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 species:

S6985 - Killarney fern (*Vandenboschia speciosa*)

ENGLAND

IMPORTANT NOTE - PLEASE READ

- The information in this document is a country-level contribution to the UK Report on the conservation status of this species, 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 species 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; (iii) the field was not relevant to this species (section 12 Natura 2000 coverage for Annex II species) and/or (iv) the field was only relevant at UK-level (sections 9 Future prospects and 10 Conclusions).
- For technical reasons, the country-level future trends for Range, Population and Habitat for the species 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 11 for Annex II, IV and V species (Annex B)

NATIONAL LEVEL

1. General information

1.1 Member State	**UK (England information only)**
1.2 Species code	**6985**
1.3 Species scientific name	**Vandenboschia speciosa**
1.4 Alternative species scientific name	Trichomanes speciosum
1.5 Common name (in national language)	Killarney fern

2. Maps

2.1 Sensitive species	No
2.2 Year or period	2000-2017
2.3 Distribution map	Yes
2.4 Distribution map Method used	Complete survey or a statistically robust estimate
2.5 Additional maps	No

3. Information related to Annex V Species (Art. 14)

3.1 Is the species taken in the wild/exploited?	No	
3.2 Which of the measures in Art. 14 have been taken?	a) regulations regarding access to property	No
	b) temporary or local prohibition of the taking of specimens in the wild and exploitation	No
	c) regulation of the periods and/or methods of taking specimens	No
	d) application of hunting and fishing rules which take account of the conservation of such populations	No
	e) establishment of a system of licences for taking specimens or of quotas	No
	f) regulation of the purchase, sale, offering for sale, keeping for sale or transport for sale of specimens	No
	g) breeding in captivity of animal species as well as artificial propagation of plant species	No
	h) other measures	No

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3.3 Hunting bag or quantity taken in the wild for Mammals and Acipenseridae (Fish)

a) Unit

b) Statistics/ quantity taken	Provide statistics/quantity per hunting season or per year (where season is not used) over the reporting period					
	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
Min. (raw, ie. not rounded)						
Max. (raw, ie. not rounded)						
Unknown	No	No	No	No	No	No

3.4. Hunting bag or quantity taken in the wild Method used

3.5. Additional information

BIOGEOGRAPHICAL LEVEL

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs

Atlantic (ATL)

4.2 Sources of information

RUMSEY, F.J., JERMY, A.C. & SHEFFIELD, E 1998 The independent gametophytic stage of Trichomanes speciosum Willd. (Hymenophyllaceae), the Killarney Fern and its distribution in the British Isles Watsonia 22, 1-19
TREWREN, K., 2003. Report on Surveys of the Killarney Fern (Trichomanes speciosum) in East Arncliff Wood and West Arncliff Wood, North York Moors - November 2002 to February 2003. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2004. Report on the Status of the Killarney Fern (Trichomanes speciosum) in West Arncliff Wood, North York Moors (Third Annual Recording) - February 2004. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2005. Survey to Determine the Status of the Killarney Fern (Trichomanes speciosum) in Northern Cumbria - February to April 2005. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2005. Report on the Status of the Killarney Fern (Trichomanes speciosum) in Park Hole Wood, North York Moors, in 2005. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2005. Report on the Status of the Killarney Fern (Trichomanes speciosum) in West Arncliff Wood, North York Moors (Fourth Annual Recording) - February to April 2005. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2006. Report on the Status of the Killarney Fern (Trichomanes speciosum) in West Arncliff Wood, North York Moors (Fifth Annual Recording) - February 2006. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2006. Report on the Status of the Killarney Fern (Trichomanes speciosum) in Park Hole Wood, North York Moors, in March 2006. English Nature

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unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2006. Report on the Status of the Killarney Fern (Trichomanes speciosum) in East Arncliff Wood, North York Moors - November 2005 to April 2006. Volume 1. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2006. Report on the Status of the Killarney Fern (Trichomanes speciosum) in East Arncliff Wood, North York Moors - November 2005 to April 2006. Volume 2. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2007. Report on the Status of the Killarney Fern (Trichomanes speciosum) in West Arncliff Wood and Park Hole Wood, North York Moors - February 2007. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2008. Report on the Status of the Killarney Fern (Trichomanes speciosum) in West Arncliff Wood, North York Moors - February 2008. English Nature unpublished report - IN STRICT CONFIDENCE
TREWREN, K., 2009. Report on the Status of the Killarney Fern (Trichomanes speciosum) in West Arncliff Wood, North York Moors - March 2009. English Nature unpublished report - IN STRICT CONFIDENCE
RUMSEY, F.R. 2013 Trichomanes speciosum Willd., Killarney Fern, Sporophyte generation in England - A CONFIDENTIAL record of extant populations. NHM, London
RUMSEY, F.R. 2018 Trichomanes speciosum Willd. (syn. Vandenboschia speciosa (Willd.)Kunkel) Sporophyte, St. Nectan's Kieve, nr. Tintagel, E. Cornwall, VC.2 - a CONFIDENTIAL report to Natural England (April 2018).

5. Range

5.1 Surface area (km²)		
5.2 Short-term trend Period		
5.3 Short-term trend Direction	Stable (0)	
5.4 Short-term trend Magnitude	a) Minimum	b) Maximum
5.5 Short-term trend Method used		
5.6 Long-term trend Period		
5.7 Long-term trend Direction		
5.8 Long-term trend Magnitude	a) Minimum	b) Maximum
5.9 Long-term trend Method used		
5.10 Favourable reference range	a) Area (km²) b) Operator c) Unknown d) Method	
5.11 Change and reason for change in surface area of range	No change The change is mainly due to:	
5.12 Additional information		

6. Population

6.1 Year or period	2005-2018

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6.2 Population size (in reporting unit)	a) Unit	number of individuals (i)
	b) Minimum	
	c) Maximum	
	d) Best single value	1859
6.3 Type of estimate	Best estimate	
6.4 Additional population size (using population unit other than reporting unit)	a) Unit	
	b) Minimum	
	c) Maximum	
	d) Best single value	
6.5 Type of estimate		
6.6 Population size Method used	Complete survey or a statistically robust estimate	
6.7 Short-term trend Period	2007-2018	
6.8 Short-term trend Direction	Stable (0)	
6.9 Short-term trend Magnitude	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.10 Short-term trend Method used	Complete survey or a statistically robust estimate	
6.11 Long-term trend Period		
6.12 Long-term trend Direction		
6.13 Long-term trend Magnitude	a) Minimum	
	b) Maximum	
	c) Confidence interval	
6.14 Long-term trend Method used		
6.15 Favourable reference population (using the unit in 6.2 or 6.4)	a) Population size	
	b) Operator	
	c) Unknown	
	d) Method	
6.16 Change and reason for change in population size	No change	
	The change is mainly due to:	
6.17 Additional information		

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat	a) Are area and quality of occupied habitat sufficient (to maintain the species at FCS)?	Yes
	b) Is there a sufficiently large area of occupied AND unoccupied habitat of suitable quality (to maintain the species at FCS)?	
7.2 Sufficiency of area and quality of occupied habitat Method used	Complete survey or a statistically robust estimate	
7.3 Short-term trend Period	2007-2018	

7.4 Short-term trend Direction	Stable (0)
7.5 Short-term trend Method used	Complete survey or a statistically robust estimate
7.6 Long-term trend Period	
7.7 Long-term trend Direction	
7.8 Long-term trend Method used	
7.9 Additional information	

8. Main pressures and threats

8.1 Characterisation of pressures/threats

Pressure	Ranking
Use of plant protection chemicals in agriculture (A21)	M
Logging without replanting or natural regrowth (B05)	M
Clear-cutting, removal of all trees (B09)	M
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	H
Hydropower (dams, weirs, run-off-the-river), including infrastructure (D02)	M
Illegal harvesting, collecting and taking (G11)	M
Collapse of terrain, landslide (M05)	M

Threat	Ranking
Use of plant protection chemicals in agriculture (A21)	H
Logging without replanting or natural regrowth (B05)	M
Clear-cutting, removal of all trees (B09)	M
Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) (C01)	H
Hydropower (dams, weirs, run-off-the-river), including infrastructure (D02)	H
Illegal harvesting, collecting and taking (G11)	M
Collapse of terrain, landslide (M05)	M

8.2 Sources of information	
8.3 Additional information	

9. Conservation measures

9.1 Status of measures	a) Are measures needed?	Yes
	b) Indicate the status of measures	Measures identified and taken
9.2 Main purpose of the measures taken		Maintain the current range, population and/or habitat for the species
9.3 Location of the measures taken		Both inside and outside Natura 2000
9.4 Response to the measures		Short-term results (within the current reporting period, 2013-2018)

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9.5 List of main conservation measures

Manage the use of natural fertilisers and chemicals in agricultural (plant and animal) production (CA09)
Stop forest management and exploitation practices (CB06)
Adapt/manage extraction of non-energy resources (CC01)
Adapt/manage exploitation of energy resources (CC02)
Control/eradication of illegal killing, fishing and harvesting (CG04)

9.6 Additional information

10. Future prospects

10.1 Future prospects of parameters

a) Range
b) Population
c) Habitat of the species

10.2 Additional information

11. Conclusions

11.1. Range

11.2. Population

11.3. Habitat for the species

11.4. Future prospects

11.5 Overall assessment of Conservation Status

11.6 Overall trend in Conservation Status

11.7 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:

11.8 Additional information

12. Natura 2000 (pSCIs, SCIs and SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network (on the biogeographical/marine level including all sites where the species is present)

a) Unit	number of individuals (i)
b) Minimum	
c) Maximum	
d) Best single value	1841

12.2 Type of estimate

Best estimate

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12.3 Population size inside the network Method used	Complete survey or a statistically robust estimate
12.4 Short-term trend of population size within the network Direction	Stable (0)
12.5 Short-term trend of population size within the network Method used	Complete survey or a statistically robust estimate
12.6 Additional information	

13. Complementary information

13.1 Justification of % thresholds for trends	
13.2 Trans-boundary assessment	
13.3 Other relevant Information	

Distribution Map

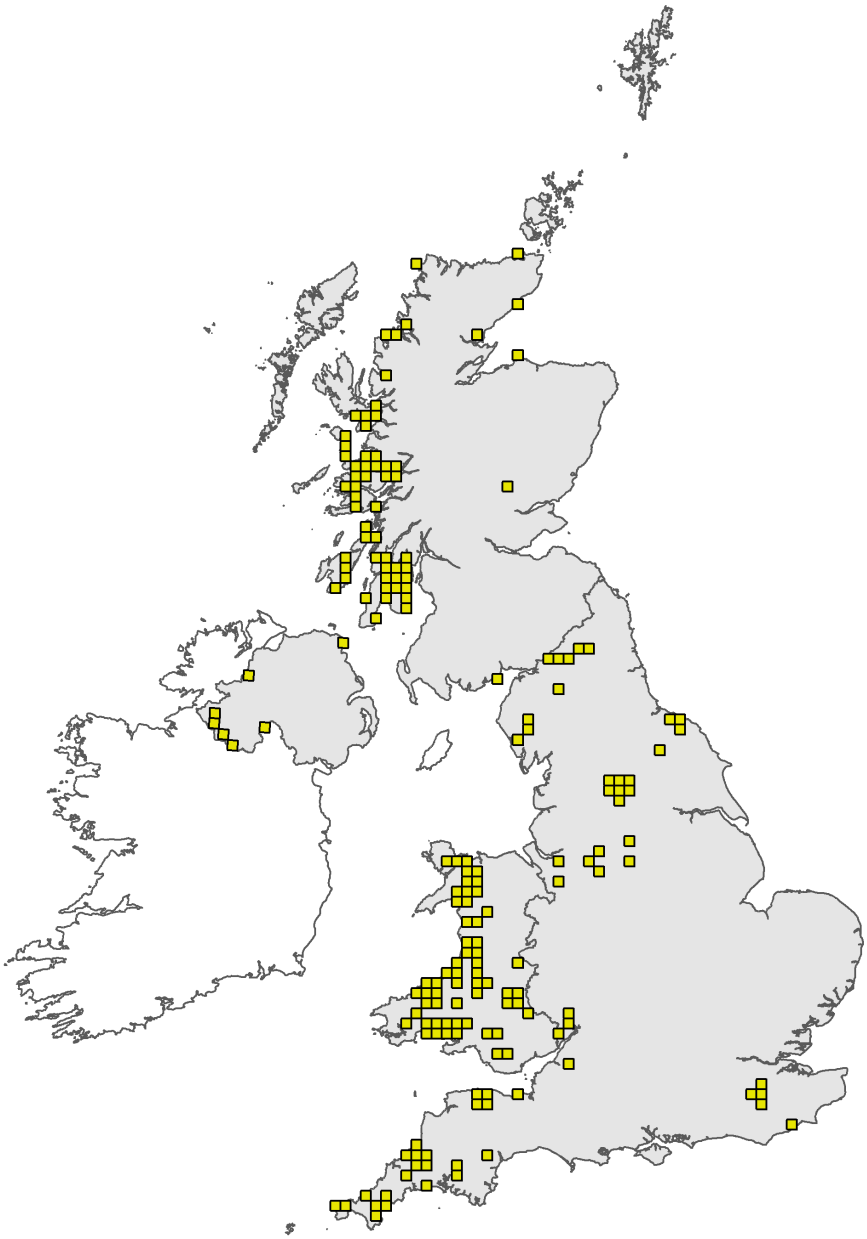

Figure 1: UK distribution map for S6985 - Killarney fern (*Vandenboschia speciosa*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The 10km grid square distribution map is based on available species records within the current reporting period. For further details see the 2019 Article 17 UK Approach document.

Range Map

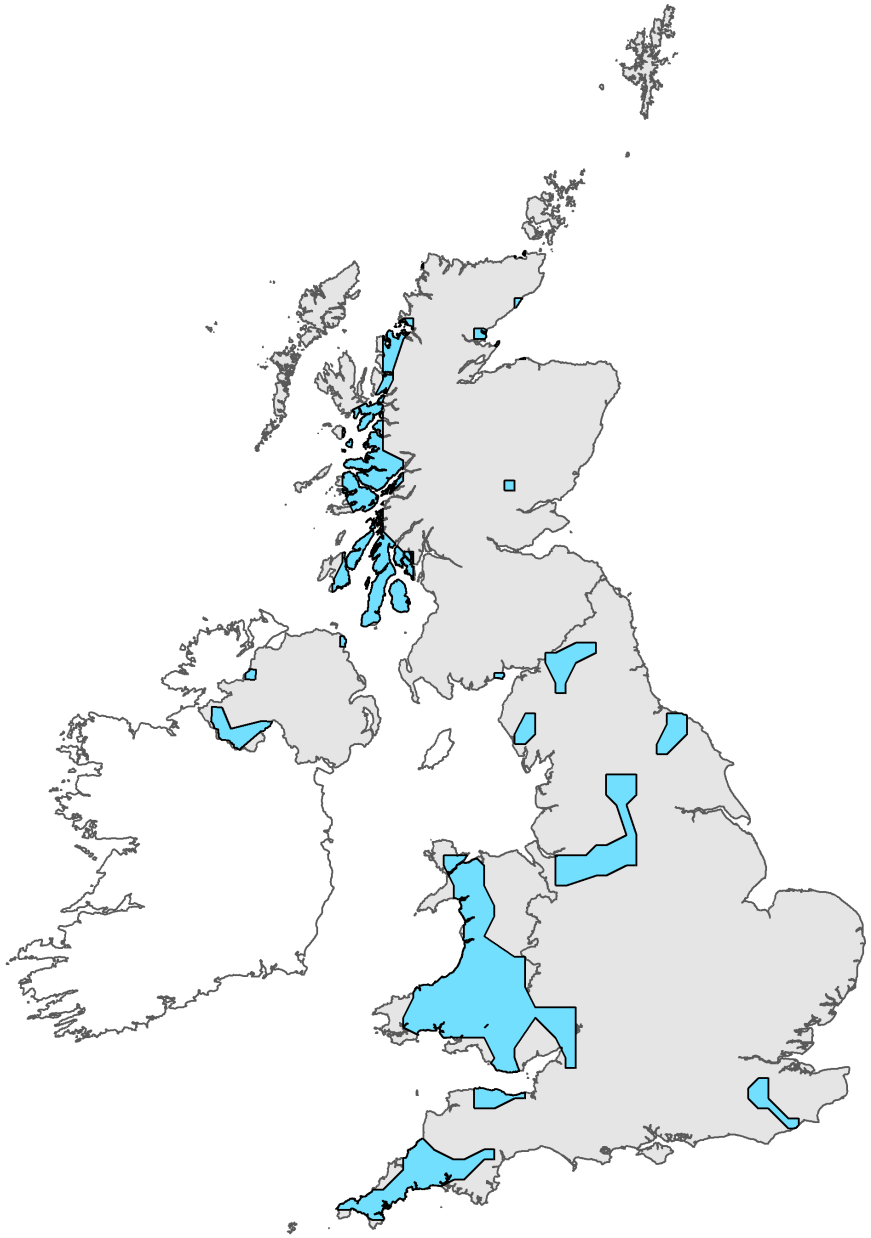

Figure 2: UK range map for S6985 - Killarney fern (*Vandenboschia speciosa*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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 species was 20km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Species name: Vandenboschia speciosa (6985)

Field label	Note
1.4 Alternative species scientific name	Most records (and recorders) continue to regard Trichomanes speciosum Willd. as the accepted name for this taxon - and it remains the name in use in the standard British flora (Stace, C.A. 2010)
2.1 Sensitive species	Sporophytes of V.speciosa have been collected from the wild for private horticultural collections and herbarium specimens for c.200 years. Whilst there are no recent reports of this, the pteridological community remains concerned - with the result that some sporophyte sites are kept secret even from the statutory nature conservation agencies. This concern does not, however, extend to the gametophyte localities - although, as has recently occured in one Yorkshire locality, sprophytes may be produced at sites where only gametophytes were previously recorded and, at this point, the location becomes more sensitive.
2.2 Year or Period	The longer period used here reflects relatively little activity in recording East Yorkshire populations since the death of the local expert, although recordng has taken place as recently as 2018 in other parts of England - most notably West Yorkshire and Cornwall.
2.3 Distribution map	Showing the post-2000 distribution of both sporophyte and gametophyte records (undifferentiated on the map)
2.4 Distribution map; Method used	As noted above some survey data was collected prior to the current recordng period but this species is long-lived and persistent and there is no reason to assume the distribution has changed to any significant extent in recent years.

Species name: Vandenboschia speciosa (6985) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	It remains the case that gametophytes are likely to be under-recorded (difficulties in identification and also access to sites (deep recesses within rock - either solid geology or boulders)) but indications are that they are very long-lived and persistent in these situations. The sporophyte sites are generally well-recorded and, although the main populations in East Yorkshire have not been assessed within the reporting period, they appear to be stable (projection from earlier annual monitoring until 2009) TREWREN 2002 to 2009.
5.11 Change and reason for change in surface area of range	No recorded or reported significant changes. The Cornish site was assessed in 2018 and had shown a significant increase in sporophytes and a small site in West Yorkshire had also increased from 1 to 5 plants. However these sites represent just 0.8% of the sporophyte population. Gametophyte populations cannot realistically be assessed due to the mat-like morphology of this life-stage.
6.2 Population size	Assessed here as plants. Colonies are sometimes used in surveys but usually in addition to plant counts but the latter are preferred as they are less equivocal. Occasionally counts are of fronds which may equate to plants on some sites, particularly where plants are small/immature, but the largest plants can have 100's of fronds. 86% (1,593) of the sporophytes included in the count come from a single Yorkshire locality last assessed in 2006.
6.3 Type of estimate	The sporophyte plant estimate is thought to be an accurate one. However, the length of time covered by the assessment must reduce its reliability to some extent (just 14 sporophytes (0.7%) were counted at 3 of the 9 sites at which sporophytes are known to occur) during the current reporting period.
6.6 Population size; Method used	All sites included in the count had detailed surveys by acknowledged experts in the species. The counts represent a full census of known sporophyte localities.

6.7 Short term trend; Period	14% of the sporophyte population (but 66% of sites) included in the total figure counted within the short-term trend period.
6.8 Short term trend; Direction	14% of the sporophyte population included in the total figure was counted within the short-term trend period and no gross habitat changes were observed at the remaining two sites to suggest any significant change. Relatively few gametophyte sites have been assessed on multiple occasions but expert opinion suggests that they are generally long-lived colonies in stable habitats.
6.10 Short term trend; Method used	Although the sporophyte census has been undertaken over a prolonged period, the stability of populations observed closely and regularly suggests that changes to population size are generally slow if their habitats remain stable. Trends in gametophyte populations are not readily assessed, however the seemingly ancient, relict populations in mainly natural, stable environments suggests they are likely to be stable over the long-term.
6.16 Change and reason for change in population size	Although a small increase was detected in two of the three recently assessed sporophyte sites this is not significant in terms of the English population as a whole. Given that gametophyte trends cannot be assessed and that most sporophyte sites have not been assessed since 2009 a stable conclusion seems the most reliable.
7.1 Sufficiency of area and quality of occupied habitat	Gametophyte sites continue to be discovered and the characteristics of these sites are unremarkable. Some gametophyte sites have also produced sporophytes from time to time (increasingly so in recent years) and it seems likely that climatic conditions are primarily responsibe for this transition rather than habiat quality or extent (although there is clearly a relationship between the two given the climatically marginal nature of England with respect to the survivorship potential of sporophytes in cold winter weather)
7.2 Sufficiency of area and quality of occupied habitat; Method used	Most suitable habitat for the species is likely to be occupied only by gametophytes due to climatic constraints on sporophyte production and survival. Gametophytes have only been recognised in England in relatively recent times and few sites discovered have been resurveyed whilst more new sites continue to be found. However gametophyte distribution data are now relatively abundant and the distribution of apparently suitable (and occupied) habitat seems to be widespread.
7.4 Short term trend; Direction	14% of the sporophyte population included in the total figure was counted within the short-term trend period and no gross habitat changes were observed at the remaining two sites to suggest any significant change. Relatively few gametophyte sites have been assessed on multiple occasions but expert opinion suggests that they are generally long-lived colonies in what are essentially stable, natural, hard-rock habitats.
8.1 Characterisation of pressures/ threats	Whilst there are a number of threats in theory with respect to sporophyte colonies the majority are addressed through existing designations. Only illegal collection remains a widespread concern (but with little recent evidence that this is a major pressure). A Cumbrian sporophyte locality is potentially at risk of hydropower development (its precise locality is unkown to the statutory conservation agency but it is known to be in a ghyll apparently suitable for such a development). Of more widespread concern is the vulnerability of gametophyte localities to herbicide applications to control bracken (Pteridium aquilinum), to modification of tree cover or forest canopies (resulting in increased risk of dehydration, direct insolation and frost penetration) and to quarrying.
9.1 Status of measures	Measures are needed to protect sporophyte localities from both gross modification (e.g. quarrying, clear-felling if wooded) and also from collection (see comments re: sensitivity).
9.2 Main purpose of the measures taken	All major sites have designations as SSSI which should ensure protection from this type of activity. In addition site details are confidential for the sites holding the largest populations of sporophytes. All measures are currently directed at sporophyte sites.

9.3 Location of the measures taken	99% of the sporophyte population lies within Natura 2000. The Cornwall locality is also a Site of Special Scientific Interest protecting a significant range extension from gross modification and interference.
9.4 Response to the measures	The measures are in place and have immediate and ongoing effect.
9.5 List of main conservation measures	Beyond site designation and maximum confidentiality of records for sporophytes there are few measures which can mitigate against the exisiting pressures and threats. Monitoring of gametophyte sites is, for example, very difficult given both their wide distribution, difficulty in determination and physical access to the colonies. The measures listed here apply mainly to sporophyte localities but also as gneral principles to apply wherever gametophytes are known to occur.
10.1 Future prospects of parameters	The stable, hard-rock environment of the gametophytes combined with their widespread distribution and the protected nature of the sporophyte colonies should ensure stability. Climate change projections would appear to favour an increase in sporophyte generation at gametophyte localities (with some evidence of this in recent years (RUMSEY 2013, 2018)) and this may eventually facilitate expansion of the species but at present there are too many unknown factors at play to make this prediction with any degree of certainty and an overall stable projection seems most appropriate.
12.1 Population size inside the pSCIs, SCIs and SACs network	This figure as with other population figures above, is of sporophytes only. It represents 99% of the known English sporophyte population. Whilst some gametophytes occur alongside sporophytes within Natura 2000 neither the population size nor the percentage of the English gametophyte population represented within Natura 2000 can be determined.
12.2 Type of estimate	The sporophyte plant estimate is thought to be an accurate one. However, the length of time covered by the assessment must reduce its reliability to some extent (just 14 sporophytes (0.7%) were counted at 3 of the 9 sites at which sporophytes are known to occur, none of which was within Natura 2000) during the current reporting period.
12.3 Population size inside the network; Method used	All Natura 2000 sites included in the count had detailed surveys by an acknowledged expert in the species. The counts represent a full census of known Natura 2000 sporophyte localities.
12.4 Short term trend of the population size within the network; Direction	Only 13.5% of the Natura 2000 sporophyte population included in the total figure was counted within the short-term trend period and no gross habitat changes were observed at the remaining Natura 2000 site to suggest any significant change.
12.5 Short term trend of population size within the network; Method used	Although the sporophyte census has been undertaken over a prolonged period, the stability of populations observed closely and regularly suggests that changes to population size are generally slow if their habitats remain stable. Trends in gametophyte populations within Natura 2000 cannot readily be assessed, however the seemingly ancient, relict populations in mainly natural, stable environments suggests they are likely to be stable over the long-term.