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 habitat:

H1170 - Reefs

ENGLAND

IMPORTANT NOTE - PLEASE READ

- The information in this document is a country-level contribution to the UK Report on the conservation status of this habitat, 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 habitat 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; and/or (iii) the field was only relevant at UK-level (sections 10 Future prospects and 11 Conclusions).
- For technical reasons, the country-level future trends for Range, Area covered by habitat and Structure and functions 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 17 for Annex I habitat types (Annex D)

NATIONAL LEVEL

1. General information

1.1 Member State	**UK (England information only)**
1.2 Habitat code	**1170 - Reefs**

2. Maps

2.1 Year or period	
2.3 Distribution map	Yes
2.3 Distribution map Method used	
2.4 Additional maps	No

BIOGEOGRAPHICAL LEVEL

3. Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	**Marine Atlantic (MATL)**
3.2 Sources of information	Ahern, D. and Hellon, J. 2014. Condition monitoring of the saltmarsh feature of The Wash and the North Noroflk Coast SAC, Volume I: The Wash: Ahern Ecology. APEM. 2013. Analysis of Invertebrate Communities and Sediment Composition of the Subtidal Sandbanks of The Wash and North Norfolk Coast.: APEM. APEM. 2013. The Wash and North Norfolk Coast SAC: Intertidal mud and sand flats assessment.: APEM. Atkinson. P. W and Clark. N. A. , 2002, Assessing the impact of cultivated mussel lays on The Wash oystercatcher population - a scoping study , Attrill, M. J., Austen, M. C., Bayley, D. T. I., Carr, H. L., Downey, K., Fowell, S. C., Gall, S. C., Hattam, C., Holland, L., Jackson, E. L., Langmead, O., Mangi, S., Marshall, C., Munro, C., Rees, S., Rodwell, L., Sheehan, E. V., Stevens, J., Stevens, T. F. and Strong, S. 2011. Lyme Bay- a case study: measuring recovery of benthic species; assessing potential spillover effects to the zoned exclusion of bottom towed fishing gear and the associated socio-economic effects in Lyme Bay. Final Report 1. June 2011: Marine Institute, Plymouth University for DEFRA. Attrill, M. J., Austen, M. C., Cousens, S. L., Gall, S. C., Hattam, C., Mangi, S., Rees, A., Rees, S., Rodwell, L. D., Sheehan, E. V. and Stevens, T. F. 2012. Lyme Bay - a case-study: measuring recovery of benthic species; assessing potential 'spillover' effects and socio-economic changes, three years after the closure. Report 1: Response of the benthos to the zoned exclusion of bottom towed fishing gear in Lyme Bay, March 2012: Plymouth University. Attrill, M. J., Fowell, S., Hall-Spencer, J., Hattam, C., Jackson, E. L., Langmead, O., Mangi, S., Munro, C., Rees, S., Rodwell, L., Sheehan, E. V. and Stevens, T. F. 2009. Lyme Bay- a case study: measuring recovery of benthic spcecies, assessing potential spill-over effects and socio-economic changes. Annual Report: Marine Institute, Plymouth University for DEFRA. Baldock, L. 2004. Marine Conservation Society Seasearch Dives in Lyme Bay 14/15 August & 16/17 October 2004: Seasearch.http://www.seasearch.org.uk/downloads/LymeBaysummary2004.pdf Baldock, L. 2006. Marine Conservation Society Survey Dives Lyme Bay 2006. , Seasearch report to Devon Wildlife Trust/ English Nature Baldock, L. 2013. Lyme Bay Rocky Reefs - A Report on Four Seasearch Dives, October 2013.: Seasearch. Baldock, L. 2017. Purbeck Coast Proposed Marine Conservation Zone: Seasearch

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4. Range

4.1 Surface area (in km²)	6290.36324
4.2 Short-term trend Period	

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4.3 Short-term trend Direction 4.4 Short-term trend Magnitude	a) Minimum	b) Maximum	
4.5 Short-term trend Method used 4.6 Long-term trend Period 4.7 Long-term trend Direction 4.8 Long-term trend Magnitude	a) Minimum	b) Maximum	
4.9 Long-term trend Method used			
4.10 Favourable reference range	a) Area (km²) b) Operator c) Unknown No d) Method		
4.11 Change and reason for change in surface area of range	No change The change is mainly due to:		
4.12 Additional information			

5. Area covered by habitat

5.1 Year or period			
5.2 Surface area (in km²)	a) Minimum 6290.3632	b) Maximum 6290.3632	c) Best single value 6290.36324
5.3 Type of estimate 5.4 Surface area Method used 5.5 Short-term trend Period 5.6 Short-term trend Direction			
5.7 Short-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.8 Short-term trend Method used 5.9 Long-term trend Period 5.10 Long-term trend Direction			
5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used			
5.13 Favourable reference area	a) Area (km²) b) Operator c) Unknown No d) Method		
5.14 Change and reason for change in surface area of range	No change The change is mainly due to:		
5.15 Additional information			

6. Structure and functions

6.1 Condition of habitat	a) Area in good condition (km²)	Minimum 1300.39324	Maximum 1300.39324
	b) Area in not-good condition (km²)	Minimum 450.14425	Maximum 450.14425
	c) Area where condition is not known (km²)	Minimum 4539.82573	Maximum 4539.82573

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6.2 Condition of habitat Method used	Based mainly on extrapolation from a limited amount of data
6.3 Short-term trend of habitat area in good condition Period	2007-2018
6.4 Short-term trend of habitat area in good condition Direction	Stable (0)
6.5 Short-term trend of habitat area in good condition Method used	Based mainly on expert opinion with very limited data
6.6 Typical species	Has the list of typical species changed in comparison to the previous reporting period? No
6.7 Typical species Method used	
6.8 Additional information	A combination of methods has been used to come up with the area of the feature in 'good' and 'not good' condition. This has been a mixture of data from: 1) full condition assessments from SACs using monitoring data to assess condition against a number of attributes at the sub-feature level, before aggregating this for feature condition. Across the feature different areas may be allocated to different condition categories based on sub-feature condition and the resolution of available data. 2) Proxy condition assessments to assign condition for sites for which there is no full condition assessment. A model was used to calculate the proxy condition of the feature based on the activities that are occurring within a site and the vulnerability of features to activities they are exposed to. This output was evaluated and the percentage of the feature in unfavourable condition was estimated from the model output. 3) Outputs of vulnerability assessments for tranche 2 and 3 marine conservation zone features that are directly or broadly comparable to annex I reefs. These were generated as part of the designation process. Any areas that overlapped with existing SACs were removed. The data from these three sources was then aggregated up to a national level, giving an area value for 'good' and 'not good' condition for each annex 1 feature. Comparison of the results from these three sources suggests that they may differ in their ability to identify 'unfavourability' with full condition assessments being more likely to identify unfavourable condition than other methods. Short term trend of area in good condition is stable between 2013-2018. This is on the basis that the pressures that the features are sensitive to which may lead to unfavourable condition have been broadly stable over this period.

7. Main pressures and threats

7.1 Characterisation of pressures/threats

Pressure	Ranking
Wind, wave and tidal power, including infrastructure (D01)	M
Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defences or coastal protection works and infrastructures) (F08)	M
Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (G01)	H

Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats (G03)	H
Sea-level and wave exposure changes due to climate change (N04)	H
Sports, tourism and leisure activities (F07)	M
Other invasive alien species (other then species of Union concern) (I02)	M
Mixed source marine water pollution (marine and coastal) (J02)	M
Temperature changes (e.g. rise of temperature & extremes) due to climate change (N01)	H
Introduction and spread of species (including GMOs) in marine aquaculture (G17)	M

Threat	Ranking
Wind, wave and tidal power, including infrastructure (D01)	H
Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defences or coastal protection works and infrastructures) (F08)	M
Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (G01)	H
Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats (G03)	H
Sea-level and wave exposure changes due to climate change (N04)	H
Sports, tourism and leisure activities (F07)	M
Other invasive alien species (other then species of Union concern) (I02)	M
Mixed source marine water pollution (marine and coastal) (J02)	M
Temperature changes (e.g. rise of temperature & extremes) due to climate change (N01)	H
Transmission of electricity and communications (cables) (D06)	M

7.2 Sources of information

7.3 Additional information

D01: Reef features are sensitive to pressures from wind, wave and tidal power activities. Reef can be damaged by infrastructure installation, and although this is subject to an EIA, Annex I reef may be damaged outside of protected sites. The infrastructure installations are likely to increase over the next 12 years, with more renewable installations being planned (Crown Estate, 2017) as well as the possible installation of tidal lagoons. Whilst the installation of infrastructure would be a one off impact, the area and volume can be large and recovery could take some time.
F08: Some intertidal reef features are sensitive to pressures from coastal

squeeze.
G01: The removal of species which make up a functional component of the reef communityfrom fishing activities will affect the condition of the reef. There are pressures from mussel harvesting on mussel beds, as well as bait collection and shellfish harvesting. There is no management of fishing activity outside of marine protected areas for Annex I reef.
G03: Whilst management measures have been brought in to prevent damage to reef features within some marine protected areas, many areas are still recovering from the pressure from demersal fishing which caused damage to the reef. These activities are still occurring outside of marine protected areas. Additionally, there may be damage to intertidal reef from bait collection and boulder turning.
N04: Sea levels have risen 1-3mm over the last century (Robins et al., 2016). This pressure combined with the pressure of coastal squeeze from hard sea defences is already acting on intertidal reef and sea level rise is predicted to increase with climate change. There is also the likely effect of increased wave damage from storms causing biological communities to be removed or disturbed, and the smothering of reef features from sediment suspension and movement during storms, which may be more frequent in the future.
F07: Intertidal reef and their communities are sensitive to pressures from recreational activities such as trampling and the removal of key species. Subtidal reef is sensitive to pressures from recreational boating such as abrasion from anchoring.
I02: Annex I reef habitat is sensitive to pressures from non-native species, such as Crassostrea gigas, Crepidula fornicata and Sargassum muticum which are prevalent across reef in certain locations, and are becoming more widespread (GB NNSS, 2018). Currently there is little management in place to address the further spread of these species in the future.
J02: This is a broad pressure that covers all pollution pressures in the marine environment: agriculture, waste water, transport, as well as unknown sources. Annex I reef features are sensitive to pressures from marine pollution. This can cause shifts in community composition and potentially the loss or decline of important native keystone species. There are various management measures in place that regulate pollutants but it unlikely they can be fully eliminated.
N01: Sea surface temperature rose 0.7 degree C from 1971-2010 (Robins et al., 2016), and this is predicted to increase in the future. The impacts from temperature rises are already causing notable shifts in species distribution and alter community composition: the ranges of many southern (lusitanean) species are known to have expanded their range north, and some northern species are known to retract further north. Further increases in temperatures will likely have further effects on marine invertebrate biodiversity as species distributions change. Also, increase in the abundances and ranges of INNS such as Crassostrea gigas are likely.
G17: Crassostrea gigas has spread from marine aquaculture where they have been settling on intertidal reef and are competing with other species . Where they exist in high densities they can alter the natural state of the ecosystem (GB NNSS, 2018)
D06: Reef features may be sensitive to pressures from the installation and maintenance of cables in the future. Reef can be damaged by infrastructure installation, and although this is subject to an EIA, Annex I reefmay be damaged outside of protected sites. The infrastructure is likely to increase over the next 12 years, with more cables being planned (Crown Estate, 2017).

Whilst the installation of infrastructure would be a one off impact, the area and volume can be large and recovery could take some time.

8. Conservation measures

8.1 Status of measures	a) Are measures needed?	Yes
	b) Indicate the status of measures	Measures identified and taken
8.2 Main purpose of the measures taken		Restore the habitat of the species (related to 'Habitat for the species')
8.3 Location of the measures taken		Both inside and outside Natura 2000
8.4 Response to the measures		Short-term results (within the current reporting period, 2013-2018)
8.5 List of main conservation measures		

Adapt/manage renewable energy installation, facilities and operation (CC03)

Reduce impact of service corridors and networks (CC06)

Reduce/eliminate marine pollution from industrial, commercial, residential and recreational areas and activities (CF07)

Management of professional/commercial fishing (including shellfish and seaweed harvesting) (CG01)

Reduce/eliminate marine pollution from agricultural activities (CA13)

Manage/reduce/eliminate marine pollution from resource exploitation and energy production (CC11)

Reduce/eliminate marine contamination with litter (CF08)

Management of hunting, recreational fishing and recreational or commercial harvesting or collection of plants (CG02)

Control/eradication of illegal killing, fishing and harvesting (CG04)

Management, control or eradication of other invasive alien species (CI03)

8.6 Additional information	Conservation measures such as fisheries byelaws that have prevented demersal trawling on reef are already having an effect within Marine protected areas (MPAs), with recovery of communities. Other management measures, such as the marine licensing and EIA process are enabling the protection of Annex I reef within marine protected areas. Some other measures, such as addressing the sources on marine pollution will have longer term results.

9. Future prospects

9.1 Future prospects of parameters	a) Range b) Area c) Structure and functions	
9.2 Additional information		An increase in the pressures to which reef is sensitive means that even though management measures are being delivered within MPAs, across the reef resource as a whole including areas outside MPAs, there is likely to be a decrease of less than 1% per year in the area and structure and function and area of this habitat. Increases in pressure may include: smothering as a result of increased wave exposure and storminess due to climate change, the increase of marine industry which outside of protected sites may impact on biogenic reef as well as development along the coast leading to coastal squeeze which will impact intertidal reef. There are significant uncertainties relating to how pressures from inshore fishing activities may change over the next twelve years; although there may be changes in distribution of effort and potentially more effort inshore, this

needs to be considered in the context of other potential management changes outlined in the UK Government's fisheries white paper. The range of the feature is likely to remain stable. There are a number of uncertainties affecting this judgement of future prospects; these include the application and interpretation of EU Caselaw to small scale developments within European Sites.

10. Conclusions

10.1. Range	
10.2. Area	
10.3. Specific structure and functions (incl. typical species)	
10.4. Future prospects	
10.5 Overall assessment of Conservation Status	
10.6 Overall trend in Conservation Status	
10.7 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:
10.8 Additional information	

11. Natura 2000 (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network (in km² in biogeographical/ marine region)	a) Minimum	2369
	b) Maximum	2369
	c) Best single value	2369
11.2 Type of estimate		
11.3 Surface area of the habitat type inside the network Method used		
11.4 Short-term trend of habitat area in good condition within the network Direction	Increasing (+)	
11.5 Short-term trend of habitat area in good condition within network Method used	Based mainly on expert opinion with very limited data	
11.6 Additional information	Within Natura 2000 sites, management measures such as fisheries byelaws have been brought in and enforced to protect reef features. Consequently the reef features are beginning to recover from previous damage, and their condition is thought to be improving, with more of the habitat in good condition.	

12. Complementary information

12.1 Justification of % thresholds for trends	

Report on the main results of the surveillance under Article 17 for Annex I habitat types (Annex D)

12.2 Other relevant information

Distribution Map

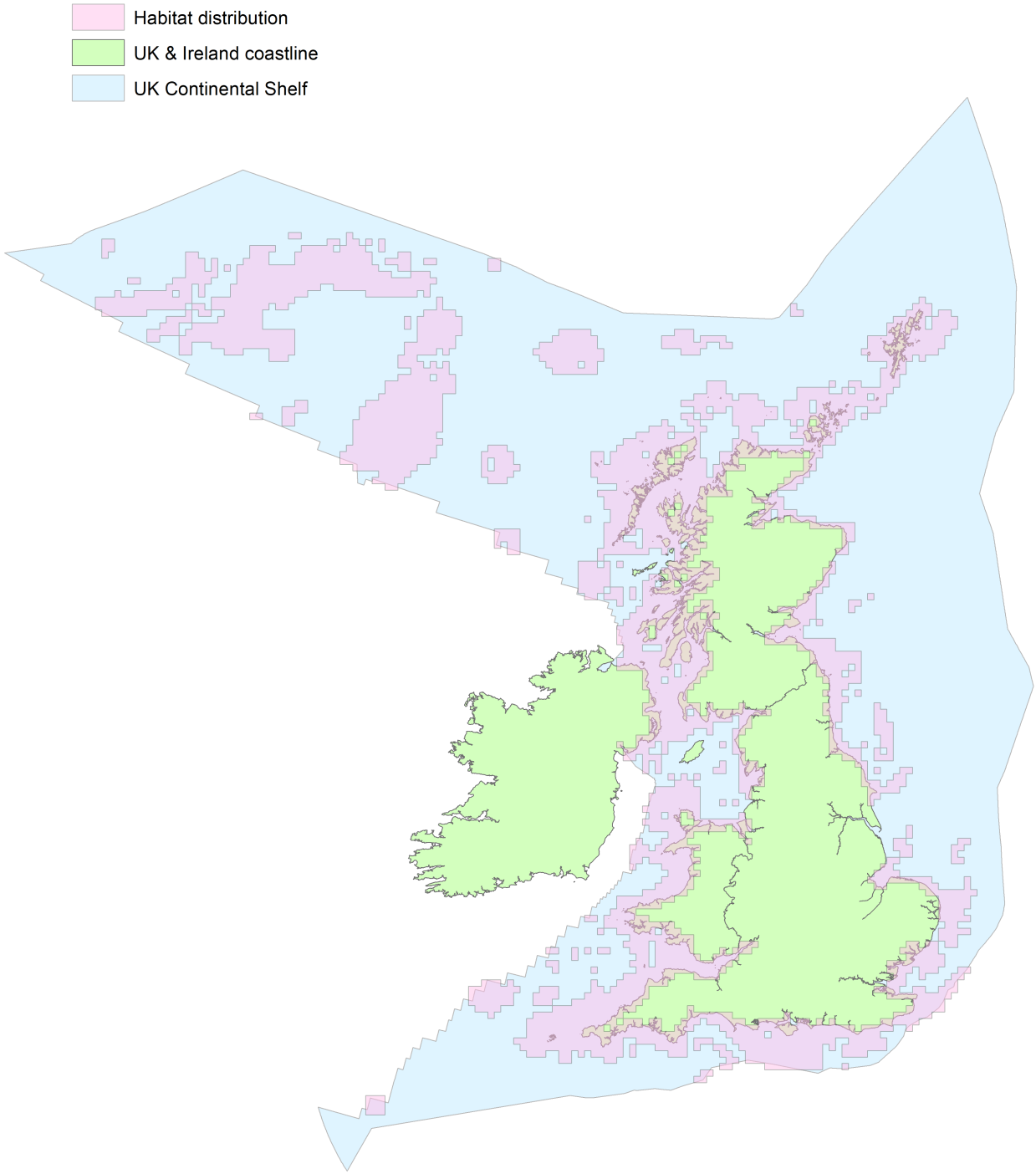

Figure 1: UK distribution map for H1170 - Reefs.

The 10km grid square distribution map is based on available habitat records which are considered to be representative of the distribution within the current reporting period. For further details see the 2019 Article17 UK Approach document.

Range Map

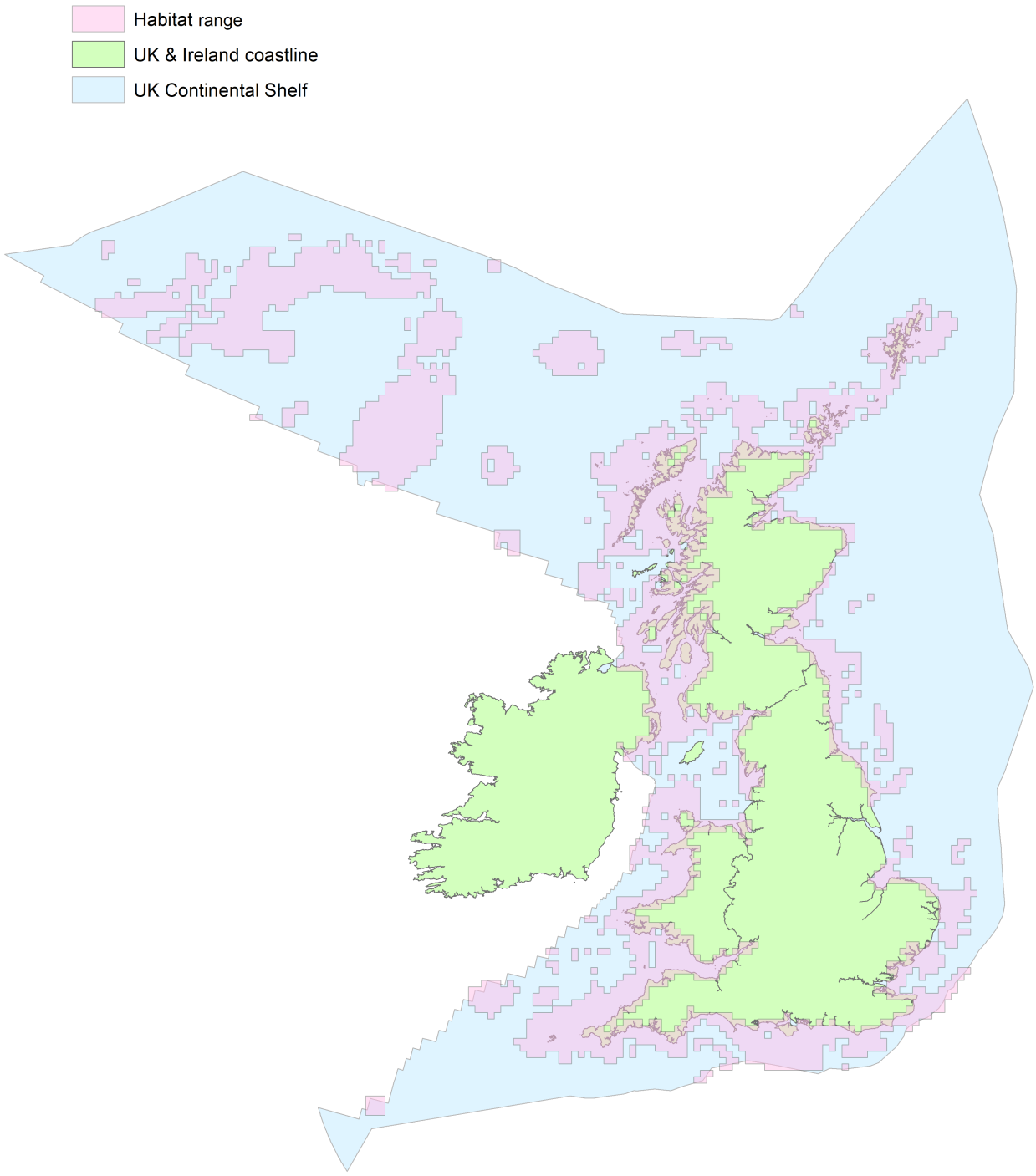

Figure 2: UK range map for H1170 - Reefs.

The UK range map was developed from the UK surface area map, but additionally included an area of iceberg ploughmarks off North-West Scotland in offshore waters, where cobble reefs had been recorded (JNCC, 2018a).

Explanatory Notes

Habitat code: 1170 Region code: MATL

Field label	Note
6.1 Condition of habitat	A combination of methods has been used to come up with the area of the feature in 'good' and 'not good' condition. This has been a mixture of data from: 1) full condition assessments from SACs using monitoring data to assess condition against a number of attributes at the sub-feature level, before aggregating this for feature condition. Across the feature different areas may be allocated to different condition categories based on sub-feature condition and the resolution of available data. 2) Proxy condition assessments to assign condition for sites for which there is no full condition assessment. A model was used to calculate the proxy condition of the feature based on the activities that are occurring within a site and the vulnerability of features to activities they are exposed to. This output was evaluated and the percentage of the feature in unfavourable condition was estimated from the model output. 3) Outputs of vulnerability assessments for tranche 2 and 3 marine conservation zone features that are directly or broadly comparable to annex I reefs. These were generated as part of the designation process. Any areas that overlapped with existing SACs were removed. The data from these three sources was then aggregated up to a national level, giving an area value for 'good' and 'not good' condition for each annex 1 feature. Comparison of the results from these three sources suggests that they may differ in their ability to identify 'unfavourability' with full condition assessments being more likely to identify unfavourable condition than other methods. Short term trend of area in good condition is stable between 2013-2018. This is on the basis that the pressures that the features are sensitive to which may lead to unfavourable condition have been broadly stable over this period.
6.2 Condition of habitat; Method used	A combination of methods has been used to come up with the area of the feature in 'good' and 'not good' condition. This has been a mixture of data from: 1) full condition assessments from SACs using monitoring data to assess condition against a number of attributes at the sub-feature level, before aggregating this for feature condition. Across the feature different areas may be allocated to different condition categories based on sub-feature condition and the resolution of available data. 2) Proxy condition assessments to assign condition for sites for which there is no full condition assessment. A model was used to calculate the proxy condition of the feature based on the activities that are occurring within a site and the vulnerability of features to activities they are exposed to. This output was evaluated and the percentage of the feature in unfavourable condition was estimated from the model output. 3) Outputs of vulnerability assessments for tranche 2 and 3 marine conservation zone features that are directly or broadly comparable to annex I reefs. These were generated as part of the designation process. Any areas that overlapped with existing SACs were removed. The data from these three sources was then aggregated up to a national level, giving an area value for 'good' and 'not good' condition for each annex 1 feature. Comparison of the results from these three sources suggests that they may differ in their ability to identify 'unfavourability' with full condition assessments being more likely to identify unfavourable condition than other methods. Short term trend of area in good condition is stable between 2013-2018. This is on the basis that the pressures that the features are sensitive to which may lead to unfavourable condition have been broadly stable over this period.

6.3 Short term trend of habitat area in good condition; Period	A combination of methods has been used to come up with the area of the feature in 'good' and 'not good' condition. This has been a mixture of data from: 1) full condition assessments from SACs using monitoring data to assess condition against a number of attributes at the sub-feature level, before aggregating this for feature condition. Across the feature different areas may be allocated to different condition categories based on sub-feature condition and the resolution of available data. 2) Proxy condition assessments to assign condition for sites for which there is no full condition assessment. A model was used to calculate the proxy condition of the feature based on the activities that are occurring within a site and the vulnerability of features to activities they are exposed to. This output was evaluated and the percentage of the feature in unfavourable condition was estimated from the model output. 3) Outputs of vulnerability assessments for tranche 2 and 3 marine conservation zone features that are directly or broadly comparable to annex I reefs. These were generated as part of the designation process. Any areas that overlapped with existing SACs were removed. The data from these three sources was then aggregated up to a national level, giving an area value for 'good' and 'not good' condition for each annex 1 feature. Comparison of the results from these three sources suggests that they may differ in their ability to identify 'unfavourability' with full condition assessments being more likely to identify unfavourable condition than other methods. Short term trend of area in good condition is stable between 2013-2018. This is on the basis that the pressures that the features are sensitive to which may lead to unfavourable condition have been broadly stable over this period.
6.4 Short term trend of habitat area in good condition; Direction	A combination of methods has been used to come up with the area of the feature in 'good' and 'not good' condition. This has been a mixture of data from: 1) full condition assessments from SACs using monitoring data to assess condition against a number of attributes at the sub-feature level, before aggregating this for feature condition. Across the feature different areas may be allocated to different condition categories based on sub-feature condition and the resolution of available data. 2) Proxy condition assessments to assign condition for sites for which there is no full condition assessment. A model was used to calculate the proxy condition of the feature based on the activities that are occurring within a site and the vulnerability of features to activities they are exposed to. This output was evaluated and the percentage of the feature in unfavourable condition was estimated from the model output. 3) Outputs of vulnerability assessments for tranche 2 and 3 marine conservation zone features that are directly or broadly comparable to annex I reefs. These were generated as part of the designation process. Any areas that overlapped with existing SACs were removed. The data from these three sources was then aggregated up to a national level, giving an area value for 'good' and 'not good' condition for each annex 1 feature. Comparison of the results from these three sources suggests that they may differ in their ability to identify 'unfavourability' with full condition assessments being more likely to identify unfavourable condition than other methods. Short term trend of area in good condition is stable between 2013-2018. This is on the basis that the pressures that the features are sensitive to which may lead to unfavourable condition have been broadly stable over this period.

6.5 Short term trend of habitat area in good condition; Method used	A combination of methods has been used to come up with the area of the feature in 'good' and 'not good' condition. This has been a mixture of data from: 1) full condition assessments from SACs using monitoring data to assess condition against a number of attributes at the sub-feature level, before aggregating this for feature condition. Across the feature different areas may be allocated to different condition categories based on sub-feature condition and the resolution of available data. 2) Proxy condition assessments to assign condition for sites for which there is no full condition assessment. A model was used to calculate the proxy condition of the feature based on the activities that are occurring within a site and the vulnerability of features to activities they are exposed to. This output was evaluated and the percentage of the feature in unfavourable condition was estimated from the model output. 3) Outputs of vulnerability assessments for tranche 2 and 3 marine conservation zone features that are directly or broadly comparable to annex I reefs. These were generated as part of the designation process. Any areas that overlapped with existing SACs were removed. The data from these three sources was then aggregated up to a national level, giving an area value for 'good' and 'not good' condition for each annex 1 feature. Comparison of the results from these three sources suggests that they may differ in their ability to identify 'unfavourability' with full condition assessments being more likely to identify unfavourable condition than other methods. Short term trend of area in good condition is stable between 2013-2018. This is on the basis that the pressures that the features are sensitive to which may lead to unfavourable condition have been broadly stable over this period.
7.1 Characterisation of pressures/ threats	G01: The removal of species which make up a functional component of the reef communityfrom fishing activities will affect the condition of the reef. There are pressures from mussel harvesting on mussel beds, as well as bait collection and shellfish harvesting. There is no management of fishing activity outside of marine protected areas for Annex I reef.
7.1 Characterisation of pressures/ threats	F08: Some intertidal reef features are sensitive to pressures from coastal squeeze.
7.1 Characterisation of pressures/ threats	G03: Whilst management measures have been brought in to prevent damage to reef features within some marine protected areas, many areas are still recovering from the pressure from demersal fishing which caused damage to the reef. These activities are still occurring outside of marine protected areas. Additionally, there may be damage to intertidal reef from bait collection and boulder turning.
7.1 Characterisation of pressures/ threats	N04: Sea levels have risen 1-3mm over the last century (Robins et al., 2016). This pressure combined with the pressure of coastal squeeze from hard sea defences is already acting on intertidal reef and sea level rise is predicted to increase with climate change. There is also the likely effect of increased wave damage from storms causing biological communities to be removed or disturbed, and the smothering of reef features from sediment suspension and movement during storms, which may be more frequent in the future.
7.1 Characterisation of pressures/ threats	F07: Intertidal reef and their communities are sensitive to pressures from recreational activities such as trampling and the removal of key species. Subtidal reef is sensitive to pressures from recreational boating such as abrasion from anchoring.
7.1 Characterisation of pressures/ threats	I02: Annex I reef habitat is sensitive to pressures from non-native species, such as Crassostrea gigas, Crepidula fornicata and Sargassum muticum which are prevalent across reef in certain locations, and are becoming more widespread (GB NNSS, 2018). Currently there is little management in place to address the further spread of these species in the future.

7.1 Characterisation of pressures/ threats	J02: This is a broad pressure that covers all pollution pressures in the marine environment: agriculture, waste water, transport, as well as unknown sources. Annex I reef features are sensitive to pressures from marine pollution. This can cause shifts in community composition and potentially the loss or decline of important native keystone species. There are various management measures in place that regulate pollutants but it unlikely they can be fully eliminated.
7.1 Characterisation of pressures/ threats	N01: Sea surface temperature rose 0.7 degree C from 1971-2010 (Robins et al., 2016), and this is predicted to increase in the future. The impacts from temperature rises are already causing notable shifts in species distribution and alter community composition: the ranges of many southern (lusitanean) species are known to have expanded their range north, and some northern species are known to retract further north. Further increases in temperatures will likely have further effects on marine invertebrate biodiversity as species distributions change. Also, increase in the abundances and ranges of INNS such as Crassostrea gigas are likely.
7.1 Characterisation of pressures/ threats	G17: Crassostrea gigas has spread from marine aquaculture where they have been settling on intertidal reef and are competing with other species . Where they exist in high densities they can alter the natural state of the ecosystem (GB NNSS, 2018)
7.1 Characterisation of pressures/ threats	D06: Reef features may be sensitive to pressures from the installation and maintenance of cables in the future. Reef can be damaged by infrastructure installation, and although this is subject to an EIA, Annex I reefmay be damaged outside of protected sites. The infrastructure is likely to increase over the next 12 years, with more cables being planned (Crown Estate, 2017). Whilst the installation of infrastructure would be a one off impact, the area and volume can be large and recovery could take some time.
7.1 Characterisation of pressures/ threats	D01: Reef features are sensitive to pressures from wind, wave and tidal power activities. Reef can be damaged by infrastructure installation, and although this is subject to an EIA, Annex I reef may be damaged outside of protected sites. The infrastructure installations are likely to increase over the next 12 years, with more renewable installations being planned (Crown Estate, 2017) as well as the possible installation of tidal lagoons. Whilst the installation of infrastructure would be a one off impact, the area and volume can be large and recovery could take some time.
8.1 Status of measures	Conservation measures such as fisheries byelaws that have prevented demersal trawling on reef are already having an effect within Marine protected areas (MPAs), with recovery of communities. Other management measures, such as the marine licensing and EIA process are enabling the protection of Annex I reef within marine protected areas. Some other measures, such as addressing the sources on marine pollution will have longer term results.
8.2 Main purpose of the measures taken	Conservation measures such as fisheries byelaws that have prevented demersal trawling on reef are already having an effect within Marine protected areas (MPAs), with recovery of communities. Other management measures, such as the marine licensing and EIA process are enabling the protection of Annex I reef within marine protected areas. Some other measures, such as addressing the sources on marine pollution will have longer term results.
8.3 Location of the measures taken	Conservation measures such as fisheries byelaws that have prevented demersal trawling on reef are already having an effect within Marine protected areas (MPAs), with recovery of communities. Other management measures, such as the marine licensing and EIA process are enabling the protection of Annex I reef within marine protected areas. Some other measures, such as addressing the sources on marine pollution will have longer term results.

8.4 Response to the measures	Conservation measures such as fisheries byelaws that have prevented demersal trawling on reef are already having an effect within Marine protected areas (MPAs), with recovery of communities. Other management measures, such as the marine licensing and EIA process are enabling the protection of Annex I reef within marine protected areas. Some other measures, such as addressing the sources on marine pollution will have longer term results.
9.1 Future prospects of parameters	An increase in the pressures to which reef is sensitive means that even though management measures are being delivered within MPAs, across the reef resource as a whole including areas outside MPAs, there is likely to be a decrease of less than 1% per year in the area and structure and function and area of this habitat. Increases in pressure may include: smothering as a result of increased wave exposure and storminess due to climate change, the increase of marine industry which outside of protected sites may impact on biogenic reef as well as development along the coast leading to coastal squeeze which will impact intertidal reef. There are significant uncertainties relating to how pressures from inshore fishing activities may change over the next twelve years; although there may be changes in distribution of effort and potentially more effort inshore, this needs to be considered in the context of other potential management changes outlined in the UK Government's fisheries white paper. The range of the feature is likely to remain stable. There are a number of uncertainties affecting this judgement of future prospects; these include the application and interpretation of EU Caselaw to small scale developments within European Sites.
11.4 Short term trend of habitat area in good condition within the network; Direction	Within Natura 2000 sites, management measures such as fisheries byelaws have been brought in and enforced to protect reef features. Consequently the reef features are beginning to recover from previous damage, and their condition is thought to be improving, with more of the habitat in good condition.
11.5 Short term trend of habitat area in good condition within the network; Method used	Within Natura 2000 sites, management measures such as fisheries byelaws have been brought in and enforced to protect reef features. Consequently the reef features are beginning to recover from previous damage, and their condition is thought to be improving, with more of the habitat in good condition.