

**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:

H1130 - Estuaries

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.

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NATIONAL LEVEL

1. General information

1.1 Member State	UK (England information only)
1.2 Habitat code	1130 - Estuaries

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	<p>ABP Marine Environment Research Ltd. 2011. River Hamble Maintenance Dredge Plan.</p> <p>Abrehart, T. R. and Jackson, R. L. 2013. An NVC of the Alde-Ore Estuary SSSI, Suffolk. An ecological survey including flora and fauna observations undertaken for Natural England by Abrehart Ecology.: Abrehart Ecology.</p> <p>ADAS Ltd. 2015. Solent Harbours Nitrogen Management Investigation: ADAS Ltd.</p> <p>ADAS Ltd. 2015. Solent Harbours Nitrogen Management Investigation: ADAS Ltd.</p> <p>Ager, J., Hebert, R., Pope, C. and Riley, A. 1999. <i>Spartina maritima</i> in the Solent Current status and distribution with special reference to the population at Newtown Harbour, IOW. Medina Valley Centre for Natural England: Medina Valley Centre for Natural England.</p> <p>AHTI Ltd., 2016, River Hamble Soft Sediment Habitat Retention Feasibility Study. Report to River Hamble Harbour Authority, AHTI Ltd. Report to River Hamble Harbour Authority</p> <p>Alde and Ore Estuary Partnership (AOEP). 2014. Draft Estuary Plan [Online]. [Accessed 22/04/2015]. http://www.suffolkcoastandheaths.org/estuaries/alde-and-ore-estuary-partnership/2014-draft-estuary-plan/</p> <p>Allen, J. H. and Proctor, N. V. 2003. Monitoring Subtidal Sandbanks of the Isles of Scilly and the Fal and Helford Special Areas of Conservation: Institute of Estuarine and Coastal Studies (ICES), University of Hull.</p> <p>Antill, R., Thomas, P. and Linnane, K. 2017. Natural England baseline intertidal and infralittoral rock survey of the Tweed Estuary SAC: APEM Scientific Report for Natural England.</p> <p>Associated British Ports (ABP). 2011. Environmental Statement for Port of Southampton: Berth 201 / 202 Works updated by Further Information Associated British Ports.</p> <p>Bailey, B. and Pearson, A. W. 2007. Change detection mapping and analysis of salt marsh areas of central southern England from Hurst Castle spit to Pagham Harbour. <i>Journal of Coastal Conservation</i>, 23, 1549-1564.</p> <p>Ball, J., Hill, C., Thomas, N., Kenny, A., Collins, K., Mallinson, J., Sheader, M. and Jenson, A. 2000. Solent and South Wight Mapping of Intertidal and Subtidal Marine cSACs: GeoData Institute.</p> <p>Bealey, C., Cox, J. and Markham, A. 2006. Survey of saltmarsh and coastal vegetation communities associated with fresh water flows and seepages within</p>

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4. Range

4.1 Surface area (in km²)

1880.25

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4.2 Short-term trend Period		
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 (km ²) b) Operator c) Unknown d) Method	No
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 km ²)	a) Minimum 1880.25	b) Maximum 1880.25	c) Best single value 1880.25
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 (km ²) b) Operator c) Unknown d) Method	No	
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 (km ²)	Minimum 883.38789	Maximum 883.38789
	b) Area in not-good condition (km ²)	Minimum 266.3676	Maximum 266.3676
	c) Area where condition is not known (km ²)	Minimum 730.4969	Maximum 730.4969

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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	Decreasing (-)
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. For sandbanks, reef and mudflats and sandflats, a model was used to calculate the proxy condition of each 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. To calculate the proxy condition of the estuaries feature, we have used: a) The proportion of favourable and unfavourable area from the proxy assessments of sandbanks, mudflats and sandflats and reefs where they are sub-features of the estuaries feature, b) The proportion of favourable and unfavourable area of Saltmarsh within estuaries from SSSI saltmarsh assessments. c) The WFD classification generated for each SAC for the condition assessment process. The data from these 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 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 the habitat area in good condition has decreased from 2013-2018. This is on the basis of coastal squeeze, other pressures that the feature is 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
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)	H
Sea-level and wave exposure changes due to climate change (N04)	H
Agricultural activities generating marine pollution (A28)	H

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Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats (G03)	H
Mixed source marine water pollution (marine and coastal) (J02)	H
Other invasive alien species (other than species of Union concern) (I02)	M
Temperature changes (e.g. rise of temperature & extremes) due to climate change (N01)	M
Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (E03)	M
Residential or recreational activities and structures generating marine macro- and micro- particulate pollution (e.g. plastic bags, Styrofoam) (F22)	M
Deposition and treatment of waste/garbage from commercial and industrial facilities (F10)	M
Threat	Ranking
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)	H
Sea-level and wave exposure changes due to climate change (N04)	H
Agricultural activities generating marine pollution (A28)	H
Mixed source marine water pollution (marine and coastal) (J02)	M
Other invasive alien species (other than species of Union concern) (I02)	H
Temperature changes (e.g. rise of temperature & extremes) due to climate change (N01)	H
Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (E03)	M
Residential or recreational activities and structures generating marine macro- and micro- particulate pollution (e.g. plastic bags, Styrofoam) (F22)	M
Wind, wave and tidal power, including infrastructure (D01)	M
Change of species distribution (natural newcomers) due to climate change (N08)	M

7.2 Sources of information

Robins et al., (2016)
Robins et al., (2016)

7.3 Additional information

F08: 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 within estuaries 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.

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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 within estuaries 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.

A28: Agricultural run-off, including eutrophic river water, encourages the growth of algal mats which adversely affect invertebrate communities on the mudflats and sandflats within estuaries. High nutrient levels within the water column encourage algal growth and can lead to hypoxia. High nutrient loading of the water column is a widespread issue in England, and while management measures are being introduced to reduce agricultural run-off in problem areas, as eutrophic river inputs from large catchment areas are often concentrated in Estuaries and Large shallow inlets and bays, the magnitude of the sources that need to be addressed means this remains a high future threat.

G03: Whilst management measures have been brought in to prevent damage to subtidal estuary features within some marine protected areas, many areas are still recovering from the pressures exerted by demersal fishing which caused historical damage. Intertidal features within large shallow inlets and bays are sensitive to pressures from shellfish harvesting which has an impact by both removing the species and on the habitat. In addition, bait collection additionally removes and disturbs species within the habitat. Conservation measures have been brought in to reduce these pressures within marine protected areas, but not outside of them, and inshore fishing pressures are unlikely to decrease in the future. This future threat is noted but did not make the top 10 shortlist for this habitat.

J02: This is a broad pressure that covers mixed pollution pressures in the marine environment: agriculture, waste water, transport, as well as unknown sources. Estuaries 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.

I02: Estuaries are sensitive to pressures from non-native species, such as *Crassostrea gigas* and *Crepidula fornicata* which are prevalent across intertidal areas 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.

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 (Iusitanian) 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.

E03: Estuaries are sensitive to pressures derived from maintaining navigational channels. In the UK 20 million tonnes of sediment is dredged a year, which can affect the sediment regimes of the system although this is regulated. Near to disposal sites, smothering of the communities may occur although the effects will generally be short lived. Anchoring and moorings are increasing in number and features within estuaries are sensitive to the

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pressures from these activities. Shipping activity is increasing, and while more targeted management may be brought in in the future to manage effects, this is likely to largely be within marine protected areas.

F22: Features within estuaries are sensitive to the pressures exerted from marine plastics in the water column, which derive from a variety of sources, not just residential and recreational. The impact of these plastics within the water column and habitats on the species that inhabit estuaries is still being investigated, but the majority of evidence shows impacts at the individual level, with less understanding of the impact on a population of a habitat (GESAMP, 2016). More measures are required to reduce the pressures deriving from marine plastics within the marine environment.

F10: Features within estuaries are sensitive to pressures from marine pollution which may enter the system from waste water and potentially cause eutrophication. High nutrient levels within the water column encourage algal growth and can lead to hypoxia. High nutrient loading of the water column is a widespread issue in England, and while management measures are being introduced to reduce pollution from waste water, inputs from large urban centres areas will be more concentrated in shallow coastal waters and the magnitude of the sources that need to be addressed means this remains a future threat. This threat is noted, but did not make the top 10 shortlist for this habitat.

D01: Estuaries are sensitive to pressures from wind, wave and tidal power activities. The possible installation of tidal lagoons around the country could impound areas of estuaries, and are likely to have an impact on their habitats and physical processes. The current pressures are noted, but were not deemed significant enough to make the top 10 shortlist of pressures for this habitat.

N08: The impacts from climate change are already causing notable shifts in species distribution and alter community composition: the ranges of many southern (Iusitanian) species are known to have expanded their range north, and some northern species are known to retract further north. Further climatic changes are likely to have further effects on marine invertebrate biodiversity as species distributions change. Impacts from climate change are noted but did not make the top 10 shortlist for current pressures.

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

Medium-term results (within the next two reporting periods, 2019-2030)

8.5 List of main conservation measures

Reduce/eliminate marine pollution from agricultural activities (CA13)

Reduce impact of transport operation and infrastructure (CE01)

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

Manage changes in hydrological and coastal systems and regimes for construction and development (CF10)

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

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

Reduce impact of outdoor sports, leisure and recreational activities (CF03)

Reduce/eliminate marine contamination with litter (CF08)

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

Early detection and rapid eradication of invasive alien species of Union concern (CI01)

8.6 Additional information

Conservation measures such as fisheries byelaws are already having an effect within marine protected areas (MPAs), with some recovery of communities. Other management measures within MPAs, such as the marine licensing and EIA process are also enabling the protection of estuaries. Some other measures, such as addressing the sources of 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 pressures to which this feature is sensitive means that there is likely to be a decrease of more than 1% per year in the structure and function of this habitat as a result of climate change, shell fisheries, recreational activities and coastal / industrial development leading to coastal squeeze. The area of the feature is likely to change by less than 1% per year and the range will remain stable as the sensitivity of the feature to these pressures will affect the structure and function more than the area, and the range should remain stable over the next two reporting cycles. However, coastal squeeze and sea level rise will have an increased effect on these attributes in the long term. 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:

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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 km ² in biogeographical/marine region)	a) Minimum	1322.9
	b) Maximum	1322.9
	c) Best single value	1322.9

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

11.5 Short-term trend of habitat area in good condition within network Method used

11.6 Additional information

Decreasing (-)

Based mainly on expert opinion with very limited data

Whilst management measures have been put in place to protect damage of the feature where necessary within Natura 2000 sites, the impact of coastal squeeze means that the habitat area in good condition is decreasing both inside and outside the network

12. Complementary information

12.1 Justification of % thresholds for trends

12.2 Other relevant information

Distribution Map

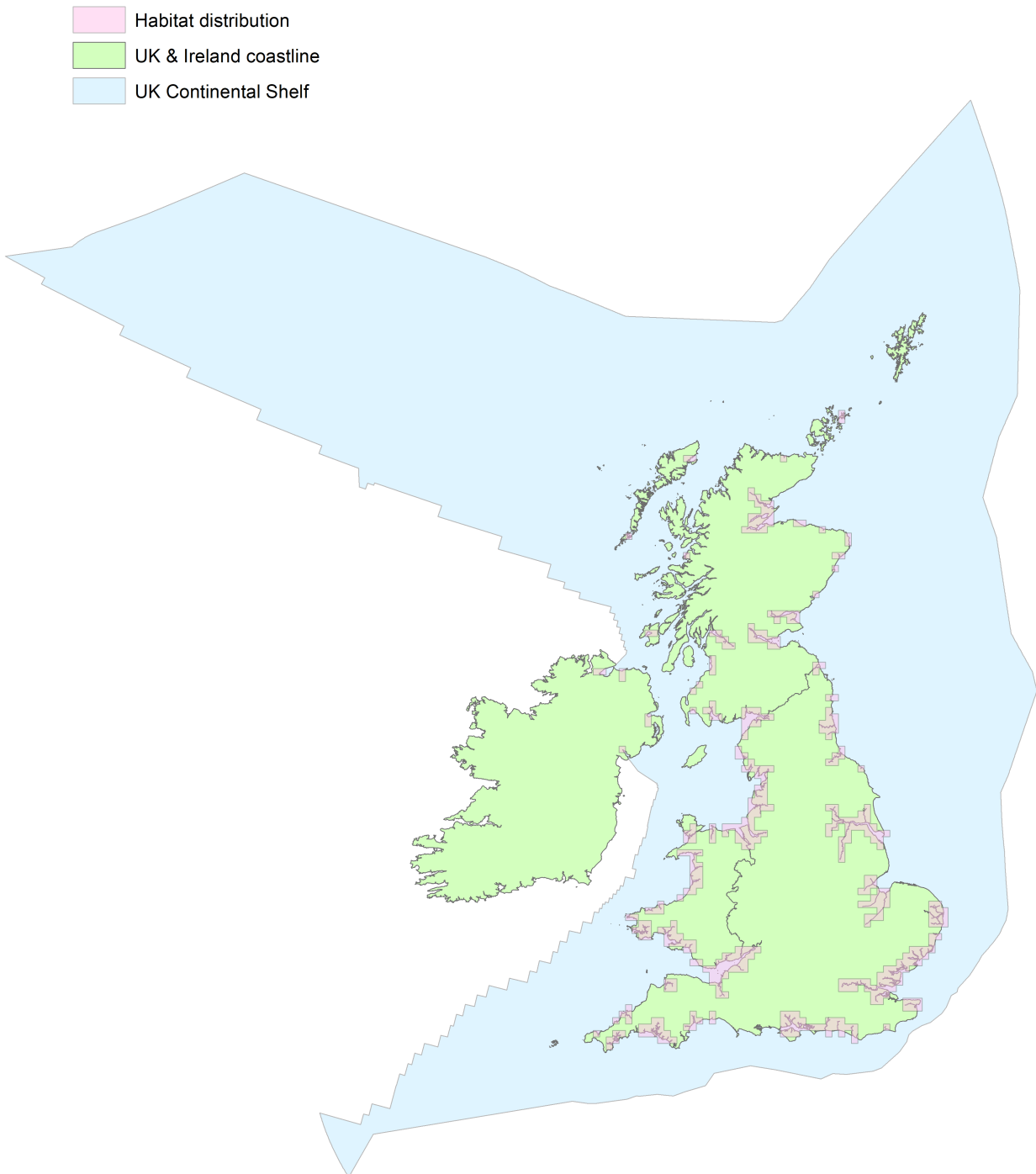


Figure 1: UK distribution map for H1130 - Estuaries.

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

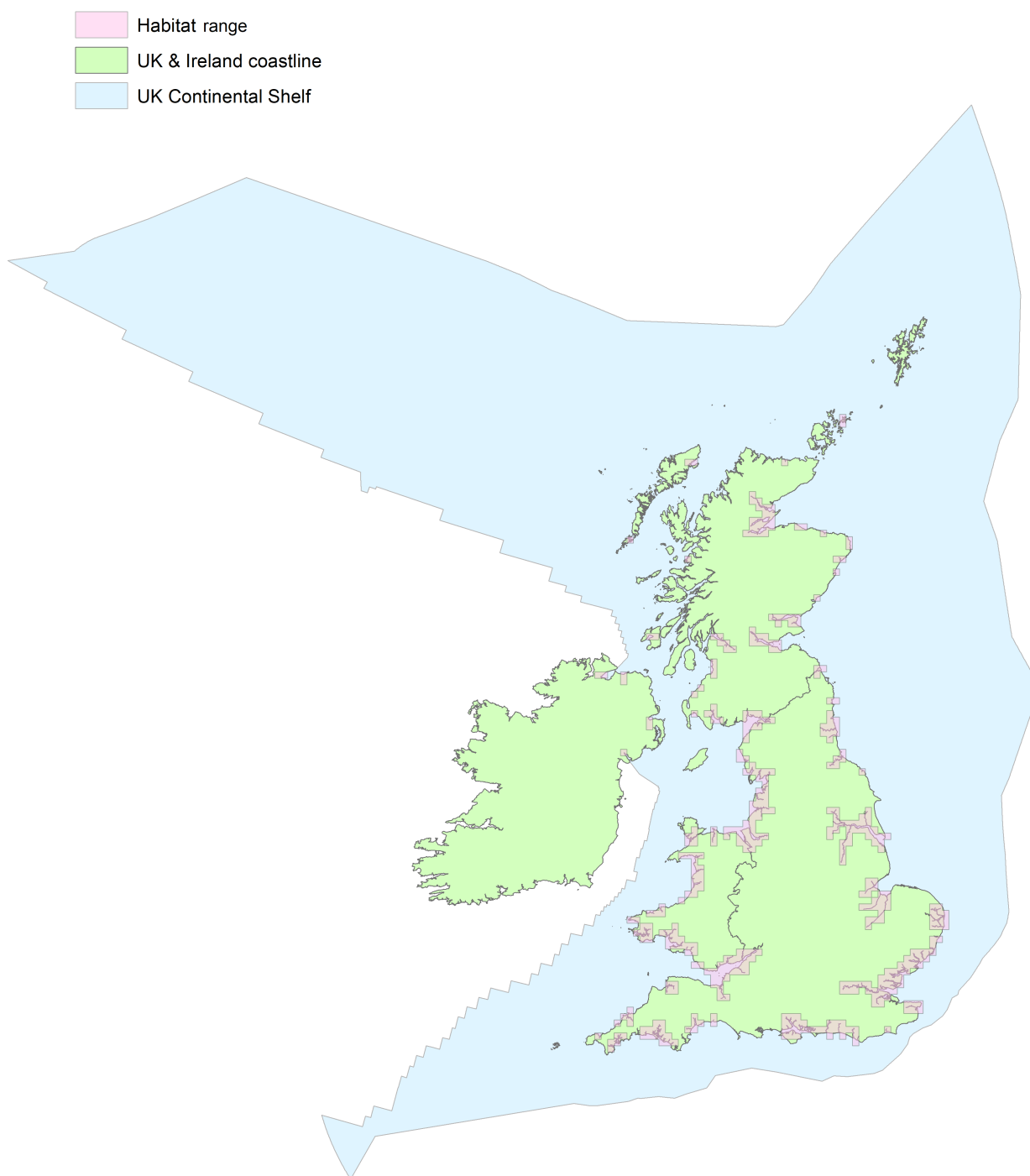


Figure 2: UK range map for H1130 - Estuaries.

Estuaries are physiographic features and so their range is determined primarily by geomorphological and hydrographic processes occurring over geological time-scales and is not related to biological communities or processes supported by communities. Therefore, the range was considered equivalent to the surface area (distribution) of the habitat.

Explanatory Notes

Habitat code: 1130 Region code: MATL

Field label	Note
6.1 Condition of habitat	<p>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. For sandbanks, reef and mudflats and sandflats, a model was used to calculate the proxy condition of each 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. To calculate the proxy condition of the estuaries feature, we have used: a) The proportion of favourable and unfavourable area from the proxy assessments of sandbanks, mudflats and sandflats and reefs where they are sub-features of the estuaries feature, b) The proportion of favourable and unfavourable area of Saltmarsh within estuaries from SSSI saltmarsh assessments. c) The WFD classification generated for each SAC for the condition assessment process. The data from these 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 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 the habitat area in good condition has decreased from 2013-2018. This is on the basis of coastal squeeze, other pressures that the feature is sensitive to which may lead to unfavourable condition have been broadly stable over this period.</p>

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. For sandbanks, reef and mudflats and sandflats, a model was used to calculate the proxy condition of each 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. To calculate the proxy condition of the estuaries feature, we have used: a) The proportion of favourable and unfavourable area from the proxy assessments of sandbanks, mudflats and sandflats and reefs where they are sub-features of the estuaries feature, b) The proportion of favourable and unfavourable area of Saltmarsh within estuaries from SSSI saltmarsh assessments. c) The WFD classification generated for each SAC for the condition assessment process. The data from these 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 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 the habitat area in good condition has decreased from 2013-2018. This is on the basis of coastal squeeze, other pressures that the feature is 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. For sandbanks, reef and mudflats and sandflats, a model was used to calculate the proxy condition of each 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. To calculate the proxy condition of the estuaries feature, we have used: a) The proportion of favourable and unfavourable area from the proxy assessments of sandbanks, mudflats and sandflats and reefs where they are sub-features of the estuaries feature, b) The proportion of favourable and unfavourable area of Saltmarsh within estuaries from SSSI saltmarsh assessments. c) The WFD classification generated for each SAC for the condition assessment process. The data from these 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 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 the habitat area in good condition has decreased from 2013-2018. This is on the basis of coastal squeeze, other pressures that the feature is 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. For sandbanks, reef and mudflats and sandflats, a model was used to calculate the proxy condition of each 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. To calculate the proxy condition of the estuaries feature, we have used: a) The proportion of favourable and unfavourable area from the proxy assessments of sandbanks, mudflats and sandflats and reefs where they are sub-features of the estuaries feature, b) The proportion of favourable and unfavourable area of Saltmarsh within estuaries from SSSI saltmarsh assessments. c) The WFD classification generated for each SAC for the condition assessment process. The data from these 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 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 the habitat area in good condition has decreased from 2013-2018. This is on the basis of coastal squeeze, other pressures that the feature is 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. For sandbanks, reef and mudflats and sandflats, a model was used to calculate the proxy condition of each 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. To calculate the proxy condition of the estuaries feature, we have used: a) The proportion of favourable and unfavourable area from the proxy assessments of sandbanks, mudflats and sandflats and reefs where they are sub-features of the estuaries feature, b) The proportion of favourable and unfavourable area of Saltmarsh within estuaries from SSSI saltmarsh assessments. c) The WFD classification generated for each SAC for the condition assessment process. The data from these 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 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 the habitat area in good condition has decreased from 2013-2018. This is on the basis of coastal squeeze, other pressures that the feature is sensitive to which may lead to unfavourable condition have been broadly stable over this period.

7.1 Characterisation of pressures/ threats	A28: Agricultural run-off, including eutrophic river water, encourages the growth of algal mats which adversely affect invertebrate communities on the mudflats and sandflats within estuaries. High nutrient levels within the water column encourage algal growth and can lead to hypoxia. High nutrient loading of the water column is a widespread issue in England, and while management measures are being introduced to reduce agricultural run-off in problem areas, as eutrophic river inputs from large catchment areas are often concentrated in Estuaries and Large shallow inlets and bays, the magnitude of the sources that need to be addressed means this remains a high future threat.
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 within estuaries 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.
7.1 Characterisation of pressures/ threats	G03: Whilst management measures have been brought in to prevent damage to subtidal estuary features within some marine protected areas, many areas are still recovering from the pressures exerted by demersal fishing which caused historical damage. Intertidal features within large shallow inlets and bays are sensitive to pressures from shellfish harvesting which has an impact by both removing the species and on the habitat. In addition, bait collection additionally removes and disturbs species within the habitat. Conservation measures have been brought in to reduce these pressures within marine protected areas, but not outside of them, and inshore fishing pressures are unlikely to decrease in the future. This future threat is noted but did not make the top 10 shortlist for this habitat.
7.1 Characterisation of pressures/ threats	J02: This is a broad pressure that covers mixed pollution pressures in the marine environment: agriculture, waste water, transport, as well as unknown sources. Estuaries 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	I02: Estuaries are sensitive to pressures from non-native species, such as <i>Crassostrea gigas</i> and <i>Crepidula fornicata</i> which are prevalent across intertidal areas 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	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 (Iusitanian) 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 <i>Crassostrea gigas</i> are likely.
7.1 Characterisation of pressures/ threats	E03: Estuaries are sensitive to pressures derived from maintaining navigational channels. In the UK 20 million tonnes of sediment is dredged a year, which can affect the sediment regimes of the system although this is regulated. Near to disposal sites, smothering of the communities may occur although the effects will generally be short lived. Anchoring and moorings are increasing in number and features within estuaries are sensitive to the pressures from these activities. Shipping activity is increasing, and while more targeted management may be brought in in the future to manage effects, this is likely to largely be within marine protected areas.

7.1 Characterisation of pressures/ threats	F22: Features within estuaries are sensitive to the pressures exerted from marine plastics in the water column, which derive from a variety of sources, not just residential and recreational. The impact of these plastics within the water column and habitats on the species that inhabit estuaries is still being investigated, but the majority of evidence shows impacts at the individual level, with less understanding of the impact on a population of a habitat (GESAMP, 2016). More measures are required to reduce the pressures deriving from marine plastics within the marine environment.
7.1 Characterisation of pressures/ threats	F10: Features within estuaries are sensitive to pressures from marine pollution which may enter the system from waste water and potentially cause eutrophication. High nutrient levels within the water column encourage algal growth and can lead to hypoxia. High nutrient loading of the water column is a widespread issue in England, and while management measures are being introduced to reduce pollution from waste water, inputs from large urban centres areas will be more concentrated in shallow coastal waters and the magnitude of the sources that need to be addressed means this remains a future threat. This threat is noted, but did not make the top 10 shortlist for this habitat.
7.1 Characterisation of pressures/ threats	D01: Estuaries are sensitive to pressures from wind, wave and tidal power activities. The possible installation of tidal lagoons around the country could impound areas of estuaries, and are likely to have an impact on their habitats and physical processes. The current pressures are noted, but were not deemed significant enough to make the top 10 shortlist of pressures for this habitat.
7.1 Characterisation of pressures/ threats	N08: The impacts from climate change are already causing notable shifts in species distribution and alter community composition: the ranges of many southern (Iberian) species are known to have expanded their range north, and some northern species are known to retract further north. Further climatic changes are likely to have further effects on marine invertebrate biodiversity as species distributions change. Impacts from climate change are noted but did not make the top 10 shortlist for current pressures.
7.1 Characterisation of pressures/ threats	F08: 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 within estuaries 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.
8.1 Status of measures	Conservation measures such as fisheries byelaws are already having an effect within marine protected areas (MPAs), with some recovery of communities. Other management measures within MPAs, such as the marine licensing and EIA process are also enabling the protection of estuaries. Some other measures, such as addressing the sources of marine pollution will have longer term results.
8.2 Main purpose of the measures taken	Conservation measures such as fisheries byelaws are already having an effect within marine protected areas (MPAs), with some recovery of communities. Other management measures within MPAs, such as the marine licensing and EIA process are also enabling the protection of estuaries. Some other measures, such as addressing the sources of marine pollution will have longer term results.
8.3 Location of the measures taken	Conservation measures such as fisheries byelaws are already having an effect within marine protected areas (MPAs), with some recovery of communities. Other management measures within MPAs, such as the marine licensing and EIA process are also enabling the protection of estuaries. Some other measures, such as addressing the sources of marine pollution will have longer term results.

8.4 Response to the measures Conservation measures such as fisheries byelaws are already having an effect within marine protected areas (MPAs), with some recovery of communities. Other management measures within MPAs, such as the marine licensing and EIA process are also enabling the protection of estuaries. Some other measures, such as addressing the sources of marine pollution will have longer term results.

9.1 Future prospects of parameters An increase in pressures to which this feature is sensitive means that there is likely to be a decrease of more than 1% per year in the structure and function of this habitat as a result of climate change, shell fisheries, recreational activities and coastal / industrial development leading to coastal squeeze. The area of the feature is likely to change by less than 1% per year and the range will remain stable as the sensitivity of the feature to these pressures will affect the structure and function more than the area, and the range should remain stable over the next two reporting cycles. However, coastal squeeze and sea level rise will have an increased effect on these attributes in the long term. 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 Whilst management measures have been put in place to protect damage of the feature where necessary within Natura 2000 sites, the impact of coastal squeeze means that the habitat area in good condition is decreasing both inside and outside the network

11.5 Short term trend of habitat area in good condition within the network; Method used Whilst management measures have been put in place to protect damage of the feature where necessary within Natura 2000 sites, the impact of coastal squeeze means that the habitat area in good condition is decreasing both inside and outside the network