

**European Community Directive  
on the Conservation of Natural Habitats  
and of Wild Fauna and Flora  
(92/43/EEC)**

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

Species:

S1421 - Killarney fern (*Trichomanes speciosum*)

**IMPORTANT NOTE – PLEASE READ**

- The country-level reporting information contained in this document is a contribution to the Article 17 UK report for the habitat/species concerned.
- It has been provided by **Natural Resources Wales** and refers only to the state of the habitat/species in **Wales** - it does not constitute an assessment for the whole of the UK.
- The Article 17 UK Approach document provides details on how this information has been used and, combined with information supplied by other Statutory Nature Conservation Bodies
- The format of the document is closely aligned to that set out by the European Commission for Member State reporting – as a result, some of the fields are not applicable at a country-level and have deliberately been left blank – in addition, the content of most fields is constrained by the EC reporting categories.

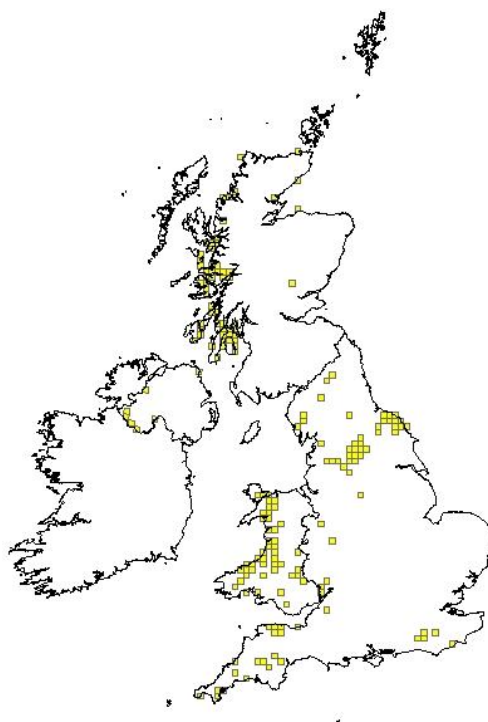
As of 1 April 2013, the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales became Natural Resources Wales/Cyfoeth Naturiol Cymru

## Reporting format on the 'main results of the surveillance under Article 11' for Annex II, IV & V species

<i>Field name</i>	<i>Brief explanations</i>	
<b>0.2 Species</b>	<b>0.2.1 Species code</b>	<b>S1421</b>
	<b>0.2.2 Species scientific name</b>	<b><i>Trichomanes speciosum</i></b>
	<b>0.2.3 Alternative species scientific name</b> Optional	
	<b>0.2.4 Common name</b> Optional	<b>Killarney fern</b>

### 1.1 Maps

<b>1.1.1 Distribution map</b>		<b>Sensitive</b>	<b>False</b>
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<b>1.1.2 Method used - map</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b> There is good information on <i>Trichomanes</i> distribution from a few local surveys (ie. Chater, 2010) and records elsewhere continue to accumulate but the gametophyte in particular is very localised, inconspicuous and difficult to recognise. General distribution patterns are now relatively clear but under-recording (especially outside of the known 'core' range) is likely to continue. For this reason, data are reported as moderate.
<b>1.1.3 Year or period</b>	<b>1989-2012</b> Populations of <i>Trichomanes</i> often grow in remote, relatively inaccessible

	sites and records therefore tend to be infrequent. Sample monitoring, however, indicates relatively little change over time. For these reasons, it is acceptable to report on all records from 1989 to 2012 in the current reporting round.
<b>1.1.4 Additional distribution map</b>	<b>False</b>
<b>1.1.5 Range map</b>	

<b>2.1 Biogeographical region &amp; marine regions</b>	<b>ATL</b>
<b>2.2 Published sources</b>	<p>"<a href="http://bsbidb.org.uk">bsbidb.org.uk</a></p> <p><b>Chater, A.O. (2010) Flora of Cardiganshire. Aberystwyth. 798pp.</b></p> <p><b>Gibby, M. (1997) Workshop on <i>Trichomanes speciosum</i>, the Killarney fern. Confidential report of proceedings. (Unpublished) Natural History Museum. London.</b></p> <p><b>Ratcliffe, D.A. (2000) In Search of Nature. Peregrine Press.</b></p> <p><b>Rumsey, F. (2012) <i>Vandenboschia speciosa</i> (Killarney fern) <a href="http://www.nhm.ac.uk/nature-online/species-of-the-day/biodiversity/endangered-species/vandenboschia-speciosa/index.html">http://www.nhm.ac.uk/nature-online/species-of-the-day/biodiversity/endangered-species/vandenboschia-speciosa/index.html</a></b></p> <p><b>'Sentinel' (2003) Killarney Fern Conservation. <i>Pteridologist</i> 4 (2) pp58-61"</b></p> <p>Due to the perceived threat of collection (see note 2.7a) there is an established practice of confidentiality over Killarney fern records. There are very few published data on this species in Wales and most of the available information for this report has been gathered from unpublished materials. These are mainly filenotes reporting site-visits by regional staff in the Countryside Council for Wales and personal communications to CCW specialists, R.A. Jones and S.D.S. Bosanquet from fern specialists at the British Museum (NHM) and vice-county recorders for the Botanical Society of the British Isles.</p>

<b>2.3 Range</b>	
<b>2.3.1 Surface area Range</b>	
<b>2.3.2 Method used Surface area of Range</b>	<p><b>Estimate based on partial data with some extrapolation and/or modelling</b></p> <p>There is good information on <i>Trichomanes</i> distribution from a few local surveys (ie. Chater, 2010) and records elsewhere continue to accumulate but the gametophyte in particular is very localised, inconspicuous and difficult to recognise. General distribution patterns</p>

	are now relatively clear but under-recording (especially outside of the known 'core' range) is likely to continue. For this reason, data are reported as moderate.	
<b>2.3.3 Short-term trend Period</b>	<b>1989-2012</b>	
	The first records for the gametophyte in Wales date from 1989 and records are still infrequent and localised in many areas (see note 2.3.2 above). For these reasons, all records from 1989 to 2012 are included in the current reporting round.	
<b>2.3.4 Short term trend Trend direction</b>		
	There is very little repeat monitoring / surveillance of the newly-discovered gametophyte but populations in a small sample area appeared relatively stable, if not increasing (Chater, 2010). Records for the sporophyte are very few and, in at least one case, unlocalised to protect the plant from human pressures (collection). There is limited evidence of historic fluctuations due to drought and frost (Ratcliffe, 2000) and evidence of more recent, post 2010, frost damage to sporophyte populations in Wales leading to the probable loss of one site at SN23 (CCW filenote, R.A. Jones, 2011). There are no equivalent data on the gametophyte response to climatic conditions or environmental factors, however, and the greater range trend is therefore unknown.	
<b>2.3.5 Short-term trend Magnitude</b>	<b>a) Minimum</b>	
	There are signs that one in six (c18%) of the known colonies of sporophyte appears to have been lost since 1989, due to exceptional low temperatures but this is only recent information and the population could still recover. Further sporophyte colonies have been found (or refound) in this period and others are confidentially thought to exist. Specific surveys have shown that the gametophyte is widespread and widely overlooked. For these reasons it is not possible to estimate rates of change.	
	<b>b) Maximum</b>	
	See note 2.3.5a above.	
<b>2.3.6 Long-term trend Period</b>		
	See notes 2.3.4 & 2.3.5a above.	
<b>2.3.7 Long-term trend Trend direction</b>		
	See notes 2.3.4 & 2.3.5a above.	
<b>2.3.8 Long-term trend Magnitude</b>  Optional	<b>a) Minimum</b>	
	See notes 2.3.4 & 2.3.5a above.	
	<b>b) Maximum</b>	
	See notes 2.3.4 & 2.3.5a above.	
<b>2.3.9 Favourable reference</b>	<b>a) Value in km<sup>2</sup></b>	

<b>range</b>		
	<b>b) Operator for FRR</b>	
	<b>c) FRR is unknown (indicated by "true")</b>	<b>False</b>
	<b>d) Method used to set FRR</b>	
<b>2.3.10 Reason for change</b> Is the difference between the reported value in 2.3.1 and the previous reporting round mainly due to...	<b>a) Genuine change?</b>	<b>False</b>
	Any genuine change in range (such as the apparent disappearance of <i>Trichomanes</i> from its only - sporophyte - locality in SN23) is very hard to confirm, especially since the gametophyte is still so widely under-recorded. Equally, the apparent increase in range is almost entirely due to better recording of the gametophyte, with improved recognition. This process is still incomplete, however, and no overall trend or change can be clearly ascertained.	
	<b>b) Improved knowledge/more accurate data?</b>	<b>False</b>
	The improved knowledge of <i>Trichomanes</i> habitat and identification (especially for the gametophyte) has given the appearance of change but it is not possible to discern any actual pattern.	
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>
	There is no certain evidence of range change, so differing methods are not applicable.	

<b>2.4 Population</b>		
<b>2.4.1 Population size estimation</b> (using individuals or agreed exceptions where possible)	<b>a) Unit</b>	
	The population size unit is occupied 10 km sqs.	
	<b>b) Minimum</b>	
	See note 2.4.1a	
	<b>c) Maximum</b>	
See note 2.4.1a		
<b>2.4.2 Population size estimation</b> (using population unit other than individuals) Optional ( <i>if 2.4.1 filled in</i> )	<b>a) Unit</b>	<b>number of map 10x10 km grid cells</b>
	The location of Killarney fern sporophyte is highly confidential and precise information is not made available for several populations. Conversely, the detailed distribution and abundance of gametophytes is unknown over large parts of the species' range but wider patterns of occurrence are available. For these reasons the only reliable measure of	

	population size in <i>Trichomanes</i> is occupied 10 x 10 km sq: adequately covering the numbers or occurrence of sporophytes and providing reliable units for the gametophyte.	
	<b>b) Minimum</b>	<b>47</b>
	New 10 km sq records for the Killarney fern continue to be made, especially at the edges of the species' range and in areas where it is still unfamiliar (eg. SH57 new for Anglesey in 2005; SO22 in Monmouthshire, 2004) and there is evidence that the plant is under-recorded elsewhere (eg in the abundant suitable habitat of Pembrokeshire, where there are only 2 records). This indicates that the current total of 47 localities is a bare minimum and the species will almost certainly be reported in increased numbers.	
	<b>c) Maximum</b>	<b>47</b>
	See note 2.4.2b above. The current total of 47 localities for <i>Trichomanes</i> in Wales is almost certainly not a maximum population size.	
<b>2.4.3 Additional information on population estimates / conversion</b> Optional	<b>a) Definition of "locality"</b>	
	<b>b) Method to convert data</b>	
	<b>c) Problems encountered to provide population size estimation</b>	
<b>2.4.4 Year or period</b>	<b>1989-2012</b>	
	(See notes 2.3.2 & 2.3.3 above). There is not enough annual information on Killarney fern populations and, conversely, a major part of this resource in historical pre-2007 (and even pre-2001) data. Consequently, the only meaningful period of population data for Killarney fern is 1989-2012.	
<b>2.4.5 Method used Population size</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>	
	The unit of population size measurement (occupied 10 km sqs) is relatively robust and suitable for extrapolation and / or modelling. The count of <i>Trichomanes</i> is, however, also incomplete and / or partial (see notes 2.4.2b & 2.4.4) so it requires some extrapolation (see notes).	
<b>2.4.6 Short-term trend Period</b>	<b>2001-2012</b>	
	See note 2.4.4. There is insufficient survey monitoring information to provide trend information on any recent period. The period for short term trend direction is given as 2001-2012 to reflect the slow progress of records. See, however, note 2.4.7, below.	
<b>2.4.7 Short-term trend Trend direction</b>	<b>unknown</b>	
	See note 2.4.6 above. One sample (Chater, 2010) found indications of local decline in gametophyte abundance and a number of sporophyte populations were certainly diminished in the winters of 2010-11 (Jones,	

	2011). Overall, however, there is insufficient information to determine trend.
<b>2.4.8 Short-term trend Magnitude</b>	<b>a) Minimum</b>
	See previous notes (eg 2.4.5 & 2.4.7). The short term trend in occupied 10 km squares appears to represent a net increase but this seems to be entirely the discovery of new, previously overlooked localities.
	<b>b) Maximum</b>
	See note 2.4.8a. It is not possible to discern a maximum short term trend, due to the continued under-recording of populations of the gametophyte.
	<b>c) Confidence interval</b>
	See notes 2.4.8a & b above.
<b>2.4.9 Short-term trend Method used</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>
	See note 2.4.5 above.
<b>2.4.10 Long-term trend – Period</b>	<b>1989-2012</b>
	The default period has been selected. See notes 2.4.6 & 2.5.2.
<b>2.4.11 Long-term trend Trend direction</b>	<b>unknown</b>
	See note 2.4.7 above.
<b>2.4.12 Long-term trend Magnitude</b> Optional	<b>a) Minimum</b>
	See note 2.4.8a above.
	<b>b) Maximum</b>
	See note 2.4.8b above
	<b>c) Confidence interval</b>
	See note 2.4.8c above
<b>2.4.13 Long term trend Method used</b>	<b>2</b>
	See notes 2.4.5 & 2.4.9 above.
<b>2.4.14 Favourable reference population</b>	<b>a) Number of individuals/agreed exceptions/other units</b>

	<b>b) Operator</b>	
	<b>c) FRP is unknown indicated by "true"</b>	<b>False</b>
	<b>d) Method used to set FRP</b>	
<b>2.4.15 Reason for change</b> Is the difference between the value reported at 2.4.1 or 2.4.2 and the previous reporting round mainly due to:	<b>a) Genuine change?</b>	<b>False</b>
	There is insufficient evidence of change in population size over the species' range. New localities (almost entirely for the gametophyte generation) continue to be found with no regular frequency. The species is highly inconspicuous and localised (although widespread) and it would be impractical to attempt any wide-ranging and / or systematic survey. New populations are usually discovered by individuals with specialist knowledge of the species' habitat and ecology such data are therefore irregular and incomplete. So far, with this partial data, we can see no obvious evidence of change in the reported range (but see also note 2.4.15b, below).	
	<b>b) Improved knowledge/more accurate data?</b>	<b>False</b>
	The presence of new data does give a better understanding of <i>Trichomanes</i> behaviour. Whilst there is very little evidence to suggest change there is some local evidence to indicate stability. A few well-monitored populations of the sporophyte do seem to be vulnerable to exceptional cold and there are reportedly very dynamic populations of the gametophyte in one or two places (Jones, 2012; Bosanquet, 2012). Both sporophyte and gametophyte populations may, therefore, be subject to genuine and significant change over their whole range. Unfortunately, these few instances are insufficient to support any generalisations and the overwhelming pattern of information is conveyed in the discovery of new sites.	
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>

## 2.5 Habitat for the species

### 2.5.1 Area estimation

**0.12**

All estimates of habitat surface area for species have to be approximate, at some point drawing the line between, possibly, hydrological



	<p>catchment (at one extreme) and leaf area, at the other. <i>Trichomanes</i> sporophytes occur in very highly localised sites next to waterfalls but probably require several km sq of suitably high-altitude catchment in the Atlantic coastal region to guarantee adequate water-supply (or, alternatively, many tonnes of sandstone block scree to provide ambient moisture away from coastal districts. The gametophyte habitat requirements are less clearly known but appear to be deep, still-air crevices in high moisture localities (eg river valleys) and, once again, their exact area of habitat could be anything between several km sq and a matter of cm sq. Several sporophyte colonies (and a few sites for the gametophyte) have many sq m of leaf area and clearly require a larger area of habitat but many sites for the gametophyte do seem to be in the smaller range. It is important to recognise, however (see notes 2.4.5 etc.), that the gametophyte is almost certainly overlooked across most of Wales and an unknown number of sites for the species remain to be discovered. For the purpose of this reporting, the surface area of habitat is judged to be c.100 m sq per recorded locality (in the BSBI distribution database).</p> <p>There is thought to be a sufficient amount of habitat in the UK to support a viable population of the species.</p>	
<b>2.5.2 Year or period</b>	<p><b>1989-2012</b></p> <p>Records are infrequent and unsystematic so a long time period is required for gathering data on the species habitat (see note 2.3.3 et seq, above). However, the data on habitat assessment is still incomplete.</p>	
<b>2.5.3 Method used Habitat for the species</b>	<p><b>Estimate based on partial data with some extrapolation and/or modelling</b></p> <p>All habitat assessments for this species are incomplete since its ecological character has only recently been recognised and large areas of potentially suitable territory remain to be surveyed.</p>	
<b>2.5.4 Quality of the habitat</b>	<b>a) Habitat quality</b>	<b>Unknown</b>
	<p>Infrequent sporophyte surveillance / monitoring data indicates moderate to good habitat quality (with some overgrowth of native species at one site and widespread frost damage elsewhere) but these represent only a tiny proportion of the species' habitat. The large number of relatively widespread records for the gametophyte generation indicate a corresponding amount of habitat but most of this has been only recently discovered and there is insufficient monitoring / surveillance data to assess quality. This incomplete information appears to indicate at least "moderate" if not "good" habitat quality but there are insufficient data here so the response is "unknown".</p>	
	<b>b) Assessment method</b>	<p><b>The species was only recently found to occur more widely (in the gametophyte generation) than had been previously supposed and relatively large numbers of the plant are now known in Wales. On this basis, the species habitat might be reported in "good" condition but there are no other data to support this assessment.</b></p>
	<p>There is currently no agreed means or method of quality assessment for the greater part of <i>Trichomanes</i> habitat (dominated by the gametophyte generation). Widespread and locally abundant populations appear to indicate "good" habitat but the species' ecology is not sufficiently well-</p>	

	understood and the factors affecting reproduction and dispersal are largely unknown.	
<b>2.5.5 Short-term trend Period</b>	<b>2001-2012</b>	
	There is limited evidence (eg. Chater, 2010) that both the sporophyte and gametophyte generations exhibit dynamic patterns of growth and reproduction over periods of a few years and so, presumably, this species is subject to short term fluctuations in habitat quality, such as growth of associated vegetation. No overall trends are discernible, however, for the species in Wales and the shortest time period for any regional or local trend assessment (as in this note) would be for the period 2001-2012.	
<b>2.5.6 Short-term trend Trend direction</b>	<b>unknown</b>	
	See note 2.5.5. There is evidence from a few sites that populations of both the gametophyte and the sporophyte generation can fluctuate in abundance over a short time period (>10 years), presumably in response to environmental factors. Gains and losses can also accompany growth in associated vegetation but there is no readily discernible trend in these fluctuations.	
<b>2.5.7 Long-term trend Period</b>	<b>1989-2012</b>	
	The <i>Trichomanes</i> gametophyte was only identified in Britain around 1989 so long term measurements could not precede this date.	
<b>2.5.8 Long-term trend Trend direction</b>	<b>unknown</b>	
	See note 2.5.5-6. No long term trend is discernible for the species distribution as a whole (although short term fluctuations have been recorded in local instances).	
<b>2.5.9 Area of suitable habitat for the species</b>	<b>a) Value in km<sup>2</sup></b>	<b>0.25</b>
	See note 2.5.1 above. No data is available on the complete area of occupied habitat (and estimates would vary according to the method used). The species is almost certainly under-recorded but, again, it is not possible to say by how much. For the purposes of this reporting it is estimated that perhaps 50% of the total population remains to be found and, using the approximation of 100 m sq for each locality, this would round off to c.0.25 km sq.	
	<b>b) Absence of data indicated as '0'</b>	
<b>2.5.10 Reason for change</b> Is the difference between the value reported at 2.5.1 and the previous reporting round mainly due to	<b>a) Genuine change?</b>	<b>False</b>
	Without any certain evidence for widespread habitat change it is not possible to provide speculative reasons, for or against.	
	<b>b) Improved knowledge/more accurate data?</b>	<b>False</b>
	There is considerably more information on the distribution and abundance of Killarney fern (mostly gametophyte) habitat in recent years but insufficient data, at present, to infer change (see note 2.5.10a above, and prev.).	
	<b>c) Use of different</b>	<b>False</b>

	<b>method (e.g. "Range tool")?</b>	
	There has not been any use of differing range tool methods.	

<b>2.6 Main pressures</b>		
<b>a) Pressure</b>	<b>b) Ranking</b>	<b>c) Pollution qualifier</b>
	H = high importance M = medium importance L = low importance	
I02: problematic native species	M	
M01: Changes in abiotic conditions	M	
B02: Forest and Plantation management & use	L	
E03: Discharges	L	
H02: Pollution to groundwater (point sources and diffuse sources)	L	NP

See note 2.6.1	
<b>2.6.1 Method used – Pressures</b>	<b>mainly based on expert judgement and other data</b> There is evidence (eg. 'Sentinel', 2003) that competition from native species (I02) and disposal of domestic waste (E03) can have locally very detrimental effects and the same source indicates pollution (H02) as a wider concern. This appears to be an unusually urban site, however, and there is no directly equivalent evidence from other sites so this has a Low rating. Changes in forestry (B02) can alter shade, nutrient levels and ambient moisture and must therefore be a distinct pressure. The species is judged to be very susceptible to climate change (M01) although this might not currently be a High pressure.

<b>2.7 Threats</b>		
<b>a) Threat</b>	<b>b) Ranking</b>	<b>c) Pollution qualifier</b>
	H = high importance M = medium importance L = low importance	
C03: Renewable abiotic energy use	M	
I02: problematic native species	M	
M01: Changes in abiotic conditions	M	
B02: Forest and Plantation management & use	L	

F04: Taking / Removal of terrestrial plants, general	L	
H02: Pollution to groundwater (point sources and diffuse sources)	L	NP

Collecting pressures (F04) are widely believed to represent the greatest threat to Killarney fern sporophytes (Ratcliffe, 2000 etc.) but are given here as a Low threat. The location of at least two populations of the sporophyte are widely known but neither appears to have suffered any deliberate damage in recent years. Forestry activities (B02), including altered shade, nutrient systems and hydrology would potentially represent a greater threat, especially to the gametophyte habitat but there is insufficient evidence (apart from the scarcity of gametophyte populations in commercial forestry) and groundwater pollution, H02, would largely affect only sporophyte populations - and those mainly near to agricultural areas. The greater risks are most likely from other native species (especially *Hedera helix* subspecies *hibernica* and *Rubus fruticosus* agg.), 102, and climate change (M01). The greatest risk of all (although here only given as Medium, since it is still localised) comes from hydroelectric power schemes, C03, altering the ambient moisture in the ravine habitat of Killarney fern.

<b>2.7.1 Method used – Threats</b>	<b>expert opinion</b>
	See note 2.7

## 2.8 Complementary information

### 2.8.1 Justification of % thresholds for trends

### 2.8.2 Other relevant information

### 2.8.3 Trans-boundary assessment

## 2.9 Conclusions (*assessment of conservation status at end of reporting period*)

Please refer to the United Kingdom assessment for this species.

## 3 Natura 2000 coverage & conservation measures - Annex II species (*only applies to species listed under Annex II of the Directive*)

### 3.1 Population

3.1.1 Population size	a) Unit	number of map 10x10 km grid cells
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Estimation of population size included in the SAC network	Measures of abundance in the SAC area are currently estimates, based on the recorded presence of <i>Trichomanes</i> (largely gametophytes) and an understanding of habitat. At least twelve 10 km sq records coincide with the SAC series and the true figure is likely to be much higher. This is the current minimum	
	<b>b) Minimum</b>	<b>12</b>
	See note 3.1.1a above. An estimated maximum number of sites for Killarney fern in the SAC series would be nearer 25.	
	<b>c) Maximum</b>	<b>25</b>
See note 3.1.1a above.		
<b>3.1.2 Method used</b>	<b>Estimate based on partial data with some extrapolation and/or modelling</b>	
See note 2.4.5 above.		
<b>3.1.3 Trend of population size within the network</b> (short-term trend)	<b>unknown</b>	
	See note 2.4.6 above.	

### 3.2 Conservation measures

Conservation measures taken (i.e. already being implemented) within the reporting period and provided information about their importance, location and evaluation.

3.2.1 Measure	3.2.2 Type					3.2.3 Ranking H = high importance M = medium importance L = low importance	3.2.4 Location where the measure is PRIMARILY applied			3.2.5 Broad evaluation of the measure					
	a) Legal/statutory	b) Administrative	c) Contractual	d) Recurrent	e) One-off		a) Inside	b) Outside	c) Both inside & outside	a) Maintain	b) Enhance	c) Long term	d) No effect	e) Unknown	f) Not evaluated
3.1: Restoring/improving forest habitats				Y		L		Y		Y	Y				
4.0: Other wetland-related measures				Y		L		Y		Y	Y				

6.3: Legal protection of habitats and species	Y	Y				M			Y	Y		Y			
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Four of the 6 major sporophyte populations are in SACs and Sites of Special Scientific Interest and at least 25% of the known major gametophyte colonies are similarly protected (6.3). There has been some local modification of alluvial habitat (4.0) to accommodate pressures at one very sensitive locality outside the protected sites network and small areas of forestry have also been managed to potentially improve the habitat for this species (3.1), inside and outside the protected sites network (mainly by removal of non-native conifers).