat for these often small and isolated habitat patches. CJ01, CC10 & CA12 National regulations are in place but have been insufficient to prevent continued high levels of N deposition nationally (CC10) and locally increasing ammonia pollution from expansion of poultry units (CA12). The area of this habitat subject to critical load exceedance is not expected to reduce between now and 2030.
9.1 Future prospects of parameters	9.1a Future prospects of -range: no significant change in range is expected. 9.1b Future prospects of -area: there is insufficient survey information on the area of this habitat to determine future trend in area. 9.1c Future prospects of -structure and function: there is insufficient survey information on the condition of this habitat to determine future trend in structure & function.
11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network	This estimate is derived from digital overlay of SAC boundaries on the habitat inventory for H7220 described under section 5.2 above and is based on 2012 data.
11.4 Short term trend of habitat area in good condition within the network; Direction	There is insufficient information on habitat condition for assessment under this heading.