

**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:

S1377 - Maerl (*Phymatolithon calcareum*)

IMPORTANT NOTE – PLEASE READ

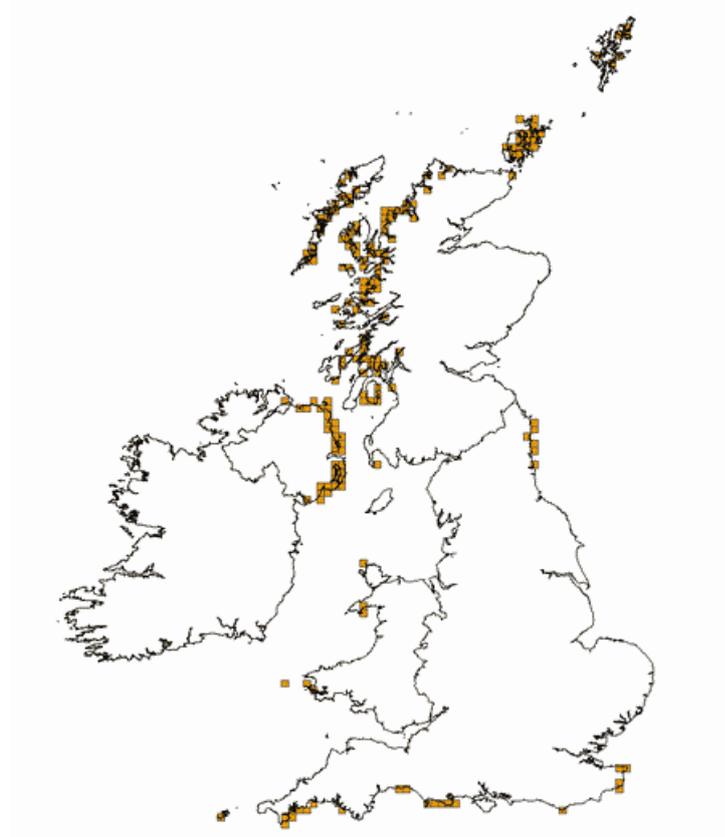
- The country-level reporting information contained in this document is a contribution to the Article 17 UK report for the habitat/species concerned.
- It has been provided by **Scottish Natural Heritage** and refers only to the state of the habitat/species in **Scotland** - it does not constitute an 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> | |
|--------------------|--|---------------------------------------|
| 0.2 Species | 0.2.1 Species code | S1377 |
| | 0.2.2 Species scientific name | <i>Phymatolithon calcareum</i> |
| | 0.2.3 Alternative species scientific name Optional | |
| | 0.2.4 Common name Optional | Maerl |

1.1 Maps

| 1.1.1 Distribution map | Sensitive | False |
|---|------------------|--------------|
| <p>P. calcareum has a predominantly western and northern distribution. Improved survey information has provided new records for previously unrecorded locations - e.g. Pentland Firth and Luce Bay. However, this reflects improved knowledge base rather than an actual change in range.</p> | | |



| 1.1.2 Method used - map | Estimate based on partial data with some extrapolation and/or modelling |
|---|--|
| <p>P. calcareum has a predominantly western and northern distribution. Improved survey information has provided new records for previously unrecorded locations - e.g. Pentland Firth and Luce Bay. However, this</p> | |

| | |
|--|---|
| | reflects improved knowledge base rather than an actual change in range. Data supplied from Marine Recorder / NBN. The records for this species are limited by incomplete survey coverage. Also, records are sometimes uncertain due to confusion with other maerl-forming species and or consistency in recording coverage of live maerl (i.e. some records are only of presence) or proportion of live/dead maerl. |
| 1.1.3 Year or period | 1993-2012 |
| 1.1.4 Additional distribution map | False |
| 1.1.5 Range map | |

| | |
|--|--|
| 2.1 Biogeographical region & marine regions | MATL |
| 2.2 Published sources | <p>"Bates, C. R., Moore, C. G., Harries, D. B., Austin, W. and Lyndon, A.R. (2004). Broad scale mapping of sublittoral habitats in Loch Sunart, Scotland. Scottish Natural Heritage Commissioned Report No. 006 (ROAME No. F01AA401C) www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=422</p> <p>Birkett, D.A., Maggs, C.A. & Dring, M.J. (1998). Maerl (Volume V). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. Scottish Association for Marine Science (UK Marine SAC Project) www.ukmarinesac.org.uk/pdfs/maerl.pdf</p> <p>Davies, J. and Hall-Spencer, J.M. (1996). Mapping of the benthic biotopes in the proposed Sound of Arisaig Special Area of Conservation. Scottish Natural Heritage / Biomar Research Survey and Monitoring Report no. 83.</p> <p>Howson, C.M. and Donnan, D.W. (2000) Trials of monitoring techniques for biotopes in the Sound of Arisaig cSAC. Scottish Natural Heritage Commissioned Report F98PA09</p> <p>Kamenos, N.A., Moore, P.G. & Hall-Spencer, J.M. (2003). Substratum heterogeneity of dredged vs un-dredged maerl grounds. J.Mar.Biol.Ass.UK, 83, 411-413</p> <p>Mercer, T., Howson, C. M., and Moore, J. J. (2007). Site Condition Monitoring: Loch Sunart marine SAC and SSSI. Scottish Natural Heritage Commissioned Report No. 286 (ROAME No. R06AC701) www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=1332</p> <p>Moore, C.G., Lyndon, A.R. and Mair, J.M. (2004). The establishment of site condition monitoring of marine sedimentary habitats in the Sound of Arisaig cSAC. Scottish</p> |

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|--|---|
| | <p>Natural Heritage Commissioned Report No. 071 (ROAME No. F02AA409) www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=488</p> <p>Moore, C.G., Saunders, G., Mair, J.M. and Lyndon, A.R. (2006). The inauguration of site condition monitoring of marine features of Loch Maddy Special Area of Conservation. Scottish Natural Heritage Commissioned Report No. 152 (ROAME No. F02AA409) www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=576"</p> <p>Bates, C. R., Moore, C. G., Harries, D. B., Austin, W. and Lyndon, A.R. (2004). Broad scale mapping of sublittoral habitats in Loch Sunart, Scotland. Scottish Natural Heritage Commissioned Report No. 006 (ROAME No. F01AA401C) www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=422</p> <p>Birkett, D.A., Maggs, C.A. & Dring, M.J. (1998). Maerl (Volume V). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. Scottish Association for Marine Science (UK Marine SAC Project) www.ukmarinesac.org.uk/pdfs/maerl.pdf</p> <p>Davies, J. and Hall-Spencer, J.M. (1996). Mapping of the benthic biotopes in the proposed Sound of Arisaig Special Area of Conservation. Scottish Natural Heritage / Biomar Research Survey and Monitoring Report no. 83.</p> <p>Howson, C.M. and Donnan, D.W. (2000) Trials of monitoring techniques for biotopes in the Sound of Arisaig cSAC. Scottish Natural Heritage Commissioned Report F98PAO9</p> <p>Kamenos, N.A., Moore, P.G. & Hall-Spencer, J.M. (2003). Substratum heterogeneity of dredged vs un-dredged maerl grounds. <i>J.Mar.Biol.Ass.UK</i>, 83, 411-413</p> <p>Mercer, T., Howson, C. M., and Moore, J. J. (2007). Site Condition Monitoring: Loch Sunart marine SAC and SSSI. Scottish Natural Heritage Commissioned Report No. 286 (ROAME No. R06AC701) www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=1332</p> <p>Moore, C.G., Lyndon, A.R. and Mair, J.M. (2004). The establishment of site condition monitoring of marine sedimentary habitats in the Sound of Arisaig cSAC. Scottish Natural Heritage Commissioned Report No. 071 (ROAME No. F02AA409) www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=488</p> <p>Moore, C.G., Saunders, G., Mair, J.M. and Lyndon, A.R. (2006). The inauguration of site condition monitoring of marine features of Loch Maddy Special Area of Conservation. Scottish Natural Heritage Commissioned Report No. 152 (ROAME No. F02AA409) www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=576</p> |
|--|---|

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|--|--|
| 2.3 Range | |
| 2.3.1 Surface area Range | 11600 |
| 2.3.2 Method used Surface area of Range | Estimate based on partial data with some extrapolation and/or modelling As per previous report Data supplied from JNCC, Marine Recorder / NBN. P. calcareum is the species present in the greatest abundance but maerl beds can be a composite of different maerl species or be mis-identified. This may slightly reduce the data quality. |
| 2.3.3 Short-term trend Period | |
| 2.3.4 Short term trend Trend direction | unknown |
| 2.3.5 Short-term trend Magnitude | a) Minimum |
| | There is no evidence that the range of P. calcareum beds has changed in the reporting series. Improving survey coverage continues to add to the knowledge base with new sites identified in the recording period. However, these are newly reported sites rather than newly formed beds of maerl. |
| | b) Maximum |
| 2.3.6 Long-term trend Period | |
| 2.3.7 Long-term trend Trend direction | unknown |
| 2.3.8 Long-term trend Magnitude Optional | a) Minimum |
| | b) Maximum |
| | |
| 2.3.9 Favourable reference range | a) Value in km² |
| | |
| | b) Operator for FRR |

| | | |
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| | | |
| | c) FRR is unknown (indicated by "true") | True |
| | As previous report - based on best expert judgement current range is sufficient to be considered suitable for survival of maerl for the foreseeable future | |
| | d) Method used to set FRR | As previous report - based on best expert judgement current range is sufficient to be considered suitable for survival of maerl for the foreseeable future |
| | As per previous report | |
| 2.3.10 Reason for change Is the difference between the reported value in 2.3.1 and the previous reporting round mainly due to... | a) Genuine change? | False |
| | | |
| | b) Improved knowledge/more accurate data? | True |
| | No evidence to suggest a change in range | |
| | c) Use of different method (e.g. "Range tool")? | False |
| | | |

| 2.4 Population | | |
|--|------------------------------------|---|
| 2.4.1 Population size estimation (using individuals or agreed exceptions where possible) | a) Unit | area covered by population in m2 |
| | b) Minimum | 6870000 |
| | c) Maximum | 6870000 |
| 2.4.2 Population size estimation (using population unit other than individuals) Optional (<i>if 2.4.1 filled in</i>) | a) Unit | number of localities |
| | b) Minimum | 6 |
| | c) Maximum | 6 |
| 2.4.3 Additional information on population estimates / conversion Optional | a) Definition of "locality" | SAC sites: there are a total of 6 SACS with marine component which contain maerl as a feature (as per the CSM spreadsheet). The population size above, |

| | | |
|--|--|--|
| | | <p>i.e 6.87 km², is based on the extent of maerl in these sites.</p> <p>This is only a portion of the maerl in Scotland but there is no information to provide a more robust idea of the total extent and localtion of maerl in Scotland.</p> <p>Data on the comparative extent of live and dead maerl in Scotland is not available.</p> |
| | <p>SAC sites: there are a total of 6 SACS with marine component which contain maerl as a feature (as per the CSM spreadsheet). The population size above, i.e 5.52km², is based on the extent of maerl in these sites.</p> <p>This is only a portion of the maerl in Scotland but there is no information to provide a more robust idea of the total extent and localtion of maerl in Scotland.</p> <p>Data on the comparative extent of live and dead maerl in Scotland is not available.</p> | |
| | b) Method to convert data | |
| | <p>SAC sites: there are a total of 6 SACS with marine component which contain maerl as a feature (as per the CSM spreadsheet). The population size above, i.e 5.52km², is based on the extent of maerl in these sites.</p> <p>This is only a portion of the maerl in Scotland but there is no information to provide a more robust idea of the total extent and localtion of maerl in Scotland.</p> <p>Data on the comparative extent of live and dead maerl in Scotland is not available.</p> | |
| | c) Problems encountered to provide population size estimation | <p>A large caveat should be assigned to this feature as we currently have little information regarding the size and condition of beds within Scottish waters and only data within protected sites has been included within this assessment.</p> <p>Also live and dead maerl has not been separated in this assessment.</p> |
| | <p>A large caveat should be assigned to this feature as we currently have little information regarding the size and condition of beds within Scottish waters and only data within protected sites has been included within this assessment. Also live and dead maerl has not been separated in this assessment.</p> | |
| 2.4.4 Year or period | 2012-2012 | |
| 2.4.5 Method used Population size | <p>Estimate based on partial data with some extrapolation and/or modelling</p> <ul style="list-style-type: none"> Information for <i>P. calcareum</i> beds tends to be best in relevant SACs where broad-scale mapping and site condition monitoring (Common Standard Monitoring) has been carried out. Current population trend is Unknown on the basis of insufficient information (i.e. incomplete survey coverage) but additional sites have been located during the survey period. <p>Population size estimation is defined as 'sites' for Scotland as per previous report.</p> | |

| | | |
|---|---|--|
| 2.4.6 Short-term trend Period | 2001-2012 | |
| 2.4.7 Short-term trend Trend direction | unknown | |
| 2.4.8 Short-term trend Magnitude | a) Minimum | |
| | b) Maximum | |
| | c) Confidence interval | |
| | | |
| 2.4.9 Short-term trend Method used | Estimate based on partial data with some extrapolation and/or modelling | |
| | There is no readily available quantitative evidence of any change in population trend in Scotland during this period. | |
| 2.4.10 Long-term trend – Period | | |
| 2.4.11 Long-term trend Trend direction | unknown | |
| 2.4.12 Long-term trend Magnitude Optional | a) Minimum | |
| | b) Maximum | |
| | c) Confidence interval | |
| | | |
| 2.4.13 Long term trend Method used | 2 | |
| | unknown - insufficient information to report the current trend. | |
| 2.4.14 Favourable reference population | a) Number of individuals/agreed exceptions/other units | |

| | | |
|--|--|--------------|
| | | |
| | b) Operator | |
| | | |
| | c) FRP is unknown indicated by "true" | True |
| | As per previous report. Based on expert judgement the current range is sufficiently large to be considered suitable for the survival of S1377 in future. | |
| | d) Method used to set FRP | |
| | | |
| 2.4.15 Reason for change | | |
| Is the difference between the value reported at 2.4.1 or 2.4.2 and the previous reporting round mainly due to: | a) Genuine change? | False |
| | | |
| | b) Improved knowledge/more accurate data? | True |
| | | |
| | c) Use of different method (e.g. "Range tool")? | False |
| | | |

| 2.5 Habitat for the species | |
|------------------------------------|--|
| 2.5.1 Area estimation | <p>6.87</p> <p>SAC sites: there are a total of 6 SACS with marine component which contain maerl as a feature (as per the CSM spreadsheet). The population size above, i.e 5.52km², is based on the extent of maerl in these sites.</p> <p>This is only a portion of the maerl in Scotland but there is no information to provide a more robust idea of the total extent and localtion of maerl in Scotland.</p> <p>Data on the comparative extent of live and dead maerl in Scotland is not available.</p> <p><i>P. calcareum</i> forms a habitat.</p> <p>The ecological requirements for living maerl beds are thought to be relatively precise and the distribution of live maerl is subject to various controlling environmental factors, the most important of which are currents, wave action and the interactive effect of depth and water quality on photosynthesis (Birkett et al., 1998). Extensive beds typically are located in coarse clean sediments of gravels and clean sands or muddy mixed sediments, which occur either on the open coast or in tide-swept channels of marine inlets. Maerl tends to be located in areas of accelerated currents e.g. narrow straits and headlands, but bottom</p> |

| | | |
|--|---|--|
| | <p>current speeds must not exceed a certain level as maerl thalli are sensitive to physical damage. Live maerl beds have been recorded from extreme low tide level to 30 m depth. Coupled with the high water flow, maerl requires a high water quality with a low particulate organic matter content. Higher levels of prevailing turbidity will limit the maximum depth to which maerl is found.</p> <p>Maerl has an open complex structure and thus forms a heterogeneous habitat for numerous fauna and flora. In fact maerl beds have been compared to seagrass beds in terms of their high biodiversity (Kamenos et al., 2003). Negative impacts such as dredging and storms can destroy the heterogeneity of this habitat and therefore reduce biodiversity.</p> | |
| 2.5.2 Year or period | 2012-2012 | |
| 2.5.3 Method used | Estimate based on expert opinion with no or minimal sampling | |
| Habitat for the species | | |
| 2.5.4 Quality of the habitat | a) Habitat quality | Unknown |
| | b) Assessment method | As noted in previous report. It is estimated that the quality of the <i>P. calcareum</i> beds is likely to have been affected by activities such as aquaculture and fishing. This based on published studies, knowledge of the activities and expert judgement. However, the extent of this is unknown. |
| | <p>As noted in previous report. It is estimated that the quality of the <i>P. calcareum</i> beds is likely to have been affected by activities such as aquaculture and fishing. This based on published studies, knowledge of the activities and expert judgement. However, the extent of this is unknown.</p> <p>For most of the sites there is only a presence/absence record. Only in locations where broadscale mapping has been conducted is there information on the extent of <i>P. calcareum</i> beds. Thereofre cannot provide an estimate of the area coverage for the species.</p> | |
| 2.5.5 Short-term trend Period | 2001-2012 | |
| 2.5.6 Short-term trend Trend direction | unknown | |
| 2.5.7 Long-term trend Period | | |
| 2.5.8 Long-term trend Trend direction | unknown | |
| 2.5.9 Area of suitable habitat for the species | a) Value in km² | 6.87 |
| | b) Absence of data indicated as '0' | |
| | | |
| 2.5.10 Reason for change Is the difference between the | a) Genuine change? | False |

| | | |
|--|--|--------------|
| value reported at 2.5.1 and the previous reporting round mainly due to | | |
| | b) Improved knowledge/more accurate data? | True |
| | | |
| | c) Use of different method (e.g. "Range tool")? | False |
| | | |

| 2.6 Main pressures | | |
|--|--|-------------------------------|
| a) Pressure | b) Ranking | c) Pollution qualifier |
| | H = high importance M = medium importance L = low importance | |
| F01: Marine and Freshwater Aquaculture | H | |
| F06: Hunting, fishing or collecting activities not referred to above | H | |
| J02: human induced changes in hydraulic conditions | H | |
| K02: Biocenotic evolution, succession | H | |
| C01: Mining and quarrying | M | |
| G05: Other human intrusions and disturbances | M | |
| | | |

Individual rhodoliths of *P. calcareum* have very slow growth rates, approximately 1 mm per year (Bosence and Wilson, 2003). As a result, even under favourable conditions, maerl can take a long time to grow and accumulate. This means a low potential for recovery from impact. Significant impacts on maerl from fishing activities (e.g. scallop dredging) have been reported (e.g. Hall-Spencer and Moore, 2000). Impacts include damage to maerl rhodoliths by removal, burial or breakage with associated disruption of the habitat structure and associated species. Hall-Spencer and Moore (2000) recorded deterioration in the quality of maerl beds off the Scottish west coast related to an expansion in scallop fishing, including evidence to suggest that maerl beds exposed to dredging have significantly smaller thalli. Hydraulic dredging for large burrowing bivalves such as *Ensis* and *Venerupis* species is widespread on the west coast of Scotland. Not only does this activity impact the target species but on the surrounding community. Detrimental effects on maerl include the settling of re-suspended sediment over the maerl resulting in death of thalli (Birkett et al., 1998; Hauton et al., 2003). Extraction of maerl is an activity that has been ongoing for hundreds of years. The commercial dredging of maerl deposits is destructive as it removes the productive surface layer and sediment covers surrounding plants, inhibiting habitat recovery. There was one licence for maerl extraction issued in Scotland for a site in Orkney in the mid-1990s. The licence has since been revoked and no others issued (Birkett et al., 1998). Deposition from fish farms can influence the percentage of maerl on the seabed that is live vs dead (Haskoning Ltd, 2006). Positioning fish cages over a maerl bed is likely to lead to fish faeces and partly consumed food pellets contaminating the maerl bed and resulting in anaerobiosis. This detritus can also have a smothering effect and reduce light penetration. Hall-Spencer et al. (2006) demonstrated the impacts of Scottish salmon fish farms on maerl and revealed significant reductions in live

maerl cover. Waste was noted up to 100 m from cages and infaunal samples taken from near-cage locations showed reductions in biodiversity, with scavenging species such as *Capitella capitata* greatly increasing in abundance. Other activities which pose pressure to this feature are the removal of sediments (e.g. for capital or maintenance dredging), which can cause direct or indirect impacts. Indirect impacts arise from suspension of particulate material in the water column with subsequent settling causing smothering of the maerl matrix. Also, eutrophication and discharges can cause excessive algal growth contributing to anoxic/hypoxic conditions in sediment (Birkett et al., 1998).

2.6.1 Method used – Pressures

mainly based on expert judgement and other data

Hall- Spencer, J. M. (1995). The effects of scallop dredging on maerl beds in the Firth of Clyde. Porcupine Newsletter, 6:16-27
pmnhs.co.uk/wp-content/uploads/2011/11/051-PNV6N1MAY95.pdf.

Hall-Spencer, J.M. and Moore, C.G. (2000). Scallop dredging has profound, long-term impacts on maerl habitats. ICES Journal of Marine Science, 57, 1407-1415
<http://icesjms.oxfordjournals.org/content/57/5/1407.full.pdf>

Hall-Spencer, J.M., White, N., Gillespie, E., Gillham K. & Foggo, A. (2006). Impact on fish farms on maerl beds in strongly tidal areas. Mar. Ecol. Progr. Ser, 326, 1-9 www.int-res.com/abstracts/meps/v326/p1-9

Haskoning UK Ltd. (2006). Investigation into the impact of marine fish farm deposition on maerl beds. Scottish Natural Heritage Commissioned Report No. 213 (ROAME No. AHLA10020348
www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=870

Hauton, C., Hall-Spencer, J.M. and Moore C.G. (2003). An experimental study of the ecological impacts of hydraulic bivalve dredging on maerl. ICES Journal of Marine Science, 60, 381-392
<http://icesjms.oxfordjournals.org/content/60/2/381.full>

| 2.7 Threats | | |
|--|--|------------------------|
| a) Threat | b) Ranking | c) Pollution qualifier |
| | H = high importance M = medium importance L = low importance | |
| F01: Marine and Freshwater Aquaculture | H | |
| F06: Hunting, fishing or collecting activities not referred to above | H | |
| J02: human induced changes in hydraulic conditions | H | |
| K02: Biocenotic evolution, succession | H | |
| C01: Mining and quarrying | M | |
| G05: Other human intrusions and | M | |

| | | |
|--------------|--|--|
| disturbances | | |
| | | |

See pressures above.

These activities are considered important threats to the survivability of *P. calcareum* and maerl beds generally.

2.7.1 Method used – Threats

expert opinion

Hall- Spencer, J. M. (1995). The effects of scallop dredging on maerl beds in the Firth of Clyde. Porcupine Newsletter, 6:16-27
pmnhs.co.uk/wp-content/uploads/2011/11/051-PNV6N1MAY95.pdf.

Hall-Spencer, J.M. and Moore, C.G. (2000). Scallop dredging has profound, long-term impacts on maerl habitats. ICES Journal of Marine Science, 57, 1407-1415
<http://icesjms.oxfordjournals.org/content/57/5/1407.full.pdf>

Hall-Spencer, J.M., White, N., Gillespie, E., Gillham K. & Foggo, A. (2006). Impact on fish farms on maerl beds in strongly tidal areas. Mar. Ecol. Progr. Ser, 326, 1-9 www.int-res.com/abstracts/meps/v326/p1-9

Haskoning UK Ltd. (2006). Investigation into the impact of marine fish farm deposition on maerl beds. Scottish Natural Heritage Commissioned Report No. 213 (ROAME No. AHLA10020348
www.snh.gov.uk/publications-data-and-research/publications/search-the-catalogue/publication-detail/?id=870

Hauton, C., Hall-Spencer, J.M. and Moore C.G. (2003). An experimental study of the ecological impacts of hydraulic bivalve dredging on maerl. ICES Journal of Marine Science, 60, 381-392
<http://icesjms.oxfordjournals.org/content/60/2/381.full>

2.8 Complementary information

2.8.1 Justification of % thresholds for trends

2.8.2 Other relevant information

2.8.3 Trans-boundary assessment

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

Please refer to the United Kingdom assessment for this species.

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

3.1 Population

| | | |
|---|-------------------|--|
| 3.1.1 Population size Estimation of population size included in the SAC network | a) Unit | |
| | b) Minimum | |
| | c) Maximum | |
| | | |
| 3.1.2 Method used | | |
| 3.1.3 Trend of population size within the network (short-term trend) | | |
| | | |

3.2 Conservation measures

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

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