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:

H91D0 - Bog woodland

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	**91D0 - Bog woodland**

2. Maps

2.1 Year or period	1985-2012
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. Forestry Commission (2011). National Forest Inventory Woodland Area Statistics: Wales: http://www.forestry.gov.uk/website/forestry.nsf/byunique/INFD-8EYJWF Guest, D. 2012. Assessing pressures and threats for Article 17 reporting based on information in CCW's Actions Database. CCW Staff Guidance Note. JNCC 2017. Habitat account - Forests. 91D0 Bog woodland: http://jncc.defra.gov.uk/ProtectedSites/SACselection/habitat.asp?FeatureIntCode=H91D0 [Accessed 19/06/18] Latham, J. 2000. Estimates of areas of woodland HSP types and HSD Annex 1 habitats in Wales. Unpublished CCW staff report. Latham, J. 2001. National Vegetation Classification of woodland in Wales: a summary of survey results 1985-2000. CCW Natural Science Report, 01/7/1, CCW, Bangor. Latham, J., Sherry, J. and Rothwell, J. 2013. Ecological connectivity and biodiversity prioritisation in the terrestrial environment of Wales. CCW Staff Science Report No. 13/3/3. Countryside Council for Wales, Bangor. Natural Resources Wales (NRW). 2013. 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 Habitat: H91D0 - Bog woodland. Available from: http://jncc.defra.gov.uk/pdf/Article17Consult_20131010/H91D0_WALES.pdf [Accessed 19 /06/18] Natural Resources Wales (NRW). 2018. SAC and SPA Monitoring Programme Results 2013-2018. Available from: http://lle.gov.wales/catalogue/item/SACSPAMonitoringProgrammeResults/?lang=en [Accessed 19/0618)] Watts, K., Griffiths, M., Quine, C., Ray, D. and Humphrey, J.W. 2005. Towards a Woodland Habitat Network for Wales. CCW Science Report 686, CCW Bangor.

4. Range

4.1 Surface area (in km²)	
4.2 Short-term trend Period	

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

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	1985-2012		
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value 1.5
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		
5.9 Long-term trend Period			
5.10 Long-term trend Direction			
5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used			
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 0.06	Maximum 0.06
	b) Area in not-good condition (km²)	Minimum 0.06	Maximum 0.06
	c) Area where condition is not known (km²)	Minimum 1.38	Maximum 1.38

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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	2007-2017
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
Mixed source air pollution, air-borne pollutants (J03)	H
Other invasive alien species (other then species of Union concern) (I02)	H
Drainage for use as agricultural land (A31)	H
Other climate related changes in abiotic conditions (N09)	M

Threat	Ranking
Mixed source air pollution, air-borne pollutants (J03)	H
Other invasive alien species (other then species of Union concern) (I02)	H
Drainage for use as agricultural land (A31)	H
Other climate related changes in abiotic conditions (N09)	M
Extensive grazing or undergrazing by livestock (A10)	M
Intensive grazing or overgrazing by livestock (A09)	M
Mixed source pollution to surface and ground waters (limnic and terrestrial) (J01)	M
Droughts and decreases in precipitation due to climate change (N02)	H
Problematic native species (I04)	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 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	

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8.4 Response to the measures	Medium-term results (within the next two reporting periods, 2019-2030)
8.5 List of main conservation measures	

Restoration of Annex I forest habitats (CB08)

Reduce impact of mixed source pollution (CJ01)

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

Manage drainage and irrigation operations and infrastructures in agriculture (CA15)

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	
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 0.15
11.2 Type of estimate	Best estimate
11.3 Surface area of the habitat type inside the network Method used	Based mainly on expert opinion with very limited 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	Based mainly on expert opinion with very limited data
11.6 Additional information	

12. Complementary information

12.1 Justification of % thresholds for trends	
12.2 Other relevant information	

Distribution Map

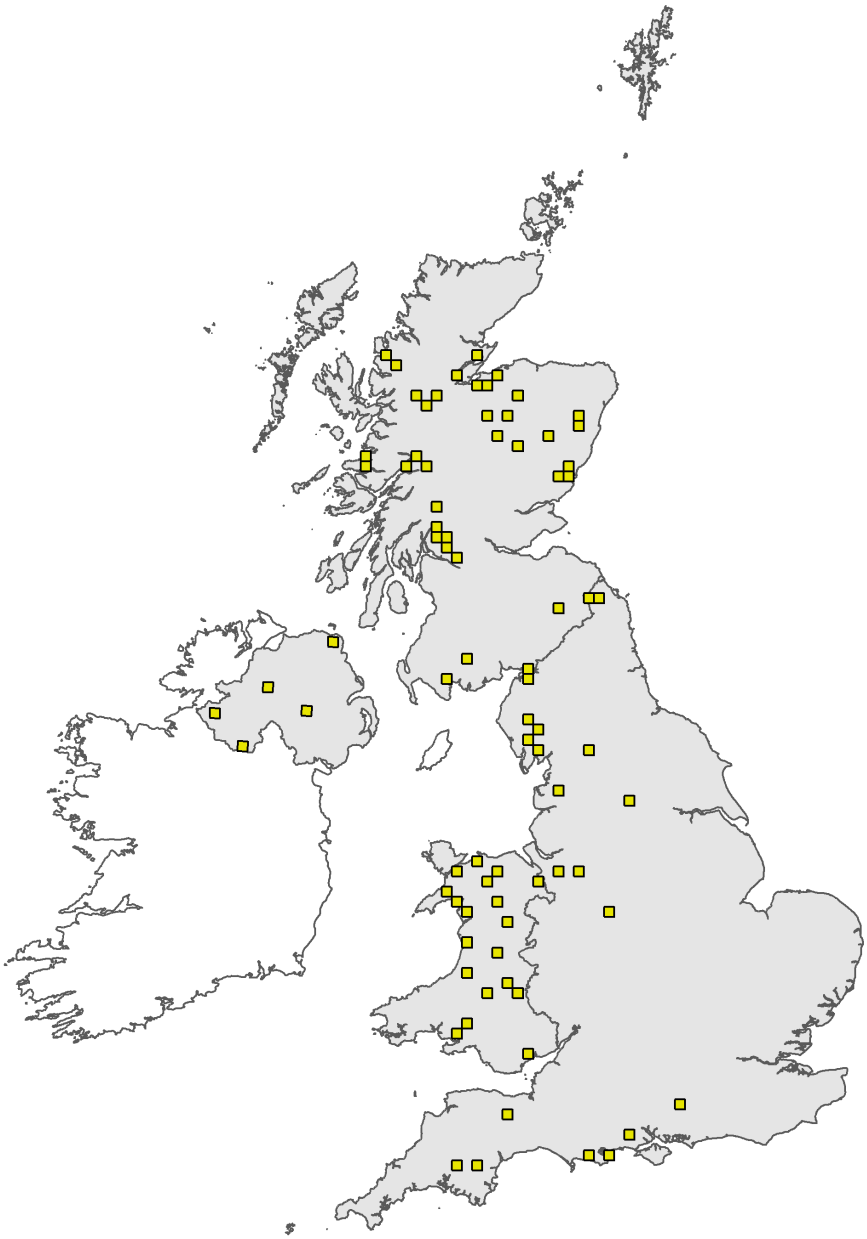

Figure 1: UK distribution map for H91D0 - Bog woodland. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

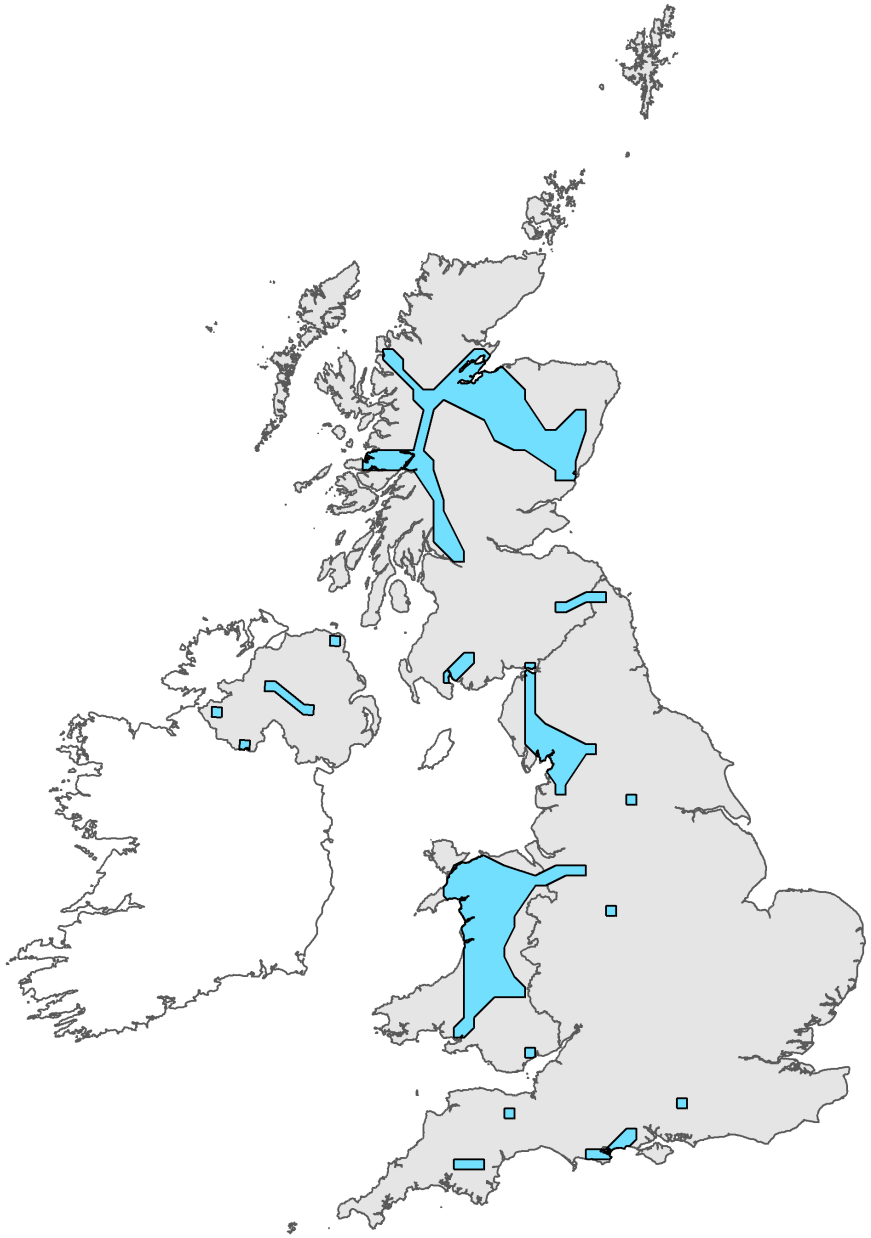

Figure 2: UK range map for H91D0 - Bog woodland. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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: 91D0

Field label	Note
2.1 Year or period	An analysis of the range and extent of likely H91D0 Bog woodland in Wales was carried out in 2012 from relevant vegetation legacy surveys (NRW, 2013). No new information has become available to significantly or confidently update this analysis, and there is also no reason to expect that the range and extent of the habitat has changed significantly since 2012; any changes are likely to be trivial in comparison to the uncertainty associated with the results of the analysis. For these reasons the figures and analysis for 2012 are reproduced here.
2.3 Distribution map; Method used	(Analysis as for 2012; see section 2.1). 91D0 Bog woodland has a fragmentary occurrence in Wales and is poorly quantified. Strictly, it comprises only woodland that occurs on active bogs (with often a very loose canopy) and without detriment to bog species; it excludes invasion of bogs by trees following changes such as drainage or burning. It equates best to W4c (the rare, Sphagnum sub-community) but also has affinities to W2b (Sphagnum sub-community) and W3 (JNCC, 2017). None of these communities are well known in Wales. Latham (2001) includes only 15 records of W4c, with a total area of only 20ha. W2b has only 6 records with a total of 22ha, but it is uncertain how well this fits the bog woodland type and these records are cautiously included . W3 has been recorded a handful of times, but it is uncertain how well these examples actually fit the NVC community and so it is prudent not make the leap to considering them also to be bog woodland. Bog woodland is not recorded on CCW Phase 1 Habitat mapping as different semi-natural broadleaved types are not distinguished (Blackstock, et al. 2010). Attempts were made to identify it by selecting bog habitats with 'scattered trees' codes, but no likely examples were found. JNCC SAC features lists records 83 ha of bog woodland on 7 SACs in Wales. However, the origin of these figures isn't clear and not supported by survey data on know sites. It seems likely that a proportion of this area has been recorded in error through the confusion with other woodland types (e.g. W4a and W4b, which are far more common (Latham, 2001)). Existing records for bog woodland sites are not numerous, but widespread, occurring throughout north and mid Wales, present in southeast Wales, but absent from the southwest. However, the total number is too few to confidently draw conclusions on actual range. Although the habitat clearly is uncommon, other small examples are likely to exist. There is no obvious mechanistic way to estimate total area of bog woodland in Wales. Latham (2000) estimated a total of 126ha by extrapolation by area of W4c, with a range of 50-100ha. This excluded W2b and some additional tiny areas of W4c have since been identified , so the total may be somewhat higher. Based on expert opinion, a cautious figure of 150ha is suggested, with a range of 100-200 ha.

Habitat code: 91D0 Region code: ATL

Field label	Note
4.3 Short term trend; Direction	See 4.11
5.1 Year or period	Total evidence range 1985-2012. Base area figures from NFI used in the analysis are from 2006 (aerial photography derived, published under NFI 2011), some assumptions on proportions used in calculations derive from surveys accumulated from 1985 - 2000.
5.2 Surface area	The area figures have been derived from analysis of the proportional representation of probable H91D0 within relevant vegetation surveys, across Wales. The scope of this analysis did not allow for a formal statistical treatment of errors, and some expert judgement has been used to derive pragmatic range values. Also see comments in section 2.3

5.4 Surface area; Method used	The area figures have been derived from analysis of the proportional representation of probable H91D0 within relevant vegetation surveys, across Wales. The scope of this analysis did not allow for a formal statistical treatment of errors, and some expert judgement has been used to derive pragmatic range values. Also see comments in section 2.3
5.8 Short term trend; Method used	There is no evidence available to judge short-term trends in the total area of this habitat. The total extent figures are derived from data with a wide time base, and their confidence errors are likely to be very much larger than any figures for ad hoc changes that may be reported.
5.14 Change and reason for change in surface area	The area of the habitat has not been re-assessed for this report and so the values are the same as the 2012 submission.
6.2 Condition of habitat; Method used	Assessment of structure and function is based on the results of Common Standards Monitoring visits at two sites where the habitat occurs as a feature (NRW, 2018), most recently assessed in 2007 and 2014. (Note that this excludes the wetland at Cors Caron included in error as bog woodland - this is secondary birch woodland resulting from tree invasion following partial drainage of the bog surface.) This is the only information available across a sample of the resource but given uncertainties over the status of the habitat at these sites and age of data only limited conclusions can be drawn from them.
6.3 Short term trend of habitat area in good condition; Period	The one site where there has been reassessment between 2007 and 2014 has changed condition from Unfavourable to Favourable (involving 6 ha) have changed condition (representing. 4% of the estimated total resource). However, it is not known whether this is due to real change, or refinement of conservation objectives and methodology, and it is not possible to draw wider conclusions.
6.4 Short term trend of habitat area in good condition; Direction	The one site where there has been reassessment between 2007 and 2014 has changed condition from Unfavourable to Favourable (involving 6 ha) have changed condition (representing. 4% of the estimated total resource). However, it is not known whether this is due to real change, or refinement of conservation objectives and methodology.

7.1 Characterisation of pressures/ threats	Pressures: Four pressures are suggested as High or Medium. J03 Air pollution appears to be a universal pressure, with all stands in areas where the Critical Load for nitrogen is exceeded coupled with more local impacts from agricultural activities. The impacts of nitrogen deposition and other forms of air pollution are poorly recorded in site monitoring and poorly reflected in NRW's Actions Database, but it is rated as high because of its comprehensive impact and because bryophyte species are critical to this habitat and are likely to be especially sensitive to air pollution impacts. I02 Invasive non-native species are a widespread problem, especially Rhododendron ponticum which may colonise and have serious impacts on bog habitats. A31 relating to water levels and drainage is likely to be a significant pressure on bog woodland. N09 'Other climate related changes in biotic conditions' has been included as a catch-all for the complex of interactions relating to long-term habitat loss, fragmentation, reduction of permeability of the matrix leading to reduced ecological connectivity, combined with the additional pressures of climate change that may require habitat range adaptation. They also interact with many of the specific climate change pressures that have been listed. These impacts are hard to quantify but likely to be ongoing. Other pressures identified as Low are: A10, which involves insufficient grazing and A09 which relates to over-grazing. This apparently contradictory situation comes about because an intermediate level of grazing is likely to be required to provide suitable conditions for both rare species (bryophytes and lichens) and for tree regeneration, and this is hard to achieve practically. Ideally management should be considered (and coordinated) across a series of sites which collectively provide all required conditions, but not necessarily at the same time in the same place. J01 mixed source pollution to surface and ground waters is likely to be an issue for Bog woodland in some situations, and important because of the high water-dependency of the habitat. A further possible pressure on Bog woodland that does not seem to be accommodated in the EU codes is the inadvertent damage or destruction of habitat through the removal of trees perceived as 'invasive scrub' during conservation projects to restore open wetland sites. Method used - pressures The assessment was based on the submission for 2012, reconsidered using expert knowledge updated accordingly for 2018. The data held in the \Actions Database\ were used to provide a basis for quantifying pressures/threats relating to Bog woodland, coupled with expert judgement on the severity of these pressures/threats (at a generic level) to give an overall evaluation of the pressure/threat level (for more details see Guest, 2012). For woodland, the Actions Database does not list Annex 1 habitats on SSSIs, so this analysis is based primarily on issues recorded on SACs, informed where possible by knowledge of the habitat on SSSIs elsewhere. Bog woodland has only been recorded on two management units in Wales, so these do not provide a complete basis for assessing threats. Issues raised however, are probably widely relevant. Threats: All the pressures identified above can be expected to remain as threats. I02 invasive species may well increase in abundance and additional species become a problem, possibly encouraged by climate change, although awareness of the problem is good and management is widespread. I05 tree pathogens and I04 deer browsing are not currently know to be a pressure within Bog woodland but pose a significant threat to all woodland types. N02 'droughts and decreases in precipitation due to climate change' are not currently know to affect the Bog woodland resource but have the potential for serious future impacts through climate change. Method used - threats: Expert opinion The pressures identified in pressures were used as a basis for threats, but additional information and expert opinion used to extrapolate to possible future impacts, and to identify large scale issues such as those of climate change that are not evident on a site reporting basis.
8.1 Status of measures	While the majority of most important measures have been identified and taken, in reality some identified measures have not yet been taken while other interventions are needed but the mechanisms have not been resolved.

8.2 Main purpose of the measures taken	The majority of the most important measures currently being undertaken are focused on maintaining the structure and functions of existing stands of Bog woodland. However several are also aimed at restoring the structure and functions both on individual sites and to the resource as a whole.
8.5 List of main conservation measures	CB08 Restoration of Annex I forest habitats. This measure is critical for Bog woodland which are both highly fragmented and localised, as well as often overlooked and poorly understood. Opportunities for restoration may arise particularly during projects to restore active peatlands following drainage and planting with conifer crops. To do this it is also vital to ensure Bog woodland is recognised as an important habitat in its own right. CJ01 Reduce impact of mixed source pollution. The impacts are probably high and significant on this habitat, but not clear what actions may be done locally to reduce deposition levels in addition to national current regulation of air pollution, hence the Medium ranking assigned here. CI03 Management, control or eradication of other invasive alien species. INNS are a problem in Bog woodland with potential for much greater impact, Rhododendron ponticum being a concern and requiring coordinated management programmes at a landscape scale. CA15 relates to the restoration of appropriate hydrological conditions for Bog woodland, for example raising water tables through managing drains. CN02 Implement climate change adaptation measures. This relates to the broad need to develop the resilience of the Bog woodland resource beyond the individual site level, planning large scale ecological networks that provide functional connectivity for relevant species between protected sites that allows both mitigation for long-term habitat loss and fragmentation and the capacity for climate change adaptation (e.g. Watts et al., 2005; Latham et al., 2013). CA05/CA06. These two measures relate to developing appropriate grazing regimes that deliver spatial and temporal variation in grazing intensity across the resource to accommodate the ecological requirements of both tree regeneration and the characteristic and rare species of the habitat; this measure will often to relevant to H91A0 Old sessile oakwood habitat which Bog woodland often occurs in association. CI07 Controlling and eradicating plant and animal diseases, pathogens and pests. This primarily relates to vigilance and the development of management and contingency plans to address the impacts of plant pathogens such as Phyophthora species. CI05 Management of problematic native species - the management of deer and their impacts. The long-term objective is to have populations of deer present at levels appropriate to the local ecology of sites. allowing them to deliver a positive ecosystem function.
9.1 Future prospects of parameters	Bog woodland has a wide range in Wales, although the total area is very restricted. With suitable restoration initiatives there is probably potential to increase the habitat's range. The potential area of Bog woodland is limited by suitable establishment sites and competition for restoration to other semi-natural habitats on peatland. There are also fundamental unknowns about the ecology of the habitat in Wales and the potential for establishing functional examples of the habitat. A general increase in woodland cover looks likely in Wales as it is supported by WG policy, but this is unlikely to be relevant to Bog woodland as policies preclude planting on peat. There are a number of negative factors which may increasingly affect Bog woodland. Its ecology is any case poorly understood in the Welsh context and it is not possible to predict trends with any confidence.
11.3 Surface area of the habitat type inside the network; Method used	Bog woodland is poorly understood and defined in Wales. NVC surveys provide some information on the resources but are unlikely to have comprehensively mapped all Bog woodland reliably. Surveys are described in Latham (2001) and digitised by GIS analysis (held on NRW GIS system). Areas of Bog woodland have previously been calculated for inclusion on JNCC's data forms: values for each of these for which the habitat is listed as a feature (grades A-D) were compiled, but then compared with habitat maps to re-assess the total area of Bog woodland included on SACs rather than that originally mapped as a feature.

11.4 Short term trend of habitat area in good condition within the network; Direction	For two sites where there has been reassessment between 2007 and 2014 (NRW, 2018), one has changed condition from Unfavourable to Favourable (representing 6.2ha, c. 40% of the total SAC resource). However, it is doubtful that this is due to real change, and more likely the result of the refinement of conservation objectives and methodology.