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:

S1395 - Petalwort (*Petalophyllum ralfsii*)

SCOTLAND

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 (Scotland information only)**
1.2 Species code	**1395**
1.3 Species scientific name	**Petalophyllum ralfsii**
1.4 Alternative species scientific name	
1.5 Common name (in national language)	Petalwort

2. Maps

2.1 Sensitive species	No
2.2 Year or period	2015-2016
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

Report on the main results of the surveillance under Article 11 for Annex II, IV and V species (Annex B)

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

Hodgetts, N.H. 2017. Surveillance of Petalophyllum ralfsii in the Hebrides - 2016/17: summary. Unpublished report to SNH.
Hodgetts, N.H. 2016. Surveillance of Petalophyllum ralfsii in the Uists - 2015/16. Unpublished report to SNH.
Rothero, G.P. 2003. Site dossier for bryological interest: Achnahaird Bay SSSI. Unpublished report to SNH.
Hodgetts, N.G. 2015. Third cycle Site Condition Monitoring report for bryological interest: Achnahaird SSSI/SAC. Scottish Natural Heritage Commissioned Report 881
Rothero, G.P. 2009. Site Condition Monitoring Dossier for bryological interest - 2nd cycle. Achnahaird SSSI. Inverness, Scottish Natural Heritage (unpublished report).
Genney, D.R. and McSorley, C.A. In prep. Exploring the range limits of the scarce liverwort Petalophyllum ralfsii in Scotland.
British Bryological Society. 2018. Database to the end of 2017 (available via the NBN)
Hodgetts, N.H. and Genney, D. R. 2013 - 2016. Surveillance of priority bryophytes in Scotland: Petalophyllum ralfsii. Unpublished report to SNH.

5. Range

5.1 Surface area (km²)

5.2 Short-term trend Period

5.3 Short-term trend Direction

Unknown (x)

Report on the main results of the surveillance under Article 11 for Annex II, IV and V species (Annex B)

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	Improved knowledge/more accurate data The change is mainly due to:	Improved knowledge/more accurate data
5.12 Additional information		

6. Population

6.1 Year or period	1974-2015	
6.2 Population size (in reporting unit)	a) Unit b) Minimum c) Maximum d) Best single value	number of map 1x1 km grid cells (grids1x1) 4
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	number of localities (localities) 3
6.5 Type of estimate	Best estimate	
6.6 Population size Method used	Based mainly on extrapolation from a limited amount of data	
6.7 Short-term trend Period	2007-2017	
6.8 Short-term trend Direction	Unknown (x)	
6.9 Short-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval	4 4
6.10 Short-term trend Method used	Based mainly on extrapolation from a limited amount of data	
6.11 Long-term trend Period	1998-2017	
6.12 Long-term trend Direction	Unknown (x)	
6.13 Long-term trend Magnitude	a) Minimum b) Maximum c) Confidence interval	4 4

Report on the main results of the surveillance under Article 11 for Annex II, IV and V species (Annex B)

6.14 Long-term trend Method used	Based mainly on extrapolation from a limited amount of data
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	Improved knowledge/more accurate data The change is mainly due to: Improved knowledge/more accurate data
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)?	No
	b) Is there a sufficiently large area of occupied AND unoccupied habitat of suitable quality (to maintain the species at FCS)?	No
7.2 Sufficiency of area and quality of occupied habitat Method used	Based mainly on extrapolation from a limited amount of data	
7.3 Short-term trend Period	2007-2018	
7.4 Short-term trend Direction	Uncertain (u)	
7.5 Short-term trend Method used	Insufficient or no data available	
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
Intensive grazing or overgrazing by livestock (A09)	H
Extensive grazing or undergrazing by livestock (A10)	M
Reseeding of grasslands and other semi-natural habitats (A13)	M
Tillage practices (e.g. ploughing) in agriculture (A15)	M
Application of natural fertilisers on agricultural land (A19)	H
Agricultural activities generating diffuse pollution to surface or ground waters (A26)	M
Sports, tourism and leisure activities (F07)	M
Accumulation of organic material (L03)	H

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

Extensive grazing or undergrazing by livestock (A10)	M
Reseeding of grasslands and other semi-natural habitats (A13)	M
Tillage practices (e.g. ploughing) in agriculture (A15)	M
Application of natural fertilisers on agricultural land (A19)	H
Agricultural activities generating diffuse pollution to surface or ground waters (A26)	M
Sports, tourism and leisure activities (F07)	M
Modification of hydrological flow (K04)	M
Accumulation of organic material (L03)	H
Abandonment of grassland management (e.g. cessation of grazing or mowing) (A06)	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, but none yet taken

9.2 Main purpose of the measures taken

Increase the population size and/or improve population dynamics (improve reproduction success, reduce mortality, improve age/sex structure) (related to 'Population')

9.3 Location of the measures taken

Both inside and outside Natura 2000

9.4 Response to the measures

Long-term results (after 2030)

9.5 List of main conservation measures

Manage the use of natural fertilisers and chemicals in agricultural (plant and animal) production (CA09)
Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land (CA01)
Maintain existing extensive agricultural practices and agricultural landscape features (CA03)
Adapt soil management practices in agriculture (CA08)
Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes (CL01)

9.6 Additional information

10. Future prospects

10.1 Future prospects of parameters

a) Range Poor

b) Population Poor

c) Habitat of the species Poor

10.2 Additional information

11. Conclusions

Report on the main results of the surveillance under Article 11 for Annex II, IV and V species (Annex B)

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 map 1x1 km grid cells (grids1x1)
	b) Minimum	
	c) Maximum	
	d) Best single value	3
12.2 Type of estimate	Minimum	
12.3 Population size inside the network Method used	Based mainly on extrapolation from a limited amount of data	
12.4 Short-term trend of population size within the network Direction	Uncertain (u)	
12.5 Short-term trend of population size within the network Method used	Insufficient or no data available	
12.6 Additional information	On the basis of 1-km records alone we would say that the short term trend is an increase, as reported in section 6. However, this would only be due to increased survey effort and does not reflect the threats and concerns about future prospects for the two 2015 discoveries in the North Uist Machair SAC. On balance we prefer to say there is uncertainty.	

13. Complementary information

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

Report on the main results of the surveillance under Article 11 for Annex II, IV and V species (Annex B)

Distribution Map

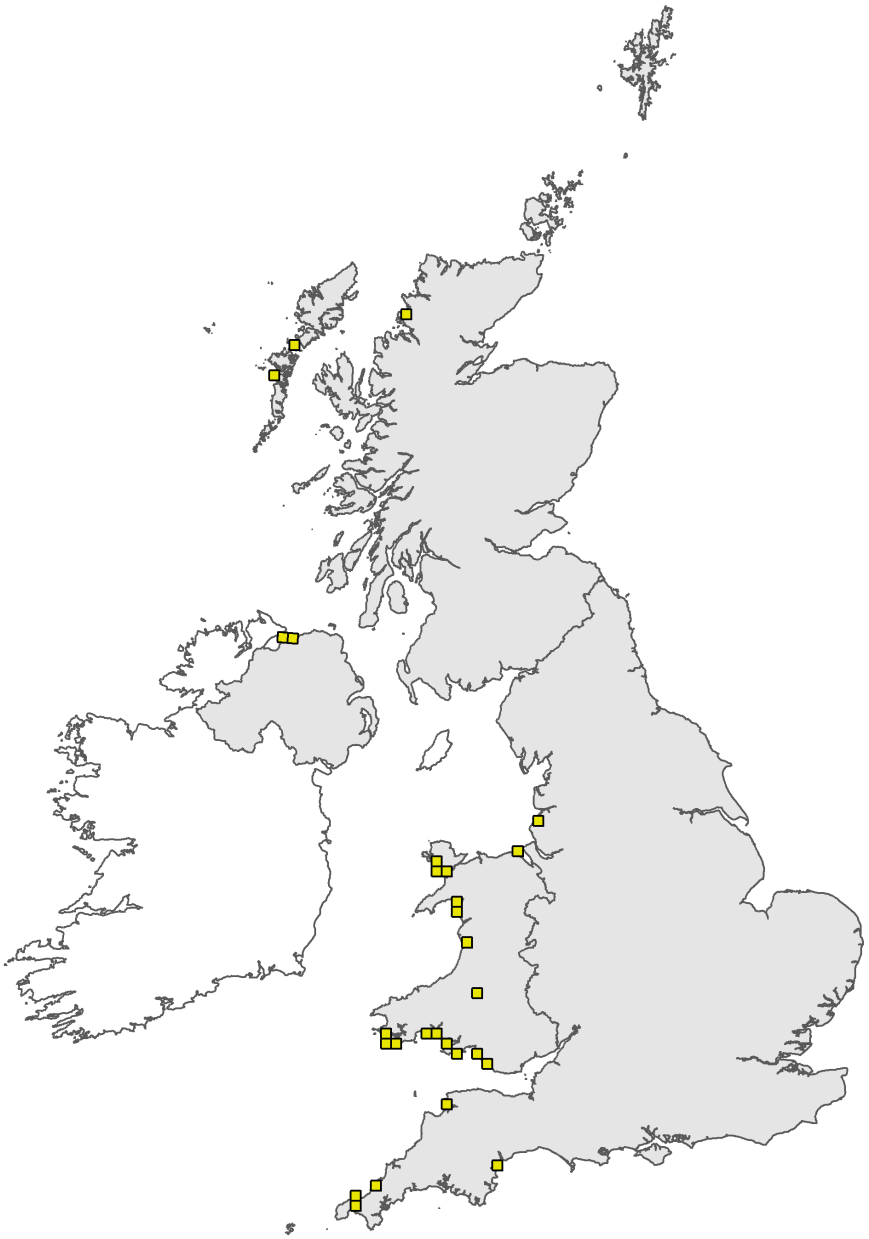

Figure 1: UK distribution map for S1395 - Petalwort (*Petalophyllum ralfsii*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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 S1395 - Petalwort (*Petalophyllum ralfsii*). 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: Petalophyllum ralfsii (1395)

Field label	Note
2.2 Year or Period	The liverwort was discovered in Scotland at Achnahaird in 1974 with the most recent record being 2016 with regular recording between these dates. However, because the additional monads were only discovered in 2015, the map would look the same irrespective of whether the date range 1974-2017 or 2015-2016 is used (2008 was the last record in the previous reporting period). 2015-2016 has been given here since all records within the current reporting period were made in this range and this data covers the entire known population in Scotland.

Species name: Petalophyllum ralfsii (1395) Region code: ATL

Field label	Note
5.3 Short term trend; Direction	The data indicate that the range has increased in Scotland, however, this is entirely due to extensive and targeted survey at potential new sites for the liverwort so the true trend is reported as unknown. There is a high risk that this newly defined range will decrease given the fragility of the newly discovered western locations. This is reflected in future prospects however and not recorded as a decline here.
5.11 Change and reason for change in surface area of range	SNH commissioned surveys during the winters of 15/16 and 16/17 focussed on known habitat characteristics outwith the then known range of this liverwort (Uists, Harris, Lewis, Colonsay, Coll and Tiree). The survey focussed on large areas of humid dune slack and resulted in the discovery of three new 1-km square records from two localities in the Uists; one on the island of Baleshare and the other on the island of Berneray. Very little suitable habitat was found elsewhere in the survey area despite an extensive search.
6.1 Year or Period	As 2.2
6.4 Additional population size	The number of individual thalli recorded at Achnahaird SAC in the 2008 SCM report was used in the previous reporting period. However, we now know that at any one time plants may be buried (but not dead) or have lost above-ground parts due to seasonal desiccation. For example, Site Condition Monitoring at Achnahaird SAC in autumn 2014 reported the absence of any thalli at a location where it was abundant previously. A follow-up visit in spring 2015, after sand had been blown off the population, estimated in excess of 1000 plants at the same location. It is likely that the population of below-ground perennating organs is more stable but we do not have a means of measuring their numbers other than by repeat visits to produce a cumulative population count. Estimates of individuals, as recorded above-ground, are no longer thought to be a meaningful way to describe the population site.
6.8 Short term trend; Direction	The data shows an increase in 1-km square records over the short-term period. However, this is entirely due to extensive and targeted survey at potential new sites for the liverwort so the true trend is reported as unknown. Given the very small number of plants in poor habitat within the newly discovered occupied 1-km squares, it is likely that similar degraded habitat has been lost elsewhere during the reporting period and that these new locations will be lost in the near future. This is reflected in future prospects however and not recorded as a decline here.
6.9 Short term trend; Magnitude	Magnitude calculated by dividing the number of occupied 1-km squares between 2013-2017 (4) by the number of 1-km squares occupied between 2007-2012 (1).
6.10 Short term trend; Method used	Given the inability to survey all of the species' range within each reporting period the survey cannot be said to be complete.

6.12 Long term trend; Direction	The data shows an increase in 1-km square records over the short-term period. However, this is entirely due to extensive and targeted survey at potential new sites for the liverwort so the true trend is reported as unknown. Given the very small number of plants in poor habitat within the newly discovered occupied 1-km squares, it is likely that similar degraded habitat has been lost elsewhere during the reporting period and that these new locations will be lost in the near future. This is reflected in future prospects however and not recorded as a decline here.
6.13 Long term trend; Magnitude	Magnitude calculated by dividing the number of occupied 1-km squares between 2007-2017 (4) by the number of 1-km squares occupied between 1995-2006 (1).
7.1 Sufficiency of area and quality of occupied habitat	We have responded 'no' to this question because of the lack of suitable habitat resulting in very small and apparently isolated populations in the Outer Hebrides. The lack of habitat here is likely due to traditional machair management resulting in poaching and dung impacts from cattle and control of rabbit populations to favour vascular plant features. Most areas at these sites were considered unsuitable but it is hard to imagine such isolated populations could have persisted for long periods with such small numbers, which suggest the area of suitable habitat was greater in the past and needs to be greater in the future for these western populations to persist. The quality of occupied habitat within Achnahaird SAC continues to be in good condition for the liverwort, as reported in 2013.
7.2 Sufficiency of area and quality of occupied habitat; Method used	Extensive survey of humid dune slack H2190 in western Scotland, which is the most likely broad habitat for the liverwort, found that most of this habitat did not have the correct micro-habitat characteristics. The proposed reasons are outlined in audit 8.1. In addition, and as reported in the 2013 report for H2190, there has been a trend towards dune system stability throughout north west Europe and losses to developments such as golf courses.
7.4 Short term trend; Direction	The H2190 habitat report will provide information on the status of the broad habitat but contains insufficient information on which to allocate a trend in the micro-habitat and processes required to support the liverwort. The trend has been assessed as 'Uncertain' because the factors restricting the extent of suitable habitat are still operating so decline is more likely than not.
8.1 Characterisation of pressures/ threats	Pressures and threats differ between Achnahaird SAC, where the species appears to be in good condition, and at the two new localities discovered in 2015 (see 5.11 and 9.5 audit notes). At Achnahaird SAC the main threats are likely to be under-grazing if sheep are not maintained on the site. Following survey of the Uists, Harris, Lewis, Colonsay, Coll and Tiree between 2015-2017, surveyor Nick Hodgetts noted that 'Most dune systems, especially on Coll and Tiree, are (now) unsuitable for P. ralfsii, being too heavily grazed and subject to heavy nutrient loading resulting in eutrophication of ground water and an increasingly organic component in the soil. This in turn leads to wet slacks being dominated by coarse vegetation with Calliergonella cuspidata dominant in the bryophyte layer. Most dune hummocks are dry, dominated by plants such as marram grass, with large common mosses such as Homalothecium lutescens, Rhytidiadelphus spp. and Syntrichia ruralis var. ruraliformis dominant in the bryophyte layer. Some sites are very intensively managed, with disturbance by vehicles, ploughing for cultivation, seaweed spreading for fertilisation, high stocking levels and much winter feed input.', And further 'Overall there was a strong impression that some sites may have deteriorated since the BBS visited them in 1992, with (for example) species such as Amblyodon dealbatus, Catoscopium nigritum and Meesia uliginosa now rare or absent, possibly due to increasingly intensive machair management. However, species other than P. ralfsii were not actively searched for, and some of them may be more visible later in the year, when producing sporophytes'.

9.5 List of main conservation measures	Within Achnahaird SAC Petalophyllum appears to be doing well with at least a stable population as the plot level. Monitoring is required here to assess the longer-term impacts of change in land use from campsite and grazing to grazing only. Negative impacts caused by recreational disturbance are likely to be negligible, but require continued monitoring. Detailed conservations measures are being developed for the Achnahaird Natura Plan. The two recently discovered populations, and assessment of potential habitat on other western Scotland islands, paint a less favourable picture (see 8.1 audit). The selected measures are required to improve habitat suitability for the liverwort. However, this may be difficult due to conflicting traditional management requirements for Machair and a long-history of grazing and fertilizer management. Recovery would likely take many decades but experimental approaches should be investigated e.g. removal of nutrient enriched surface soil. Cattle grazing should be replaced by sheep and rabbit grazing at known sites if there is to be any chance of avoiding continued decline.
10.1 Future prospects of parameters	While it is difficult to measure the rate of decline in habitat suitability at the Uist sites, the habitat appears to be deteriorating and currently supports a very small population based on thallus counts. It is likely that these populations will be lost at some point in the near future, reducing the range in Scotland back to the single large population at Achnahaird. This will also result in loss of 1-km square occupancy, so the population and habitat for the species will likely decline. The prospects are poor because there is unlikely to be a significant change in management in the Uists.
12.4 Short term trend of the population size within the network; Direction	On the basis of 1-km square population units, the population is stable at Achnahaird SAC. However, there is not enough information about the trend in 1-km squares within North Uist Machair SAC over the reporting period to confidently provided a trend here. For this reason the overall assessment is 'uncertain'.