Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A

2019-2024

Conservation status assessment for the species:

S6985 - Killarney fern

(*Vandenboschia speciosa*)

Wales

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Important note - Please read

- The information in this document represents the Wales Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A, for the period 2019-2024.
- It is based on supporting information provided by Natural Resources Wales, which is documented separately.
- The Habitats Regulations reporting 2019-2024 Approach Document provides details on how this supporting information contributed to the UK Report and the fields that were completed for each parameter.
- Maps showing the distribution and range of the species are included.
- Explanatory notes (where provided) are included at the end. These provide additional audit trail information to that included within the assessments. Further underpinning explanatory notes are available in the related country reports.
- 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 not relevant to this species (section 12 National Site Network coverage for Annex II species).

Further details on the approach to the Habitats Regulations Reporting 2019-2024 are available on the JNCC website.

Assessment Summary: Killarney fern

Distribution Map

Range Map

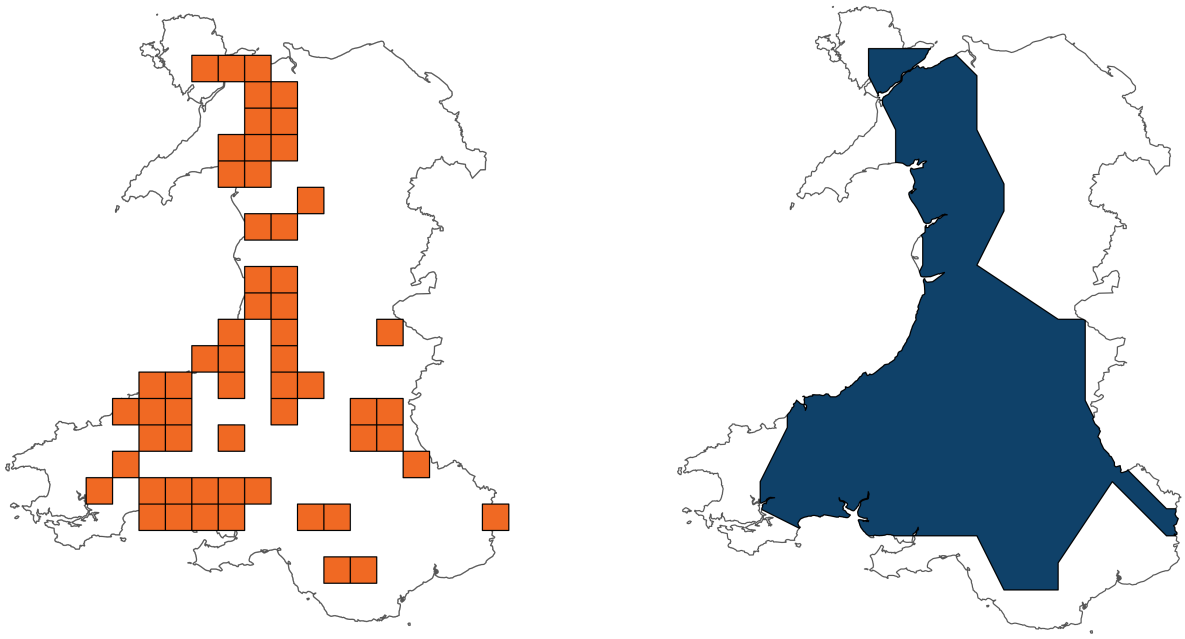

Figure 1: Wales distribution and range map for S6985 - Killarney fern (*Vandenboschia speciosa*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority. The 10km grid square distribution map is based on available species records within the current reporting period.

Table 1: Table summarising the conservation status for S6985 - Killarney fern (*Vandenboschia speciosa*). Overall conservation status for species is based on assessments of range, population, habitat for the species, and future prospects.

Overall Conservation Status (see section 11)

Favourable (FV)

Breakdown of Overall Conservation Status

Range (see section 5)	**Favourable (FV)**
Population (see section 6)	**Favourable (FV)**
Habitat for the species (see section 7)	**Favourable (FV)**
Future prospects (see section 10)	**Favourable (FV)**

List of Sections

National Level

1. General information

1.1 Country	Wales
1.2 Species code	S6985
1.3 Species scientific name	*Vandenboschia speciosa*
1.4 Alternative species scientific name	
1.5 Common name	Killarney fern
Annex(es)	II, IV

2. Maps

2.1 Sensitive species	Yes
2.2 Year or period	2000-2024
2.3 Distribution map	Yes
2.4 Distribution map; Method used	Based mainly on extrapolation from a limited amount of data

2.5 Additional information

No additional information

3. Information related to Annex V Species

3.1 Is the species taken in the wild / exploited?

3.2 What measures have been taken?

a) Regulations regarding access to property
b) Temporary or local prohibition on the taking of specimens in the wild and exploitation
c) Regulation of the periods and/or methods of taking specimens
d) Application of hunting and fishing rules which take account of the conservation of such populations

e) Establishment of a system of licences for taking specimens or of quotas

f) Regulation of the purchase, sale, offering for sale, keeping for sale, or transport for sale of specimens

g) Breeding in captivity of animal species as well as artificial propagation of plant species

Other measures

Other measures description

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

a) Unit

Table 2: Quantity taken from the wild during the reporting period (see 3.3a for units). For species with defined hunting seasons, Season 1 refers to 2018/2019 (autumn 2018 to spring 2019), and Season 6 to 2023/2024. For species without hunting seasons, data are reported by calendar year: Year 1 is 2019, and Year 6 is 2024.

	Season/ year 1	Season/ year 2	Season/ year 3	Season/ year 4	Season/ year 5	Season/ year 6
b) Minimum	-	-	-	-	-	-
c) Maximum	-	-	-	-	-	-
d) Unknown	-	-	-	-	-	-

3.4: Hunting bag or quantity taken in the wild; Method used

3.5: Additional information

No additional information

Biogeographical Level

4. Biogeographical and marine regions

4.1 Biogeographical or marine region where the species occurs ATL

4.2 Sources of information

See section 14 References

5. Range

5.1 Surface area (km²)	11,910.37
5.2 Short-term trend; Period	2013-2024
5.3 Short-term trend; Direction	Stable
5.4 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	Best estimate
f) Rate of decrease	
5.5 Short-term trend; Method used	Based mainly on extrapolation from a limited amount of data
5.6 Long-term trend; Period	2000-2024
5.7 Long-term trend; Direction	Stable
5.8 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Rate of decrease	

5.9 Long-term trend; Method used	Based mainly on extrapolation from a limited amount of data

5.10 Favourable Reference Range (FRR)

a) Area (km²)	
b) Pre-defined increment	Current range is less than 2% smaller than the FRR
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

5.11 Change and reason for change in surface area of range

a) Change	No
b) Genuine change	
c) Improved knowledge or more accurate data	
d) Different method	
e) No information	
f) Other reason	
g) Main reason	

5.12 Additional information

No additional information

6. Population

6.1 Year or period	2013-2024

6.2 Population size (in reporting unit)

a) Unit	number of individuals
b) Minimum	
c) Maximum	

d) Best single value	17
6.3 Type of estimate	Best estimate
6.4 Quality of extrapolation to reporting unit	moderate

6.5 Additional population size (using population unit other than reporting unit)

a) Unit	number of map 10x10 km grid cells
b) Minimum	
c) Maximum	
d) Best single value	58
e) Type of estimate	Best estimate
6.6 Population size; Method used	Complete survey or a statistically robust estimate
6.7 Short-term trend; Period	2013-2024
6.8 Short-term trend; Direction	Stable
6.9 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
6.10 Short-term trend; Method used	Based mainly on extrapolation from a limited amount of data
6.11 Long-term trend; Period	2000-2024
6.12 Long-term trend; Direction	Stable
6.13 Long-term trend; Magnitude	

a) Minimum	
b) Maximum	
c) Confidence interval	
d) Rate of decrease	
6.14 Long-term trend; Method used	Based mainly on extrapolation from a limited amount of data

6.15 Favourable Reference Population (FRP)

ai) Population size	
aii) Unit	
b) Pre-defined increment	Current population is less than 5% smaller than the FRP
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

6.16 Change and reason for change in population size

a) Change	No
b) Genuine change	
c) Improved knowledge or more accurate data	
d) Different method	
e) No information	
f) Other reason	
g) Main reason	

6.17 Additional information

No additional information

6.18 Age structure, mortality and reproduction deviation	No deviation from normal

7. Habitat for the species

7.1 Sufficiency of area and quality of occupied habitat (for long-term survival)

a) Is area of occupied habitat sufficient?	Yes
b) Is quality of occupied habitat sufficient?	Yes
c) If No or Unknown, is there a sufficiently large area of unoccupied habitat of suitable quality?	

7.2 Sufficiency of area and quality of occupied habitat; Method used

a) Sufficiency of area of occupied habitat; Method used	Based mainly on extrapolation from a limited amount of data
b) Sufficiency of quality of occupied habitat; Method used	Based mainly on extrapolation from a limited amount of data
7.3 Short-term trend; Period	2013-2024
7.4 Short-term trend; Direction	Stable
7.5 Short-term trend; Method used	Based mainly on expert opinion with very limited data
7.6 Long-term trend; Period	
7.7 Long-term trend; Direction	
7.8 Long-term trend; Method used	

7.9 Additional information

No additional information

8. Main pressures

8.1 Characterisation of pressures

Table 3: Pressures affecting the species, including timing and importance/impact ranking. Pressures are defined as factors acting currently and/or during the reporting period (2019–2024). Rankings are: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Pressure	Timing	Ranking
PA18: Agricultural activities generating air pollution	Ongoing and likely to be in the future	Medium (M)
PD02: Hydropower (dams, weirs, run-off-the-river and respective infrastructure)	Ongoing and likely to be in the future	Medium (M)
PK01: Mixed source pollution to surface and ground waters (limnic and terrestrial)	Only in future	Medium (M)
PJ03: Changes in precipitation regimes due to climate change	Only in future	Medium (M)

8.2 Sources of information

See section 14 References

8.3 Additional information

No additional information

9. Conservation measures

9.1: Status of measures

a) Are measures needed?	Yes
b) Indicate the status of measures	Measures identified, but none yet taken

9.2 Main purpose of the measures taken

9.3 Location of the measures taken

9.4 Response to measures

9.5 List of main conservation measures

Table 4: Key conservation measures addressing current pressures and/or anticipated threats during the next two reporting periods (2025–2036). Measures are ranked by importance/impact: High (direct/

immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Conservation measure	Ranking
MA11: Reduce/eliminate air pollution from agricultural activities	Medium (M)
MB02: Maintain existing traditional forest management and exploitation practices	Medium (M)
MC04: Reduce impact of hydropower operation and infrastructure (incl. the restoration of freshwater habitats)	Medium (M)

9.6 Additional information

No additional information

10. Future prospects

10.1a Future trends of parameters

ai) Range	Overall stable
bi) Population	Overall stable
ci) Habitat for the species	Overall stable

10.1b Future prospects of parameters

aii) Range	Good
bii) Population	Good
cii) Habitat for the species	Good

10.2 Additional information

No additional information

11. Conclusions

11.1 Range	Favourable (FV)
11.2 Population	Favourable (FV)
11.3 Habitat for the species	Favourable (FV)

11.4 Future prospects	Favourable (FV)
11.5 Overall assessment of Conservation Status	Favourable (FV)
11.6 Overall trend in Conservation Status	Stable

11.7 Change and reason for change in conservation status

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

11.7 Change and reason for change in conservation status trend

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

11.8 Additional information

No additional information

12. UK National Site Network (pSCIs, SCIs, SACs) coverage for Annex II species

12.1 Population size inside the pSCIs, SCIs and SACs network

a) Unit	number of individuals
b) Minimum	
c) Maximum	
d) Best single value	6
12.2 Type of estimate	Best estimate
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
12.5 Short-term trend of population size within the network; Method used	Based mainly on extrapolation from a limited amount of data
12.6 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Direction	Stable
12.7 Short-term trend of habitat for the species inside the pSCIs, SCIs and SACs network; Method used	Based mainly on extrapolation from a limited amount of data

12.8 Additional information

No additional information

13. Complementary information

13.1 Justification of percentage thresholds for trends

No justification information

13.2 Trans-boundary assessment

No trans-boundary assessment information

13.2 Other relevant information

No other relevant information

14. References

Biogeographical and marine regions

4.2 Sources of information

Ratcliffe, D.A. Birks, Birks H.J.B., Birks Hilary H. The Ecology and conservation of the Killarney Fern Trichomanes speciosum WILLD. In Britain and Ireland. Biological Conservation 66 (1993) 231 −247.

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 species: S1421 - Killarney fern (Trichomanes speciosum).

Natural England, RSPB. 2014. Climate Change Adaptation Manual.

Chater, A.O. 2010. Flora of Cardiganshire. Aberystwyth. 798pp.

Botanical Society of Britain & Ireland distribution database, https://database.bsbi.org/

Schuler, S. B-M. et al. Genetic diversity and population history of the Killarney fern, Vandenboschia speciosa (Hymenophyllaceae), at its southern distribution limit in continental Europe. Botanical Journal of the Linnean Society, Volume 183, Issue 1, 1 January 2017, Pages 94-105.

Gibby, M. 1997. Workshop on Trichomanes speciosum, the Killarney fern. Confidential report of proceedings. (Unpublished) Natural History Museum. London.

'Sentinel' (2003) Killarney Fern Conservation. Pteridologist 4 (2) pp58-61

Stroh, P.A., Walker, K.J., Humphrey, T.A., Pescott, O.L & Burkmar, R.J. eds (2023). Plant Atlas 2020. Mapping Changes in the Distribution of the British and Irish Flora. 2 Volumes. Princeton: Botanical Society of Britain and Ireland & Princeton University Press.https://doi.org/10.2307/j.ctv2x6f08m

Rumsey, F.J. 2017. A review and analysis of the sporophyte generation of the Killarney fern Vandenboschia speciosa (Willd.) Kunkel (syn. Trichomanes specisosum Wild.) in Wales. Confidential report to NRW.

Rumsey, F.J. Jermy, A.C. 1998. The independent gametophytic stage of Trichomanes speciosum Willd. (Hymenophyllaceae), the Killarney Fern and its distribution in the British Isles. Watsonia 22: pages 1 - 19

Rumsey, F.J., Farrar, D.R. & Sheffield, E. 1990. Filmy fern gametophytes in the British Isles. Pteridologist 2: 40-42.

Ratcliffe, D.A. 2000. In Search of Nature. Peregrine Press.

Woodman (in prep) Summary of Vandenboschia speciosa sporophyte condition 2021 – 2025.

Main pressures

8.2 Sources of information

No sources of information

15. Explanatory Notes

Field label	Note
2.1: Sensitive species	While locations are not considered confidential at the 10km scale the perceived threat posed by collection means that there is some effort in keeping the exact locations of the sporophyte generation confidential.
2.4: Distribution map; Method used	Locations for the sporophyte are well known (Rumsey 2017 and pers. Comm with VCR's, NNR senior reserve managers, and recorders in Wales) and localised. The gametophyte is more widespread and there has been a steady accumulation of locations since the identification and technique for searching for the gametophyte has become better understood (Rumsey 1998). The gametophyte is still probably under-recorded, but this level of under-recording may well plateau soon.
5.3: Short-term trend; Direction	See 6.8
5.11: Change and reason for change in surface area of range	No clear change has been observed between reporting rounds. The sporophyte stations remain intact and present, the gametophyte locations are not surveyed systematically. No fluctuations in presence / absence of gametophyte observed with mapping using BSBI data (BSBI DDB and Atlas 2020).
6.2: Population size	Best Single Value = 17 (colonies) Estimates of the population size for Vandenboschia are not straight forward and could potentially be based on a number of different parameters. The sporophyte is known from six sites in Wales. These sites support a total of 17 discrete colonies (the unit most closely related to the standard EU reporting unit of individuals) of variable size (Rumsey 2017 and subsequent pers.comm with recorders 2021-2025). The combined total of live fronds, summed from the most recent visits to all Welsh colonies, is estimated at just over 2200, although exact counts at some sites are difficult and subject to natural fluctuations. All sites

	have been looked at and recorded from 2021 to 2025 and the extent and colony size has not changed since Rumsey surveys in 2016 & 2017. The gametophyte is much more widespread, and its exact distribution is less well understood and documented. Quantifying the population of this life stage is therefore not simple and is subject to significant uncertainties. The most repeatable and reliable measure of the gametophyte population currently available is the 10km square count, which currently stands at 58.
6.5: Additional population size	Vandenboschia speciosa (sporophytes and/or gametophytes) have been recorded from 58 separate hectads (10 x 10 km squares) in Wales (Botanical Society of Britain & Ireland distribution database, Rumsey 2017, Woodman in prep 2025).
6.6: Population size; Method used	All of the known localities for Vandenboschia speciosa sporophytes are visited on a regular basis by either NRW staff, local botanists or the relevant site guardian. The most complete assessment of these populations, summarised in Rumsey 2017, include an assessment of the number of discrete colonies and (in all but one case) an assessment of the number of live fronds. Subsequently visits to the known localities has been more ad hoc and data is variable. All colonies will have been visited between 2021 – 2025 (Woodman 2025 in prep). The distribution of the gametophyte in Wales is less well understood and monitored. The current hectad count is derived from data held in the BSBI database and from NRW records and is based on records provided by a range of both professional and amateur botanists. The life stage and its preferred habitat in the UK was first described less than 30 years ago (Rumsey et al. 1990) and its inconspicuous nature and relatively inaccessible habitat means that it is likely to remain under-recorded in Wales (Rumsey 2017).

6.8: Short-term trend; Direction	The short-term trend in population size is best considered stable. The overall increase in the reported hectad distribution of the gametophyte is mostly the result of the discovery of new, but presumably established colonies, rather than any significant spread of the life stage, which almost certainly remains under recorded, at least in some parts of Wales. There have been no recent losses or gains in the number of known localities for the sporophyte in Wales from surveys undertaken between 2021 – 2025 (Woodman 2025 in prep). Rumsey (2017) reports mixed trends in the numbers of live fronds recorded at individual sites, with the count at one site increasing, two remaining relatively stable, two fluctuating with no clear trend and one decreasing.
6.10: Short-term trend; Method used	The assessment of trend in population size is based on consideration of several different parameters for which different amounts and quality of data are available. Sites for the sporophyte generation are regularly visited by recorders, and while some aspects of population size (notably live frond count and to a lesser extent number of discrete colonies) are difficult to assess consistently at some less accessible sites, most are subject to relatively comprehensive recording. Sites for the gametophyte generation are not subject to any organised, routine surveillance and it is likely to remain under-recorded in some areas.
6.18: Age structure, mortality and reproduction	The age structure of individual populations of Vandenboschia in Wales is unusual, at least in comparison to many other plant species, with most populations consisting only of the gametophyte generation and occupying micro-habitats relatively unsuitable for the development of the sporophyte. Of the six known localities for the sporophyte three have never been known to produce fertile fronds, and recruitment of new sporophytes has only been observed at one in recent years, although all either occur in close association with or relatively near to colonies of the gametophyte (Rumsey 2017). However,

	there is no indication this is not the normal population structure in Wales.
7.1: Sufficiency of area and quality of occupied habitat	The sporophyte occupies continuously humid crevices, ravines and cave mouths. Anecdotally there is sufficient extent and quality of habitat that is both occupied and unoccupied. The gametophyte occupies rock crevices and ravines, sometimes similarly humid and sometimes in the same locations as the sporophyte. It also is found further afield in less humid locations (where the sporophyte is found). Again there is sufficient occupied and unoccupied habitat to support the gametophyte.
8.1: Characterisation of pressures	Pressures: Forestry activitities (PB09, PB23), 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) to consider them as any more than Low pressure. PI03, problematic native species (especially Hedera helix subspecies hibernica and Rubus fruticosus agg.) were considered to represent a greater risk to populations in the 2012 article 17 report (NRW 2013). However more recently Rumsey (2017) observed that “as a species successfully adapted to growth in very low light levels and to receive much/most of its nutrition through its foliage and therefore not from the competitive environment of the soil I believe that there is little evidence that the Trichomanes (Vandenboschia) sporophyte would suffer from interspecific competition, particularly when growing in optimal conditions” and on the strength of this PI03 is considered to be only a low pressure here. Climate change, notably Changes in precipitation regimes and this resulting in summer droughting (PJ03) (Natural England & RSPB 2014) may represent a significant risk to some established populations of Killarney fern sporophytes.

There is however little evidence of any current adverse impacts, but it is predicted that weather extremes and that including more prolonged and intense summer droughting are likely to increase and therefore it is given a medium threat for the future.

PD02, Hydroelectric power schemes, and to a lesser extent other activities that change the flow of water (PL05) represent a significant risk to populations through alteration of the ambient moisture levels in their ravine habitat. The pressure and threat level is considered low at all sites due to the present level of protection and regulation of hydroelectric schemes. Any lowering or removal of present level of protection and regulation would increase the level of threat from these activities for sporophyte populations and possibly some gametophyte populations. There used to be an abstraction up stream from the Carmarthenshire site that ceased some years ago.

PA18, Agricultural activities generating air pollution and that mostly reactive Nitrogen, notably from intensive agricultural production (chicken and dairy) is increasingly recognised as an issue adversely impacting species and habitats on sites across Wales. Although there is at present no direct evidence of impacts on Vandenboschia, this species, which receives much of its nutrition directly through its foliage (Rumsey 2017), is potentially very vulnerable to dry deposition of Ammonia through direct toxicity. Net enrichment by nutrient nitrogen, which favours more competitive species, may also represent a risk to some populations.

PF06, Deposition and treatment of waste/garbage from household/recreational facilities;PI02 other invasive alien species; PK01, mixed source pollution to surface and ground waters; and PM07, Natural processes without direct or indirect influence from human activities or climate change (e.g. erosion, silting up, drying out, submersion, salinization), have all been identified as issues at the

previously unprotected site (now SSSI) sporophyte site in Wales (S. Bosanquet, pers comm.). Here there has been and continues to be a threat from fly-tipping into the site from an adjacent road (PF06). This has led in the recent past to alteration of the stream bed and silting up / deposition of silt (PM07) over colonies of the Killarney Fern sporophyte.: There is also an ongoing pressure and continued threat from populations of non-native plant species (Galeobdolon luteum and Lonicera nitida) (PI02).This site is surrounded by agricultural land and upstream there is a slurry store and sewage treatment works. There is no evidence of any adverse impacts from these sources but they remain a significant threat and any unexpecting release from either installation could have a dramatic negative impact to the site and the population of Killarney fern here. All of the above pressures are considered to be low at the scale of Welsh populations as a whole but PI02 is identified as a Medium threat given the potentially catastrophic consequences of any accidental discharge on what is a key site for the species.

Threats:

All of the pressures listed above are considered to be ongoing and are expected to represent a continuing threat to the conservation status of the species over the next 12 years. Also see specific comments about ongoing threats to the Carmartheshire site above.

Collecting pressures (PG12) have been widely considered to represent the greatest threat to Killarney fern sporophytes in the UK and are believed to have eradicated at least five British colonies, as well as uncounted populations in Ireland (Ratcliffe 2000). However the locations of at least two populations of the sporophyte are widely known within the botanical community and neither appears to have suffered any deliberate damage in recent years nor is there any evidence of recent collection from any of the other Welsh localities. As such while collection is

	considered to be only a low threat it is not included as a pressure. Any alterations to the flow and chemical composition of the water, and to the microclimate, in the habitats of this fern are likely to be inimical to its survival (PD02, PL05), as through tree removal, hydro-electric developments and other water extraction. The natural random scouring of ravines by stream torrents under flood conditions can be aggravated by human interference within catchments. One small colony was lost during the intense frosts of early 1963, but probably after human activity had previously reduced its vigour. The Pembrokeshire population was severely damaged during the winter of 2011/12 but survives in small size today (Michael Sneade, NRW pers. Comm 2024)
9.5: List of main conservation measures	All of the 6 known sporophyte populations are in SACs and/or Sites of Special Scientific Interest and at least 25% of the known major gametophyte colonies are similarly protected (NRW 2013). Small areas of forestry have also been managed to potentially improve the habitat for this species (MB02), inside and outside the protected sites network (mainly by removal of non-native conifers). Emissions of reactive atmospheric nitrogen are controlled by both national and international regulations and more local planning controls. These regulations and other controls cover larger individual agricultural emitters but smaller emitters are largely unregulated (MA11). Reducing problematic native species through direct management may be required on some sites (MI05 & MS03). Recently improved regulation of hydropower schemes and presence of many of the sporophyte colonies within protected sites should limit any adverse impacts from these developments, although undiscovered and/or undisclosed colonies will remain at risk (MC04) Some work to reduce the impact of invasive non-native

	species (MI03) has been undertaken at one site. This may require further action.
10.1: Future trends and prospects of parameters	Future prospects of range While ongoing survey work may reveal further records extending the known distribution of the gametophyte, it is considered unlikely that there will be any significant change in the actual distribution (and associated range) of Vandenboschia in Wales over the next twelve years. Future prospects of population The overall trend in the population of Vandenboschia in Wales is likely to at least remain stable over the next twelve years. Existing populations of the sporophyte and gametophyte are fully protected from deliberate damage under the Wildlife and Countryside Act and the majority are included within the protected sites series. Threats, are in the main limited and/or largely offset by existing conservation measures. However, given the tiny number of individual colonies of the sporophyte there is the potential for chance events to have catastrophic impacts, for example more exposed colonies of the sporophyte remain vulnerable to frost damage in severe winters and the survival of one remains in the balance following the winter of 2011/12 (colony intact but reduced 2023). Future prospects of habitat of the species The overall trend in the habitat of Vandenboschia in Wales is likely to at least remain stable over the next twelve years. Threats, are in the main limited and/or largely offset by existing conservation measures.
11.1: Range	Conclusion on Range reached because: (i) the short-term trend direction in Range surface area is stable; and (ii) the current Range surface area is approximately equal to the Favourable Reference Range.

11.2: Population	Conclusion on Population reached because:(i) the short-term trend direction in Population size is stable; (ii) the current Population size is approximately equal to the Favourable Reference Population; and iii) reproduction, mortality and age structure not deviating from normal.
11.3: Habitat for the species	Conclusion on Habitat for the species reached because: i) the area of occupied habitat is sufficiently large for the long-term survival of the species (ii) the quality of occupied habitat is suitable for the long-term survival of the species; and (iii) the short-term trend in area of habitat is stable
11.4: Future prospects	Conclusion on Future prospects reached because: (i) the Future prospects for Range are good; (ii) the Future prospects for Population are good; and (iii) the Future prospects for Habitat for the species are good.
11.5: Overall assessment of Conservation Status	Overall assessment of Conservation Status is Favourable because all of the conclusions are Favourable.
12.1: Population size inside the pSCIs, SCIs and SACs network	Best single value = 6 (colonies) Vandenboschia is a recognised feature of three SACs in Wales, all of which support colonies of the sporophyte. The sporophyte is also known from a fourth Welsh SAC, although the secrecy surrounding this location resulted in it not being identified as a qualifying feature of the site at the point of designation. In total these four sites hold six discrete patches of the sporophyte (colonies) and (according to the most recent count data) include some 1440 live fronds.
12.3: Population size inside the network; Method used	All of the known localities for Vandenboschia speciosa sporophytes on SACs in Wales are visited on a regular basis by either NRW staff or local botanists. In the previous reporting round, assessments of these populations, were reported on in Rumsey 2017. This includes an assessment of the number of discrete colonies and (in all but one case) an assessment of the number of live fronds. More recently An assessment of colony size and health has been done at two of the four SAC populations in 2023 & 2024 (Woodman in prep 2025.)

12.4: Short-term trend of the population size within the network; Direction	The overall trend in the population of Vandenboschia (sporophyte) within the Welsh N2K series is comparatively stable. Fluctuations in the size and number of live fronds associated with individual colonies have been observed over both the long- and short-term, with severe winters adversely impacting the size and vigour of individual patches, but these are not considered to show any overall trend. There has been no comprehensive surveillance or monitoring of the gametophyte within Welsh SACs, but at present there is no reason to suspect an ecologically significant trend in the overall 'population size' of this life stage.
12.5: Short-term trend of population size within the network; Method used	The data underpinning the assessment of short-term trend is of mixed quality and this is reflected in the overall assessment of method type. Visit have been made to all known sporophyte locations since 2021 and the general health of these populations is stated to be good. Trend data for the sporophyte is derived from reasonably regular and comprehensive surveys by NRW staff and local botanists. Limited information is available on which to judge any trend in the gametophyte and for this life stage the trend assessment is made largely on the strength of expert Judgement.
6.15: Favourable Reference Population (FRP)	The UK-level FRV for population was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current population trends and abundance.
5.10: Favourable Reference Range (FRR)	The UK-level FRV for range was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent

reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current distribution and trends.