

**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:

S1395 - Petalwort (*Petalophyllum ralfsii*)

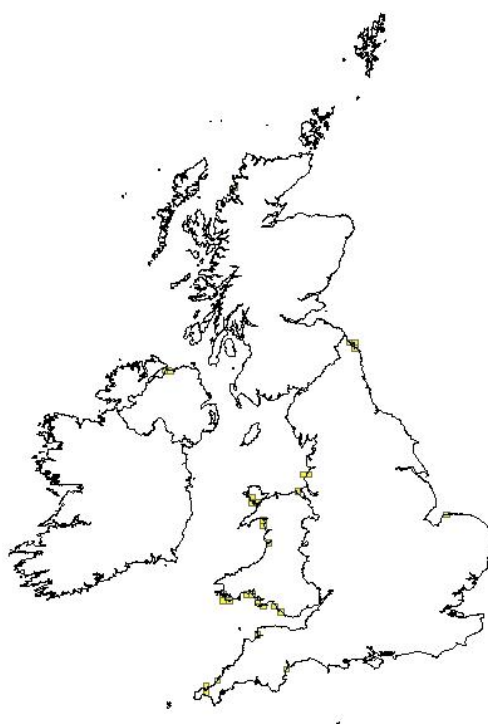
**IMPORTANT NOTE – PLEASE READ**

- 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 **Scottish Natural Heritage** and refers only to the state of the habitat/species in **Scotland** - 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.

**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>S1395</b>
	<b>0.2.2 Species scientific name</b>	<b><i>Petalophyllum ralfsii</i></b>
	<b>0.2.3 Alternative species scientific name</b> Optional	
	<b>0.2.4 Common name</b> Optional	<b>Petalwort</b>

<b>1.1 Maps</b>			
<b>1.1.1 Distribution map</b>		<b>Sensitive</b>	<b>False</b>



<b>1.1.2 Method used - map</b>	<b>Complete survey/Complete survey or a statistically robust estimate</b>
<b>1.1.3 Year or period</b>	<b>1974-2008</b>
<b>1.1.4 Additional distribution map</b>	<b>False</b>
<b>1.1.5 Range map</b>	

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<b>2.1 Biogeographical region &amp; marine regions</b>	<b>ATL</b>
<b>2.2 Published sources</b>	<p><b>"Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: Petalophyllum ralfsii. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.</b></p> <p><b>Reference included in above report:</b>  <b>ECCB (European Committee for conservation of Bryophytes), 1995. Red data book of European bryophytes. University of Trondheim.</b>  <b>Hodgetts NG, 2011. A revised Red List of bryophytes in Britain. Field Bryology 103 40-49.</b>  <b>Holyoak, D T, 1998. Petalwort Petalophyllum ralfsii: Report to Plantlife on work carried out during 1999 and summary of results of work during 1997 and 1998. Plantlife Report 143, unpublished.</b>  <b>Holyoak, D T, 2000. Petalwort Petalophyllum ralfsii: Report to Plantlife on work carried out during 1997. Plantlife Report, unpublished.</b>  <b>Hughes, K, 1997. The factors which affect the distribution of Petalophyllum ralfsii on the Birkdale coast. Dissertation for BSc Geographical Studies, Liverpool Hope University College. Unpublished</b>  <b>Paton, J A, 1999. The liverwort flora of the British Isles. Harley Books.</b>  <b>Preston CD, 2010. A revised list of nationally rare bryophytes. Field Bryology 100 32-40.</b>  <b>Rothero GP, 1994. Species dossier: Petalophyllum ralfsii. Unpublished report for SNH.</b>  <b>Rothero GP, 1998. Baseline survey of the population of Petalophyllum ralfsii and a preliminary survey of Red Data Book Bryum species at Achnahaird Bay, Wester Ross. Unpublished report for SNH.</b>  <b>Rothero GP, 2004. Site dossier for bryological interest: Achnahaird Bay. Report for Scottish Natural Heritage.</b>  <b>Rothero GP, 2008. Site dossier for bryological interest – 2nd cycle: Achnahaird Bay. Report for Scottish Natural Heritage."</b></p>
	<p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: Petalophyllum ralfsii. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.</p> <p>Reference included in above report:  ECCB (European Committee for conservation of Bryophytes), 1995. Red data book of European bryophytes. University of Trondheim.  Hodgetts NG, 2011. A revised Red List of bryophytes in Britain. Field Bryology 103 40-49.</p>

	<p>Holyoak, D T, 1998. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1999 and summary of results of work during 1997 and 1998. Plantlife Report 143, unpublished.</p> <p>Holyoak, D T, 2000. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1997. Plantlife Report, unpublished.</p> <p>Hughes, K, 1997. The factors which affect the distribution of <i>Petalophyllum ralfsii</i> on the Birkdale coast. Dissertation for BSc Geographical Studies, Liverpool Hope University College. Unpublished</p> <p>Paton, J A, 1999. The liverwort flora of the British Isles. Harley Books.</p> <p>Preston CD, 2010. A revised list of nationally rare bryophytes. Field Bryology 100 32-40.</p> <p>Rothero GP, 1994. Species dossier: <i>Petalophyllum ralfsii</i>. Unpublished report for SNH.</p> <p>Rothero GP, 1998. Baseline survey of the population of <i>Petalophyllum ralfsii</i> and a preliminary survey of Red Data Book Bryum species at Achnahaird Bay, Wester Ross. Unpublished report for SNH.</p> <p>Rothero GP, 2004. Site dossier for bryological interest: Achnahaird Bay. Report for Scottish Natural Heritage.</p> <p>Rothero GP, 2008. Site dossier for bryological interest – 2nd cycle: Achnahaird Bay. Report for Scottish Natural Heritage.</p>
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<b>2.3 Range</b>							
<b>2.3.1 Surface area Range</b>	<p><b>0.05</b></p> <p>This species is known from one site in Scotland, Achnahaird SAC, where a large fluctuating population occurs over an area of about 5.0 hectares.</p>						
<b>2.3.2 Method used Surface area of Range</b>	<p><b>Complete survey/ Complete survey or a statistically robust estimate</b></p> <p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.</p>						
<b>2.3.3 Short-term trend Period</b>	<p><b>2004-2008</b></p> <p>2001 (2004 1st survey date in period)-2012 (2008 last survey date in period)</p>						
<b>2.3.4 Short term trend Trend direction</b>	<p><b>stable</b></p>						
<b>2.3.5 Short-term trend Magnitude</b>	<table border="1" style="width: 100%;"> <tr> <td style="background-color: #e0e0e0;"><b>a) Minimum</b></td> <td></td> </tr> <tr> <td colspan="2"> <p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.)</p> <p>The range has not changed because the species is still present at its one Scottish site.</p> </td> </tr> <tr> <td style="background-color: #e0e0e0;"><b>b) Maximum</b></td> <td></td> </tr> </table>	<b>a) Minimum</b>		<p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.)</p> <p>The range has not changed because the species is still present at its one Scottish site.</p>		<b>b) Maximum</b>	
<b>a) Minimum</b>							
<p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.)</p> <p>The range has not changed because the species is still present at its one Scottish site.</p>							
<b>b) Maximum</b>							

<b>2.3.6 Long-term trend Period</b>		
<b>2.3.7 Long-term trend Trend direction</b>		
<b>2.3.8 Long-term trend Magnitude</b>  Optional	<b>a) Minimum</b>	
	The range has not changed because the species is still present at its one Scottish site. Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i> . SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.)	
	<b>b) Maximum</b>	
<b>2.3.9 Favourable reference range</b>	<b>a) Value in km<sup>2</sup></b>	
	Only one site so to maintain this site is a sensible reference range.	
	<b>b) Operator for FRR</b>	
	<b>c) FRR is unknown (indicated by "true")</b>	False
	<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>	False
	No change	
	<b>b) Improved knowledge/more accurate data?</b>	False
	<b>c) Use of different method (e.g. "Range tool")?</b>	False

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<b>2.4 Population</b>	
<b>2.4.1 Population size estimation</b> (using individuals or agreed exceptions where possible)	<b>a) Unit</b> <b>number of individuals</b>
	<b>b) Minimum</b> <b>3680</b>
	<b>c) Maximum</b> <b>3680</b>
<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 localities</b>
	Thallus
	<b>b) Minimum</b> <b>1</b>
<b>2.4.3 Additional information on population estimates / conversion</b> Optional	<b>a) Definition of "locality"</b> <b>SAC boundary</b>
	<b>b) Method to convert data</b>
	<b>c) Problems encountered to provide population size estimation</b> <b>1. The plant is small, numerous and scattered which precludes a direct count. 2. The plant disappears at the surface after dry spells 3. Suitable areas of habitat are not easy to define in photos or on maps and may change over time. 4. Petalophyllum ralfsii is a ruderal species and the population may vary markedly from year to year.</b>
<b>2.4.4 Year or period</b>	<b>2008-2008</b>
<b>2.4.5 Method used Population size</b>	<b>Complete survey/ Complete survey or a statistically robust estimate</b>
	Bryophyte data for Great Britain from the British Bryological Society held by BRC Explained in answers to questions above
<b>2.4.6 Short-term trend Period</b>	<b>2004-2008</b>
	The short term trend period used for all bryophyte reports is comparison of 2001-2006 data with 2007-2012 data. For <i>P. ralfsii</i> , this includes two data points, one in 2004 and one in 2008.
<b>2.4.7 Short-term trend</b>	<b>stable</b>

<b>Trend direction</b>	0 based on locality.  > based on recorded number of thalli but unknown really due to the variability in accuracy of population method between monitoring points.	
<b>2.4.8 Short-term trend Magnitude</b>	<b>a) Minimum</b>	<b>0</b>
	<b>b) Maximum</b>	<b>0</b>
	0 (58% with low confidence if using population estimate)	
	<b>c) Confidence interval</b>	
<b>2.4.9 Short-term trend Method used</b>	<p><b>Complete survey/Complete survey or a statistically robust estimate</b></p> <p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.</p> <p>Reference included in above report:                  ECCB (European Committee for conservation of Bryophytes), 1995. Red data book of European bryophytes. University of Trondheim.                  Hodgetts NG, 2011. A revised Red List of bryophytes in Britain. Field Bryology 103 40-49.                  Holyoak, D T, 1998. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1999 and summary of results of work during 1997 and 1998. Plantlife Report 143, unpublished.                  Holyoak, D T, 2000. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1997. Plantlife Report, unpublished.                  Hughes, K, 1997. The factors which affect the distribution of <i>Petalophyllum ralfsii</i> on the Birkdale coast. Dissertation for BSc Geographical Studies, Liverpool Hope University College. Unpublished                  Paton, J A, 1999. The liverwort flora of the British Isles. Harley Books.                  Preston CD, 2010. A revised list of nationally rare bryophytes. Field Bryology 100 32-40.                  Rothero GP, 1994. Species dossier: <i>Petalophyllum ralfsii</i>. Unpublished report for SNH.                  Rothero GP, 1998. Baseline survey of the population of <i>Petalophyllum ralfsii</i> and a preliminary survey of Red Data Book Bryum species at Achnahaird Bay, Wester Ross. Unpublished report for SNH.                  Rothero GP, 2004. Site dossier for bryological interest: Achnahaird Bay. Report for Scottish Natural Heritage.                  Rothero GP, 2008. Site dossier for bryological interest – 2nd cycle: Achnahaird Bay. Report for Scottish Natural Heritage.</p> <p>Trend based on locality:                  Continued presence at one locality = no change.</p>	

	<p>Trend based on population estimate:  Trend % = population count 2008/(population count 2008 – population count 2004) x 100</p> <p>We have very low confidence in the population trend data because:</p> <ol style="list-style-type: none"> <li>1. The plant is small, numerous and scattered which precludes a direct count.</li> <li>2. The plant disappears at the surface after dry spells</li> <li>3. Suitable areas of habitat are not easy to define in photos or on maps and may change over time.</li> <li>4. <i>Petalophyllum ralfsii</i> is a ruderal species and the population may vary markedly from year to year.</li> </ol> <p>In our opinion, the variation in population is most likely due to variation in point monitoring data due to these caveats rather than a real decline in population over the trend period.</p>	
<p><b>2.4.10 Long-term trend – Period</b></p>	<p><b>1974-2008</b></p> <p>The long term trend period used for all bryophyte reports is comparison of 1989-2000 data with 2001-2012 data. For <i>P. ralfsii</i>, this includes two data points in the first period (1994 and 1998) and two data points in the second period (2004 and 2008).</p>	
<p><b>2.4.11 Long-term trend Trend direction</b></p>	<p><b>stable</b></p> <p>0 based on locality.</p> <p>&gt; based on recorded number of thalli but unknown really due to the variability in accuracy of population method between monitoring points.</p>	
<p><b>2.4.12 Long-term trend Magnitude</b> Optional</p>	<p><b>a) Minimum</b></p>	<p><b>0</b></p>
	<p><b>b) Maximum</b></p>	<p><b>0</b></p>
	<p>0 (72% with low confidence if using population estimate)</p>	
	<p><b>c) Confidence interval</b></p>	
<p><b>2.4.13 Long term trend Method used</b></p>	<p><b>3</b></p> <p>Bryophyte data for Great Britain from the British Bryological Society held by BRC</p> <p>Trend based on locality: Continued presence at one locality = no change.</p> <p>Trend based on population estimate: Trend % = population count 1998/(population count 1998 – mean</p>	



	<p>population count (2004 and 2008)) x 100</p> <p>We have very low confidence in the population trend data because:</p> <ol style="list-style-type: none"> <li>5. The plant is small, numerous and scattered which precludes a direct count.</li> <li>6. The plant disappears at the surface after dry spells</li> <li>7. Suitable areas of habitat are not easy to define in photos or on maps and may change over time.</li> <li>8. <i>Petalophyllum ralfsii</i> is a ruderal species and the population may vary markedly from year to year.</li> </ol> <p>In our opinion, the variation in population is most likely due to variation in point monitoring data due to these caveats rather than a real decline in population over the trend period.</p>	
<p><b>2.4.14 Favourable reference population</b></p>	<p><b>a) Number of individuals/agreed exceptions/other units</b></p>	
	<p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013. Presumably this is one locality for Scotland and this seems suitable given the survey constraints highlighted above.</p>	
	<p><b>b) Operator</b></p>	
	<p><b>c) FRP is unknown indicated by "true"</b></p>	<p><b>False</b></p>
	<p><b>d) Method used to set FRP</b></p>	
<p><b>2.4.15 Reason for change</b></p> <p>Is the difference between the value reported at 2.4.1 or 2.4.2 and the previous reporting round mainly due to:</p>	<p><b>a) Genuine change?</b></p>	<p><b>False</b></p>
	<p>NO CHANGE at locality scale. Not likely to be genuine change at individual scale.</p>	
	<p><b>b) Improved knowledge/more accurate data?</b></p>	<p><b>False</b></p>
	<p><b>c) Use of different method (e.g. "Range tool")?</b></p>	<p><b>False</b></p>

**2.5 Habitat for the species****2.5.1 Area estimation**

Almost all sites in the British Isles and certainly the largest populations of *Petalophyllum ralfsii* are on damp calcareous sand in coastal dune systems.

The thin soils in which *Petalophyllum ralfsii* grows have a small organic fraction and tend to be nutrient poor but calcium-rich. Most stands are associated with bare patches of sandy soil though *Petalophyllum ralfsii* can be abundant in a thin but complete cover of small perennial herbs and bryophytes. However, it does not occur in areas of mobile sand and appears to need a firm substrate which persists for some time. Some stands at Achnahaird seem to persist after moderate scouring of the sand surface, sufficient to expose the normally subterranean 'tubers' and can grow through a moderate covering (<5 mm) of fresh sand.

*Petalophyllum ralfsii* favours substrates that are wet for at least part of the year and in England and Wales it is most common in dune slacks that are wet or flooded during the winter. Some sites in Cornwall (Holyoak, 2000) and the population at Achnahaird grow on sand that is irrigated either by rainwash or drainage from the slopes above and, at Achnahaird, by ground water seepage and springs within the dunes. In Britain, *Petalophyllum ralfsii* seems to be intolerant of shading though it does occur under trees in the Mediterranean. On the Birkdale coast it occurs under light shading from scrub in some places but is thought to be under threat here unless the scrub is cleared. All the sites at Achnahaird are very open indeed. Another factor common to most sites is the intense grazing of the sward, usually by rabbits, but by rabbits and sheep at Achnahaird, and this is presumably plays some part in keeping the sward very short and open. At some sites in England and Wales some light trampling of the sward may have the same effect and at Achnahaird small stands of *Petalophyllum ralfsii* occurred on worn ground used for camping and caravanning during the summer before the campsite was closed (Rothero, 1998).

It is unknown whether the amount of habitat in the UK is sufficient to support a viable population of the species.

Unknown: No estimate for the total area of damp calcareous sand in coastal dune systems available for Scotland. The area of broad habitat at the one locality is c. 5 ha, but the specific habitat area is much less (see referenced reports).

It is unknown whether the amount of habitat in the UK is sufficient to support a viable population of the species.

Unknown, however because the large population is only at a single locality it is at risk due to natural events (e.g. storms) or changes in land management.

There are no appropriate annex 1 habitats that report area for the specific habitat required by the liverwort.

Surveys of a number of other sand dune systems in Scotland in 1998 failed to find any more sites (Rothero, 1998).

	It is unknown whether the amount of habitat in the UK is sufficient to support a viable population of the species.	
<b>2.5.2 Year or period</b>		
<b>2.5.3 Method used Habitat for the species</b>	<b>Complete survey/Complete survey or a statistically robust estimate</b>	
	3 for the habitat estimate based on monitoring photographs at its single Scottish locality.	
<b>2.5.4 Quality of the habitat</b>	<b>a) Habitat quality</b>	<b>Good</b>
	<p>The single locality is currently considered to be in Favourable Condition because there is plenty of apparently suitable habitat.</p> <p>Site Condition Monitoring</p> <p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.</p> <p>Reference included in above report:</p> <p>ECCB (European Committee for conservation of Bryophytes), 1995. Red data book of European bryophytes. University of Trondheim.</p> <p>Hodgetts NG, 2011. A revised Red List of bryophytes in Britain. <i>Field Bryology</i> 103 40-49.</p> <p>Holyoak, D T, 1998. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1999 and summary of results of work during 1997 and 1998. <i>Plantlife Report</i> 143, unpublished.</p> <p>Holyoak, D T, 2000. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1997. <i>Plantlife Report</i>, unpublished.</p> <p>Hughes, K, 1997. The factors which affect the distribution of <i>Petalophyllum ralfsii</i> on the Birkdale coast. Dissertation for BSc Geographical Studies, Liverpool Hope University College. Unpublished</p> <p>Paton, J A, 1999. The liverwort flora of the British Isles. Harley Books.</p> <p>Preston CD, 2010. A revised list of nationally rare bryophytes. <i>Field Bryology</i> 100 32-40.</p> <p>Rothero GP, 1994. Species dossier: <i>Petalophyllum ralfsii</i>. Unpublished report for SNH.</p> <p>Rothero GP, 1998. Baseline survey of the population of <i>Petalophyllum ralfsii</i> and a preliminary survey of Red Data Book Bryum species at Achnahaird Bay, Wester Ross. Unpublished report for SNH.</p> <p>Rothero GP, 2004. Site dossier for bryological interest: Achnahaird Bay. Report for Scottish Natural Heritage.</p> <p>Rothero GP, 2008. Site dossier for bryological interest – 2nd cycle: Achnahaird Bay. Report for Scottish Natural Heritage.</p>	
	<b>b) Assessment method</b>	<b>The single locality is currently considered to be in Favourable Condition because there is plenty of apparently suitable</b>

	<b>habitat.</b>		
	Based on expert survey at single SAC via Site Condition Monitoring		
<b>2.5.5 Short-term trend Period</b>	<b>2001-2012</b>		
<b>2.5.6 Short-term trend Trend direction</b>	<b>stable</b>		
	<p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.</p> <p>Reference included in above report:  ECCB (European Committee for conservation of Bryophytes), 1995. Red data book of European bryophytes. University of Trondheim.  Hodgetts NG, 2011. A revised Red List of bryophytes in Britain. <i>Field Bryology</i> 103 40-49.  Holyoak, D T, 1998. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1999 and summary of results of work during 1997 and 1998. <i>Plantlife Report</i> 143, unpublished.  Holyoak, D T, 2000. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1997. <i>Plantlife Report</i>, unpublished.  Hughes, K, 1997. The factors which affect the distribution of <i>Petalophyllum ralfsii</i> on the Birkdale coast. Dissertation for BSc Geographical Studies, Liverpool Hope University College. Unpublished  Paton, J A, 1999. The liverwort flora of the British Isles. Harley Books.  Preston CD, 2010. A revised list of nationally rare bryophytes. <i>Field Bryology</i> 100 32-40.  Rothero GP, 1994. Species dossier: <i>Petalophyllum ralfsii</i>. Unpublished report for SNH.  Rothero GP, 1998. Baseline survey of the population of <i>Petalophyllum ralfsii</i> and a preliminary survey of Red Data Book <i>Bryum</i> species at Achnahaird Bay, Wester Ross. Unpublished report for SNH.  Rothero GP, 2004. Site dossier for bryological interest: Achnahaird Bay. Report for Scottish Natural Heritage.  Rothero GP, 2008. Site dossier for bryological interest – 2nd cycle: Achnahaird Bay. Report for Scottish Natural Heritage.  As above, this is based on a single site assessment and there has been no significant change in habitat extent at the locality.</p>		
<b>2.5.7 Long-term trend Period</b>			
<b>2.5.8 Long-term trend Trend direction</b>			
<b>2.5.9 Area of suitable habitat for the species</b>	<table border="1"> <tr> <td><b>a) Value in km<sup>2</sup></b></td> <td><b>0.05</b></td> </tr> </table> <p>Main data summary in Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i>. SNH report (unpublished at time of reporting but will appear at <a href="http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/">http://www.snh.gov.uk/publications-data-and-research/trends/scotlands-trends/</a> in 2013.</p> <p>Reference included in above report:  ECCB (European Committee for conservation of Bryophytes), 1995. Red data book of European bryophytes. University of Trondheim.</p>	<b>a) Value in km<sup>2</sup></b>	<b>0.05</b>
<b>a) Value in km<sup>2</sup></b>	<b>0.05</b>		

	<p>Hodgetts NG, 2011. A revised Red List of bryophytes in Britain. <i>Field Bryology</i> 103 40-49.</p> <p>Holyoak, D T, 1998. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1999 and summary of results of work during 1997 and 1998. <i>Plantlife Report</i> 143, unpublished.</p> <p>Holyoak, D T, 2000. Petalwort <i>Petalophyllum ralfsii</i>: Report to Plantlife on work carried out during 1997. <i>Plantlife Report</i>, unpublished.</p> <p>Hughes, K, 1997. The factors which affect the distribution of <i>Petalophyllum ralfsii</i> on the Birkdale coast. Dissertation for BSc Geographical Studies, Liverpool Hope University College. Unpublished</p> <p>Paton, J A, 1999. The liverwort flora of the British Isles. Harley Books. Preston CD, 2010. A revised list of nationally rare bryophytes. <i>Field Bryology</i> 100 32-40.</p> <p>Rothero GP, 1994. Species dossier: <i>Petalophyllum ralfsii</i>. Unpublished report for SNH.</p> <p>Rothero GP, 1998. Baseline survey of the population of <i>Petalophyllum ralfsii</i> and a preliminary survey of Red Data Book <i>Bryum</i> species at Achnahaird Bay, Wester Ross. Unpublished report for SNH.</p> <p>Rothero GP, 2004. Site dossier for bryological interest: Achnahaird Bay. Report for Scottish Natural Heritage.</p> <p>Rothero GP, 2008. Site dossier for bryological interest – 2nd cycle: Achnahaird Bay. Report for Scottish Natural Heritage.</p>	
	<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>
	<b>b) Improved knowledge/more accurate data?</b>	<b>False</b>
	<b>c) Use of different method (e.g. "Range tool")?</b>	<b>False</b>

<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	
A04: grazing	H	

There have been changes in the management of the site, actual and planned, which need to be considered. The owner of the site has confirmed that sheep numbers on the site have been reduced somewhat and that

further reductions may be planned. This is likely to have an effect on the sward on all of the monitoring sites as all have been grazed quite hard in the past, a condition that ideally suits *Petalophyllum ralfsii*. The owner also raised the possibility of fencing off the dune system, presumably to control access by grazing animals. The problems associated with this have been discussed with the owner and the hope is that this will not happen. The question of cattle grazing has also been proposed. It is possible that cattle could do some damage to the site but it is equally possible that some level of disturbance might actually benefit a ruderal species like *Petalophyllum ralfsii*. There are other sites in the UK, and particularly in Ireland, where cattle and *Petalophyllum ralfsii* regularly mix. Much would depend on the stocking level. It would also seem prudent to have some mechanism within the consent whereby the policy could be changed if unacceptable levels of poaching were seen to be taking place. All of these management options are currently being discussed with the owner with regards to encouraging an agri-environment (SRDP) application in the near future.

<b>2.6.1 Method used – Pressures</b>	<b>based exclusively or to a larger extent on real data from sites/occurrences or other data sources</b>
	SCM 2nd cycle report

<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	
G01: Outdoor sports and leisure activities, recreational activities	M	
H01: Pollution to surface waters (limnic & terrestrial, marine & brackish)	M	

Threats identified for various of the populations in England and Wales include scrub encroachment, lowering of the water table, eutrophication of the groundwater, recreational use of the sites and development. All of these except scrub encroachment are possible threats to the population at Achnahaird. The site was directly below a caravan and camping site which has now closed: indeed some caravans and tents were pitched on stands of *Petalophyllum ralfsii* during the summer months. This posed something of a direct threat but it is the indirect effects of the caravan site that are still worrying, particularly lingering eutrophication of the run-off by sewage or the channelling of water to improve drainage on the site. There are signs within the areas where *Petalophyllum ralfsii* grows that vehicles, including motor bikes, are ridden down through the dunes and one of the attractions of the site is the easy access to the dunes for pedestrians. At present, the limited use of the site during much of the year means that these threats are at a low level and it seems likely that this situation will continue for the foreseeable future, particularly now that the campsite has closed.

<b>2.7.1 Method used – Threats</b>	<b>expert opinion</b>
	SCM and Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i> . SNH report.

**2.8 Complementary information**

<b>2.8.1 Justification of % thresholds for trends</b>	
<b>2.8.2 Other relevant</b>	

<b>information</b>	
<b>2.8.3 Trans-boundary assessment</b>	

**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**

<b>3.1.1 Population size</b>	<b>a) Unit</b>	<b>number of localities</b>
Estimation of population size included <u>in the SAC network</u>	<p>The condition of the site is in favourable condition but not without some caveats. Assessing the condition of the feature of interest where this is a ruderal species on a dynamic habitat is fraught with difficulty. Populations of ruderal species can fluctuate dramatically as a result of changes in the habitat and this can mean large increases as well as decreases. The numbers of thalli of <i>Petalophyllum ralfsii</i> have dropped dramatically since the survey in 1998, from a peak of 22500+ to the estimate of just 3700 in September 2008. But a sample survey by Genney in February 2008 found many more thalli and a repeat visit by Rothero and Genney in February 2009 gave an estimate of numbers greater than in September but less than in February 2008. The limited measures available to assess the population of the rare Bryum species suggest that the stands here are probably somewhat reduced from those in 2004 but all are still present.</p> <p>The drop of more than 50% since 2004 in the number of thalli observed in this survey is worrying and calls for some comment. As always, conditions during the few months prior to the survey and the weather in the few days before can make a difference. The summer of 2008 in NW Scotland was surprisingly dry considering the generally wet summer further south and east in Scotland. It may be that the rosettes of <i>Petalophyllum ralfsii</i> were only just beginning to grow from the underground thalli by which it survives dry spells. However, there have been changes in the management of the site, actual and planned, which also need to be considered. The owner of the site confirmed that sheep numbers on the site had already been reduced somewhat and that further reductions may be planned. This is likely to have an effect on the sward on the monitoring sites as all have been grazed quite hard in the past, a condition that ideally suits <i>Petalophyllum ralfsii</i> and the rare Bryum species. It seems likely that a decrease in grazing will eventually reduce niche availability.</p>	

	<b>b) Minimum</b>	<b>1</b>
	<b>c) Maximum</b>	<b>1</b>
<b>3.1.2 Method used</b>	<b>Complete survey/Complete survey or a statistically robust estimate</b>	
	SCM and Rothero, G.P. (2012) Surveillance of priority bryophytes in Scotland 2010-2013: <i>Petalophyllum ralfsii</i> . SNH report.	
<b>3.1.3 Trend of population size within the network (short-term trend)</b>	<b>stable</b>	

<b>3.2 Conservation measures</b>															
Conservation measures taken (i.e. already being implemented) within the reporting period and provided information about their importance, location and evaluation.															
<b>3.2.1 Measure</b>	<b>3.2.2 Type</b>					<b>3.2.3 Ranking</b>  H = high importance M = medium importance L = low importance	<b>3.2.4 Location</b>  where the measure is PRIMARILY applied			<b>3.2.5 Broad evaluation of the measure</b>					
	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
2.1: Maintaining grasslands and other open habitats	Y		Y	Y	Y	H	Y			Y		Y			
4.2: Restoring/improving the hydrological regime	Y		Y	Y	Y	L	Y			Y		Y			
4.4: Restoring coastal areas			Y	Y	Y	L	Y			Y					



6.1: Establish protected areas/sites	Y					M					Y	Y			
6.3: Legal protection of habitats and species	Y					M				Y		Y			

Conservation measures are implemented through designation (SSSI/SAC), statutory procedures, agri-environment scheme (SRDP) and management agreements (SNH).