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:

H1160 - Large shallow inlets and bays

WALES

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 (Wales information only)**
1.2 Habitat code	**1160 - Large shallow inlets and bays**

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	Anthony D. Bates Partnership LLP. 2016. Milford Haven Port Authority Dredging Strategy Document (Revision 2), June 2016. Atkins. 2010. SMP 19, Anchor Head to Lavernock Point (Severn Estuary) Shoreline Management Plan (SMP) Review. AWFA reports. 2017. Multiple on-line reports. https://naturalresources.wales/about-us/our-projects/marine-projects/assessing-welsh-fishing-activities/?lang=en. Bergmann. M, Gutow. L, & Klages, M. 2015. Marine Anthropogenic Litter. https://link.springer.com/content/pdf/10.1007%2F978-3-319-16510-3.pdf Birchenough, S. N. R., Bremne J., Henderson, P., Hinz, H., Jenkins, S., Mieszkowska, N., Roberts, J. M., Kamenos, N. and Plenty, S. 2013. Impacts of Climate Change on Shallow and Shelf Subtidal Habitats. MCCIP Science Review 2013: 193-203 Bohn, K. 2014. The distribution and potential northwards spread of the invasive slipper limpet Crepidula fornicata in Wales, UK. NRW Evidence Report No: 40, 43pp, Natural Resources Wales, Bangor. Borja, A., Franco, J. & Perez, V. 2000. A Marine Biotic Index to Establish the Ecological Quality of Soft-Bottom Benthos Within European Estuarine and Coastal Environments. Marine Pollution Bulletin. 40(12), 1100-1114. Brazier DP. In prep. Pembroke power Station - Limpet Size Profiles. NRW data. Bunker, F. St. P. D. 2011. Monitoring of a Maerl Bed in the Milford Haven Waterway, Pembrokeshire, 2010. CCW Contract Science Report No. 979. A report to the Countryside Council for Wales by MarineSeen, Pembrokeshire 145pp + iii. Bunker, F. St. P. D., Diaz-Tapia, P. and Maggs, C. A. (in prep). Monitoring a maerl bed in Milford Haven between 2005 and 2016. NRW Evidence Report No: 213, Natural Resources Wales, Bangor CCW sidescan. 2009. Side scan of the Milford Haven including the Milford Haven Maerl Bed. Data Held Internally in NRW. Clarke, L., Griffin, R. & Green. M. (in review) Special Area of Conservation Condition Reporting - Large Shallow Inlets & Bays Sublittoral Soft Sediment Ecological Monitoring of Red Wharf Bay. NRW Evidence Report In Review. Edwards P. 2014. Nutrient concentrations in the Milford Haven catchment area. Tech. memo: TMW14-09 Natural Resources Wales. NRW.

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Galloway, T. S. & Lewis C. N. 2016. Marine Microplastics Spell Big Problems for Future Generations. Proceedings of the National Academy of Sciences vol. 113 No. 9: 2331-2333.
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Griffin, R. & Clarke, L. (in review) Special Area of Conservation Condition Reporting - Large Shallow Inlets & Bays Sublittoral Soft Sediment Ecological Monitoring of St Brides Bay. NRW Evidence Report In Review.
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HM Government. 1989. Electricity Act 1989 (Section 36): https://www.legislation.gov.uk/ukpga/1989/29/section/36
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NRW Article 17 Intertidal Mud and Sand Flats Report Evidence Pack 2018
NRW Article 17 Maerl Report Evidence Pack 2018
NRW Article 17 Reef Report Evidence Pack 2018

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4. Range

4.1 Surface area (in km²)	1520.15	
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 (km²)	
	b) Operator	
	c) Unknown	No
	d) Method	

4.11 Change and reason for change in surface area of range	Use of different method The change is mainly due to: Use of different method
4.12 Additional information	

5. Area covered by habitat

5.1 Year or period			
5.2 Surface area (in km²)	a) Minimum 1520.15	b) Maximum 1520.15	c) Best single value 1520.15
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	Use of different method The change is mainly due to: Use of different method		
5.15 Additional information			

6. Structure and functions

6.1 Condition of habitat	a) Area in good condition (km²)	Minimum 624.39	Maximum 624.39
	b) Area in not-good condition (km²)	Minimum 881.82	Maximum 881.82
	c) Area where condition is not known (km²)	Minimum 13.94	Maximum 13.94
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	Uncertain (u)		
6.5 Short-term trend of habitat area in good condition Method used	Insufficient or no data available		
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			

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

7. Main pressures and threats

7.1 Characterisation of pressures/threats

Pressure	Ranking
Mixed source marine water pollution (marine and coastal) (J02)	H
Residential or recreational activities and structures generating marine macro- and micro- particulate pollution (e.g. plastic bags, Styrofoam) (F22)	M
Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (G01)	M
Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (E03)	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
Development and operation of energy production plants (including bioenergy plants, fossil and nuclear energy plants) (D05)	M

Threat	Ranking
Mixed source marine water pollution (marine and coastal) (J02)	H
Residential or recreational activities and structures generating marine macro- and micro- particulate pollution (e.g. plastic bags, Styrofoam) (F22)	M
Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species (G01)	M
Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (E03)	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
Development and operation of energy production plants (including bioenergy plants, fossil and nuclear energy plants) (D05)	M
Marine aquaculture generating marine pollution (G16)	M
Other invasive alien species (other then species of Union concern) (I02)	M
Sea-level and wave exposure changes due to climate change (N04)	M
Wind, wave and tidal power, including infrastructure (D01)	M

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

7.2 Sources of information

7.3 Additional information

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 impact of mixed source pollution (CJ01)
Reduce/eliminate marine pollution from agricultural activities (CA13)
Management of professional/commercial fishing (including shellfish and seaweed harvesting) (CG01)
Manage changes in hydrological and coastal systems and regimes for construction and development (CF10)
Adapt/manage fossil energy installation, facilities and operation (CC05)
Adapt/manage renewable energy installation, facilities and operation (CC03)
Reduce/eliminate marine contamination with litter (CF08)
Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructure, operations and activities (CF02)
Management, control or eradication of other invasive alien species (CI03)
Reduce impact of transport operation and infrastructure (CE01)

8.6 Additional information

9. Future prospects

9.1 Future prospects of parameters	a) Range b) Area c) Structure and functions
9.2 Additional information	

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

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

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	1280.81
	b) Maximum	1280.81
	c) Best single value	1280.81
11.2 Type of estimate	Best estimate	
11.3 Surface area of the habitat type inside the network Method used	Complete survey or a statistically robust estimate	
11.4 Short-term trend of habitat area in good condition within the network Direction	Uncertain (u)	
11.5 Short-term trend of habitat area in good condition within network Method used	Insufficient or no data available	
11.6 Additional information		

12. Complementary information

12.1 Justification of % thresholds for trends
12.2 Other relevant information

Distribution Map

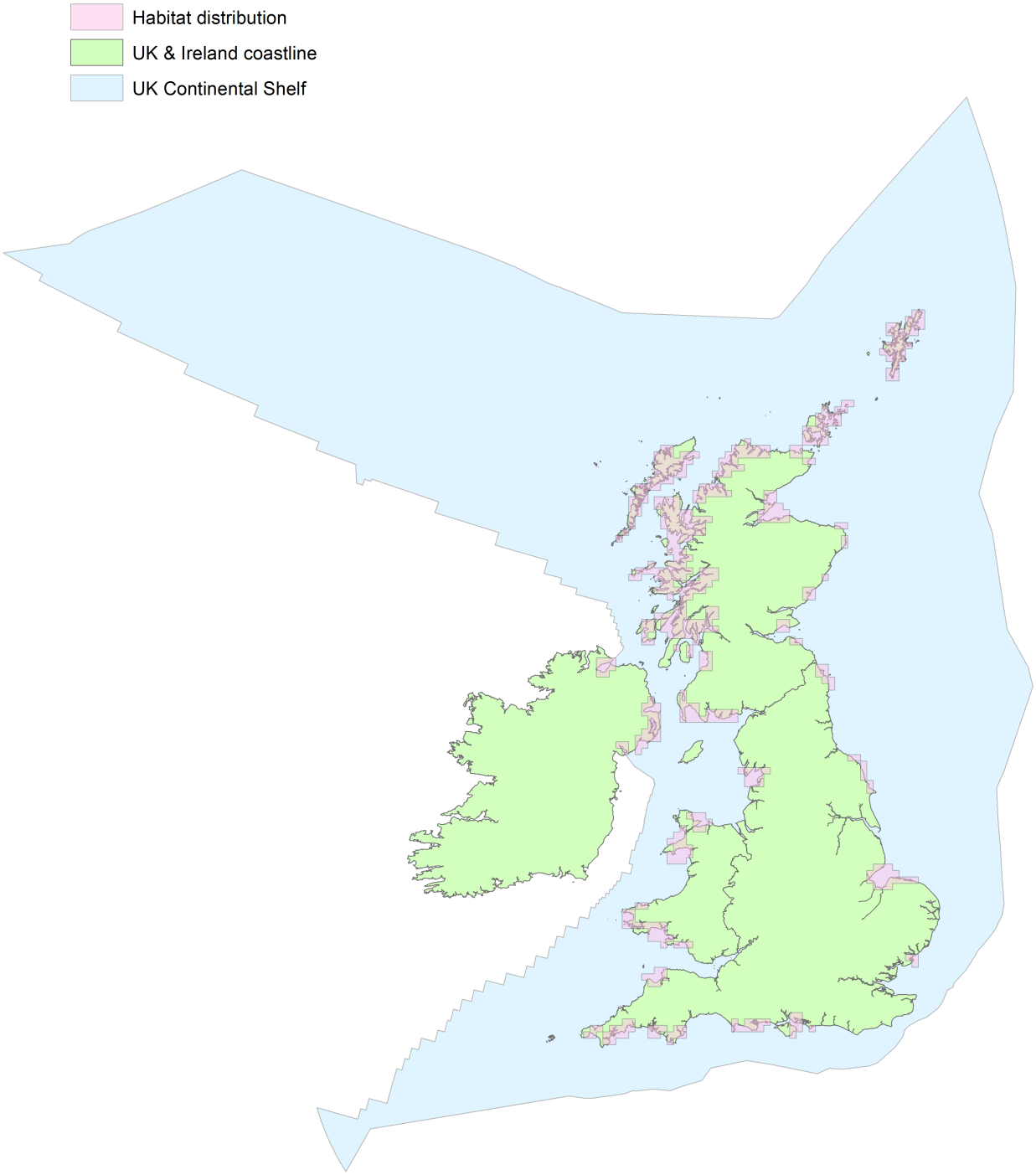

Figure 1: UK distribution map for H1160 - Large shallow inlets and bays.

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

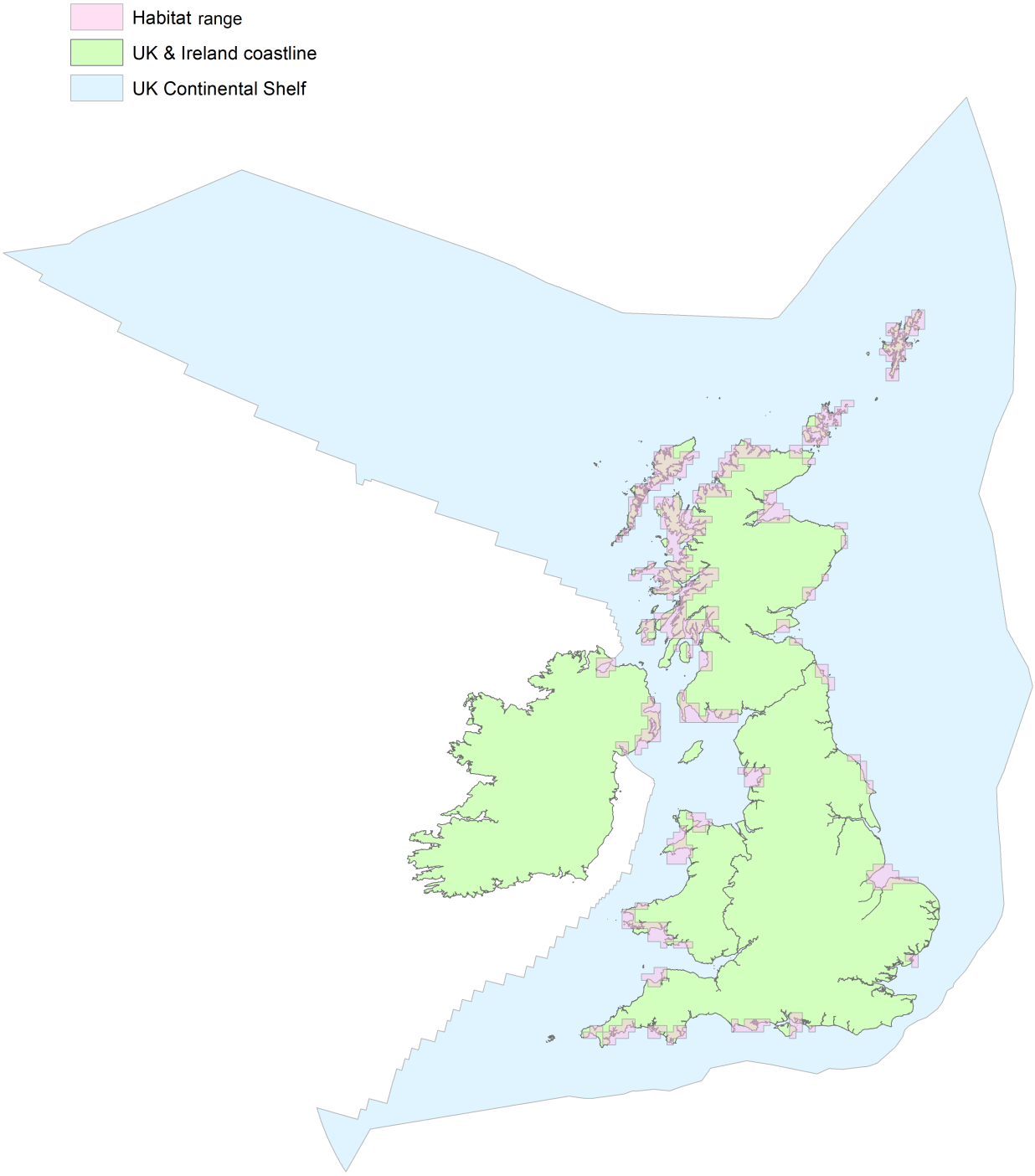

Figure 2: UK range map for H1160 - Large shallow inlets and bays.

Large shallow inlets and bays are physiographic features and so their range is determined primarily by geomorphological and hydrographic processes occurring over long time-scales and is not related to biological communities or processes supported by communities. Therefore, the range was considered equivalent to the surface area of the habitat.

Explanatory Notes

Habitat code: 1160 Region code: MATL

Field label	Note
4.3 Short term trend; Direction	The occurrence of this habitat is defined by physiographic processes over long timescales. While the physical area of some of individual sub-habitats (see section 5.3) may have declined due to localised pressures, the geographic spread and distribution of bays is not thought to have been reduced (stable).
4.11 Change and reason for change in surface area of range	There has been a change of 5.64km2 in total area calculated by JNCC from 2013 to 2018, no new data was submitted therefore this is likely due to projection/GIS issues.
5.6 Short term trend; Direction	Boundaries for Shallow Inlets and Bays are based on physiographic processes and are unlikely to change unless there is substantial shift in geomorphology. Some of the losses in Intertidal Mud and Sand Flats and Reefs are within Large Shallow Inlets and Bays, but the areas of the Large Shallow Inlets and Bays likely remains stable. Stable indicated in 2013 (although minor losses indicated due to coastal defence) (NRW, 2013).
5.14 Change and reason for change in surface area	There has been a change of 5.64km2 in total area calculated by JNCC from 2013 to 2018, no new data was submitted therefore this is likely due to projection/GIS issues.

6.1 Condition of habitat

The area in good/not good/unknown condition for structure and function of welsh Large Shallow Inlet and Bays (LSIB) was assessed using collated available evidence and conclusions from specific data analysis which were spatially and ecologically relevant. Evidence used included; Water Framework Directive assessments and conclusions of the indicative site level assessments for specific bays within Welsh SACs and specific recent collated evidence and data analysis. Condition was assessed for each bay as whole units. Details of assessment and confidence in assessment is presented by each bay below. Note: there was a difference in the total figures calculated by JNCC and NRW of 0.75km2. The difference was subtracted from the unknown area so that the totals were the same, this approach was agreed with JNCC. Relevant activities and noted activities are provided (as per indicative condition assessments [NRW, 2018a-e]): Relevant activities: These were activities agreed during the indicative assessment process as having an impact on the condition of the feature, underpinned by evidence. There was no confidence rating associated with these activities or their associated impacts. Noted activities: These were activities agreed during the indicative assessment process as occurring in the site, but where there is no evidence that the activity is having a direct impact on condition of the feature at that site. Noted activities may be having, or have the potential to have, an impact on feature condition, and were listed to be kept under review. Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC Carmarthen Bay and Estuaries (418.5km2; 27.5% of Welsh resource): Not Good Overall Indicative Condition (unfavourable, medium confidence): Structure and Function and Typical Species assessed as unfavourable (with Medium and Low confidence respectively). Identified related sub-feature: Intertidal Mud and Sand Flats. Structure and Function (Unfavourable, Medium confidence): The Carmarthen Bay and Estuaries SAC overlaps with a number of WFD waterbodies however, only two overlap with the bay feature (Burry Inlet Outer & Carmarthen Bay). Burry Inlet Outer has an overall poor status but a good chemical status, Carmarthen Bay waterbody has an overall moderate status but a fail for chemical status driven by a failure for mercury and its compounds. Both waterbodies receive only a moderate for DIN (dissolved inorganic nitrogen) and Bury Inlet outer has a poor assessment for phytoplankton, although both waterbodies had favourable results (high and good) for macroalgae. This component has been assessed as unfavourable. Typical Species (Unfavourable, Low Confidence): Both waterbodies were assessed for IQI (infaunal quality Index) one (Bury Inlet Outer) received a moderate grade, the other (Carmarthen Bay) was good. Bury Inlet outer was also assessed as poor for phytoplankton (WFD Classification, 2015). Intertidal SAC infaunal data has been gathered recently but has not been fully worked up. Statistical analysis for all of the infaunal sites around Carmarthen Bay do not show any changes up until 2010, other than at Llansteffan where there is a trend over time of increasing Spio and Capitella (polychaete worms) species, whilst the cockle and other species stay the same. At all but one of the sample sites (2010: LS04b), the changes were not statistically significant (NRW, 2018e). Subtidal data from 2012 indicates lower species richness compared to 1996, not apparently related to PSA (particle size analysis). Changes due to types of species present as well as abundance (internal NRW analysis), confidence level of medium. Data collected in 1996 and 2012 however survey methods have changed so the data is difficult to interpret. Communities are changing year on year but it is unclear whether the reason for this is anthropogenic or natural. Low number of sampling dates leads to low confidence in the data. More recent surveys may be more conclusive. This component has been assessed as unfavourable (NRW, 2018e). Relevant activities: - Diffuse pollution - Point source pollution Noted Activities: - Potting for whelks (Buccinum undatum) (removal of commonly found species) Menai Strait and Conwy Bay SAC Overall Indicative Condition (Unfavourable): Structure and Function and Typical Species assessed as unfavourable (with Medium confidence) (NRW, 2018b). Conwy Bay (200.4km2, 13.2% of Welsh resource): Not Good Identified related sub-feature: subtidal sandbanks and intertidal mud and sandflats Structure and function (Unfavourable, Medium Confidence): WFD data was used from

the four relevant waterbodies that overlap this feature (Conwy Bay, Menai Strait, Anglesey North and Conwy) one of these waterbodies has a good overall status and good chemical status while three have a moderate overall status and a fail for chemical status, the chemical status fails in all cases is for mercury and it's compounds. Angiosperms were assessed as good in the one waterbody in which they were assessed, Conwy Bay, with saltmarsh good and seagrass assessed as high. Macroalgae was high in the two waterbodies where it was assessed and phytoplankton was good in the two waterbodies where it was assessed. Invertebrates were good at two of the waterbodies but moderate in the other two (NRW, 2018b; WFD Classification, 2015). Additional macrobenthic analysis recently undertaken in Red Wharf Bay (in the northern part of the Conwy Bay large and shallow inlet and bay feature) indicated, overall, sublittoral habitats in Red Wharf Bay are in good ecological health and have broadly remained so throughout the monitoring. The spatial and temporal variation evident in the results can be considered within the limits of natural variation and likely due to natural disturbance events. It was noted however, that one surveillance station was characterised by higher volumes of fine sediment fractions and increased contribution of AMBI Ecological AMBI Groups III and IV (the AMBI index classifies the sensitivity/tolerance of benthic fauna to stress gradients e.g. pollution - see Borja et al., 2000 for details), indicating increased nutrient enrichment, which may arise from a nearby sewage effluent pipe (Clarke, Griffin & Green, in review). Typical Species (unfavourable, Medium confidence): Infaunal quality index (IQI) was moderate in two waterbodies; Conwy Bay and Conwy but good at three (NRW, 2018b). A basic investigatory assessment of the Conwy Bay IQI sample data confirmed there was concern about the ecological status of benthic communities in the bay which was consistently moderate over two broad scale surveys, although the average was close to the good/moderate boundary in the later survey (2013). Relevant Activities - Water quality issues Noted pressures - Inappropriate vehicle use Pembrokeshire Marine SAC Overall Indicative Condition: Structure and Function and Typical Species assessed as unfavourable (both with Medium confidence). Mainly relating to issues in Milford Haven (NRW, 2018d). Milford Haven Waterway (47.1km2, 3.1% of Welsh resource): Not Good Identified related sub-feature: estuaries, intertidal mud and sandflats and reefs. Structure and Function (Unfavourable, Medium Confidence): - Exceptionally high suspended sediment loads in the Haven (for more detail see NRW, 2018d). - There has been a 91.7% decline in live maerl at the only known maerl bed in Wales sustained (Bunker et al., in prep; Moore & Mercer, in prep) damage as a result of development maintenance (Bunker, 2011 & NRW, 2018d) in combination with other factors (see NRW Article 17 Maerl Report). - Levels of certain contaminants are above statutory guideline concentrations (see Little & Galperin, 2014), although indications are that hydrocarbon contaminant inputs decreasing (Little, 2009). There is pressure from occasional spills (e.g. Sea Empress) and continued presence and reworking of historic oil. Tributyltin (TBT) levels remain high (but the trend is downwards) but pressure from use of antifoulants remains (NRW, 2018d). - WFD data was assessed (six relevant waterbodies were assessed in the Indicative Condition Assessment) (NRW, 2018d). The two most relevant waterbodies are Milford Haven Inner and Outer. These cover approximately 94% of the feature. The outer waterbody (covering 73% of the feature) fails for DIN and mercury and components. The inner waterbody (covering 20.9% of the feature) fails for DIN and macroalgae and Tributyltin Compounds, Mercury and Its Compounds and Brominated diphenylether (BDPE) (WFD waterbody classifications, 2015). Typical Species (Unfavourable, Medium confidence): - Subtidal seagrass bed (component of LSIB) at Gelliswick Bay - evidence of high levels of nutrients reported in Jones & Unsworth (2016) although there is no evidence that this represents a deterioration over time. - Bait digging affecting certain areas (e.g. the Gann) (NRW, 2018d). - Milford Haven Waterway is a hot spot for invasive non-native species (Mieszhowska, 2011), including Crepidula fornicata, Sargassum muticum, and Undaria pinnatifida (modification of habitat and associated community is observable in areas of

high density of e.g. Crepidula - especially the maerl bed. There have been significant recent increases of some of these species (e.g. C. fornicata & S. muticum) (NRW, 2018d). - Wildfowl and wader numbers give an indication of habitat health. Wigeon numbers on the Cleddau complex 2013-2014 gave the lowest count since 2002-2003 and may be related to local food supply. The numbers are up since but not quite reaching previous levels (NRW, 2018d). - Native oysters have declined (recent anecdotal evidence suggest that numbers of native oyster may be rising [monitoring report not yet finished]) (NRW, 2018d). Relevant Activities (NRW, 2018d): - Coastal infrastructure - Point source pollution - Sediment pollution - Diffuse water pollution - Bait digging is widespread and has generated clear habitat damage and modification in some areas (especially the Gann) - sensitive habitats such as seagrass and muddy gravels are being impacted (NRW, 2018d). - Pembroke Power Station: The levels of clupeids such as herring and demersal species such as gobies that have become entrained or impinged in the cooling water system at Pembroke Power station are higher than was predicted. The significance of this is uncertain. Thermal impacts from the discharged cooling water are being monitored. Other than direct localised impacts around the point of discharge, there is, at present, no evidence of significant thermal impacts from this source (NRW, 2018d). - Raised turbidity and silt deposition is likely to be affecting subtidal algae (including maerl, see Article 17 maerl report, 2018) and seagrass but we do not have evidence of change in species composition indicative of anthropogenic impact (NRW, 2018d). - Invasive species - slipper limpet having an impact on some habitats (NRW, 2018d). St Brides Bay (205 km2, 13.5% of Welsh resource): Good Identified related sub-feature: reefs. Structure and function: - Indicative condition reports assessed the Pembrokeshire Large Shallow Inlet and Bay feature as unfavourable structure and function (NRW, 2018d), however updated multivariate and univariate assessment of benthic ecological and physical data has indicated that the current status of St Brides Bay is in overall favourable condition (see below). - Monitoring data collected across St Bride's Bay from 2000-2016 indicate that the bay's sublittoral soft sediment habitats have been of overall good ecological quality, at both broad-scale and surveillance stations. In the context of inherent heterogeneity in the structure of marine communities, many of the observed patterns in the data can be considered well within the limits of natural variation (Griffin and Clarke, in review). - Infauna monitoring around Skomer Island: the last five surveys have shown the infauna community to be healthy and species rich. There was a suggestion of a decline in species richness in 2009 & 2013 but this has increased again in 2016 and compared to other areas of the UK the sediment communities around Skomer MCZ are very diverse and recent increase in scallops was observed. Also, grey seal pup production in Skomer MCZ for the past 5 years has shown the highest totals recorded for the area with average production for 2012-16 at 345 pups. However, a concerning number of broken sea fans was observed at Bull Hole (Lock et al., 2017). - The WFD assessment for key waterbody; Pembrokeshire South (overlapping 98.6% of the feature), was assessed as Good (WFD waterbody classifications, 2015). Typical species - Between 2011 and 2014 new records were collected for the ocean quahog (Arctica islandica), extending the known distribution within St. Brides Bay and new records of crayfish (Palinurus elephas) were made in St. Brides Bay and the entrance to Milford Haven. Whilst these could be due to previous under-recording they could be interpreted as providing evidence of a possible increase (or at least, no decrease) in these Section 7 / OSPAR species (NRW, 2018d). - In 2016, an unusually high number of sea fan losses were recorded at Skomer MCZ, especially at the Bull Hole site. The losses are most likely due to mechanical damage (breakages), as remains of colony stalks were located. Activities that could lead to mechanical damage include potting, angling, recreational diving and anchoring, although anchoring is unlikely in this area of strong currents (Newman et. al., 2017). The decline in the sea fan population is not enough to fail the whole typical species component (of the Pembrokeshire Marine SAC reef sub-feature). We do not have information on sea fans in the reef feature outside of the MCZ (NRW, 2018d). Lleyn

Peninsula and the Sarnau SAC Tremadog Bay (419.4km2, 27.6% of Welsh Resource) Good Overall Indicative Condition: Structure and Function and Typical Species assessed as favourable (with low confidence) (NRW, 2018c). Identified sub-feature: Reefs Structure and function: Data analysis of invertebrate and sediment data did not highlight any concerning spatial or temporal trends however, analysis has only been undertaken on data acquired up to 2012. 2009 scallop dredge marks were identified in the muddy gravel habitat, it is unknown whether this has recovered (NRW, 2018c). The most relevant waterbodies (Tremadog Bay and Glaslyn) have a good overall status with good ecological status. The Cardigan Bay North Waterbody (encompassing some of the bay) failed for TBT (2015 waterbody classification), following some investigation it was unclear whether this was relevant for the bay. If TBT is present in offshore waters, it is of concern as there are areas of deposition in the bay. This requires further investigation. Typical species: - Seagrass beds (component of LSIB) have been found in new areas (Abersoch). Existing locations continue to slowly increase in extent (NRW, 2018c). - Infaunal data collected for LSIB sandflats show no change in the amphipod Pectenogammarus (now Echinogammarus incertae sedis planicrurus) population, although sediment recharge at Pwllheli still threatens Pectenogammarus (NRW, 2018c). - In 2014 the areas of Sabellaria alveolata reef at two survey locations (Llandanwg and West of Afon Dwyfor), can be seen to have decreased dramatically. The impact at West Afon Dwyfor was the most marked with a decrease in reef area of 67%. The pattern within the associated species was also one of decreasing abundance (Mercer, 2016). The reasons for the decline are currently unknown (NRW, 2018c). - Presence of Maxmuelleria lankesteri in Tremadog Bay indicate the presence of a biotope that forms part of the OSPAR Seapens and burrowing megafauna threatened and declining habitat. However, this may have been under recorded due to the size of the animal. Records have been made from grab samples and Seasearch records (NRW, 2018c). - Infaunal sampling data analysis of data from 2004 - 2012: No noted deleterious changes in subtidal invertebrate data. There are significant changes in individual sampling sites but the broad picture is favourable, stable (NRW, 2018c). - WFD infaunal quality index (IQI) for Tremadog Bay waterbody was assessed as High (NRW, 2018c). Noted activities (NRW, 2018c): - Coastal defence and beach feeding at Pwllheli. - Commercial fisheries: it was noted that there was 'No clear evidence of stock levels of commercially exploited typical species.' - Coastal squeeze may be having an impact on structure and function, expert judgement. - Intertidal non-native Sargassum muticum is an issue impacting condition but not enough to conclude unfavourable. Note that favourable condition has been assessed with low confidence for some components due to: - No evidence of recoverability from scallop dredging (NRW, 2018c) - Longer term concerns about coastal squeeze (NRW, 2018c) - Declines in Sabellaria reef (NRW, 2018c) - TBT failure, it is uncertain whether the TBT failure in Cardigan Bay North is relevant to Tremadog bay or not due to uncertainties in levels of detection. Bays which are not in Special Areas of Conservation Caernarfon Bay (157.1km2, 10.3% of the feature): Not good This bay overlaps with 3 WFD waterbodies; Caernarfon Bay North (24.7km2, covering 28.9% of the feature), Caernarfon Bay South (58.7km2, covering 68.8% of the feature) and Menai Strait (1.9km2 covering 2.3% of the feature) (WFD waterbody classifications, 2015). The key waterbody (Caernarfon Bay North), which overlaps with the majority of the bay fails for Dissolved Inorganic Nitrogen. Others were assessed as Good. Overall, the bay is assessed as Not Good. Low confidence should be associated with this assessment as the specific locations of the sample points contributing to this assessment have not been reviewed. Fishguard Bay (14.7km2, 1% of the feature): Unknown The vast majority (14. 2km2, covering 98.9% of the feature) of this bay overlaps with the Cardigan Bay South Waterbody. This was assessed as Good overall, but no relevant ecological elements were reported. Therefore, the condition assessment of this bay concluded unknown (WFD waterbody classifications, 2015). Swansea Bay (58.7km2, 3.9% of the feature) Not Good Five WFD waterbodies overlap with this bay. The key waterbody is Swansea Bay which overlaps

	with 93.3% of the bay. This waterbody failed for Dissolved Inorganic Nitrogen (WFD waterbody classifications, 2015). Overall, the condition of the bay was assessed as not good. Low confidence should be associated with this assessment as the specific locations of the sample points contributing to this assessment have not been reviewed. Fish Assessments: The condition of typical fish species populations associated with Welsh Large Shallow Inlets and Bays (Kay and Dipper, 2009) were considered using available ICES/IUCN assessments (ICES reports 2015-2018/IUCN website). Many of the commercial species were assessed as undefined by ICES usually where there remains insufficient information on which to base substantive advice. In assessment areas encompassing Welsh bays some relevant fish species were recently assessed to be fished (fishing pressure) above minimum sustainable yield reference points (whiting [7.a, 7b-c & e-k], sole [7.f & g], cod [7. e-k], herring [7.a South of 52 degree 30'N, 7.g-h, and 7.j-k], haddock [7.b-k] and mackerel [subareas 1-8 and 14, and in Division 9.a]) and in some cases above FPA (Sole [7.f & g], cod [7.e-k] & Herring [7.a South of 52 degree 30'N, 7.g-h, and 7.j-k]) or Flim (Whiting [7.a]). Some species were assessed as being below Bpa and therefore \increased risk\ (cod [7.a] & Herring [7.a South of 52 degree 30'N, 7.g-h, and 7.j-k]) or being at \reduced reproductive capacity\ (whiting [7.a], sole [7.a], cod [7.e-k] & seabass [4.b-c, 7.a & 7.d-h]). Plaice (7.a and 7.f & g), Haddock (7.a) and Herring (7.a North of 52 degree 30'N) were fished below or at MSY reference points and were assessed to be at full reproductive capacity (ICES reports 2015-2018/IUCN website). The spawning stock biomass of some species were also estimated to be notably reduced compared to non-recent levels (reductions were observed in spawning stock biomass estimates over the past 40-50 years) (e.g. sole [7.a and 7.f & 7.g], whiting [7.a] and cod [7.e-k]). Because of a marked decline in the UK; both whiting and sole species were included on the Welsh Biodiversity Action Plan (BAP) list and subsequently on the Environment Act (2016) Priority Species List and are therefore of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales (covered under Section 7, Environment (Wales) Act 2016; JNCC BAP reports, 2010). Some shark species are classified as vulnerable (e.g. tope in European waters) or endangered/critically endangered (e.g. spurdog in Europe/North East Atlantic respectively) by the IUCN with key threats being identified as fishing (IUCN website, accessed 2018). Some commercial ray species were assessed to be 'Unknown' by ICES but 'Near Threatened' by the IUCN (blonde ray, thornback ray, and small eyed ray) (IUCN website, accessed 2018) in European waters. This related to estimated long-term or short-term declines in population and/or range in the north east Atlantic. Threats to rays are consistently identified as fisheries. However, it should be noted that recent data produced by ICES shows variable recent stock size indications (blonde ray = no info, thornback = The stock size indicator shows an increasing trend since 1994, small eyed ray = below average in recent years but recently increased) (ICES advice reports, 2016). It is important to acknowledge that there is concern about the level of some commercial fish populations in the wider sea area which are associated with Large Shallow Inlets and Bay annex I habitat. It should be noted that the majority of fishing related whiting mortality in area 7.a is a consequence of discards in the Nephrops fishery (ICES whiting report, 2017, area 7.a); there is no specific Nephrops fishery in Welsh waters. It should also be noted that the Welsh fishing fleet currently consists of mainly<10m vessels (MMO, 2016) which concentrate mainly on shellfish fishing (Seafish, 2017). Whilst the information held in the ICES/IUCN assessments provides some wider context, there is very little evidence of the current removal of these typical species from the vicinity of Welsh bays. The information available demonstrates that there is a lack of fisheries data that could be used in the assessment and that the available data are of low confidence. Therefore, this data was not used to calculate area in Good/Not Good condition.
6.3 Short term trend of habitat area in good condition; Period	We are currently uncertain of the short-term trend in the area of good condition for this feature. Whilst evidence is available we are unable to assess this field in a meaningful way given current time resources.

6.4 Short term trend of habitat area in good condition; Direction	We are currently uncertain of the short-term trend in the area of good condition for this feature. Whilst evidence is available we are unable to assess this field in a meaningful way given current time resources.
6.5 Short term trend of habitat area in good condition; Method used	Whilst evidence is available we are unable to assess this field in a meaningful way given current time resources.

7.1 Characterisation of pressures/ threats

Pressure and Threats Due to a lack of time, pressures and threats and related rank were mainly obtained from the 2013 report and codes translated based on narrative provided. As much as possible, checks were undertaken to ensure that the pressures and threats are still relevant and correctly coded with appropriate narrative. This involved assessing new evidence where readily available, consulting NRW staff, using pressures and threats from 2018 article 17 subfeature reports and checking the outputs of NRW's actions database (NRW, 2017). Quality assurance was undertaken with S. Wales conservation staff (02.08.2018) and with other Article 17 report author staff (Matthew Green, Paul Brazier and Charles Lindenbaum) (23.07.2018). Pressures and threats were also edited following a review process. 16 threats were identifed as either High or Medium, these were considered and the top 10 most imporant were retained for submission (as per guidance). Where threats were not included due to reporting limitations the corresponding pressure was also not included to avoid confusion. J02: Mixed source marine water pollution (marine and coastal) Pressure: High; Threat: High There is an assortment of sources to pollution to the marine environment that are difficult to quantify and apportion. Open coast areas are relatively unpolluted, but several bays adjacent to large catchments have raised levels of nutrients and contaminants. Contaminants in sediments and/or poor water quality is present in several bays (e.g. Milford Haven Waterway, Conwy Bay, Carmarthen Bay and Swansea Bay) (e.g. Little & Galperin, 2014; NRW, 2018d). Below 'Good' WFD water body assessments tend to reflect this. Recent WFD 'less than good' waterbodies (including all ecological and chemical elements) represent approximately 57% of Large Shallow Inlet and Bay Feature area; approximately 47% of the area represented by metals and/or organic determinand failure (WFD waterbody classifications, 2015). Pollution to groundwater also contributes to diffuse nutrient input. TBT levels are reducing but pressure from use of antifoulants on recreational boats and commercial shipping is still present (NRW, 2013). This pressure/threat for key sub annex I habitat assessed as high/medium (NRW Article 17 Intertidal Mud and Sand Flats, Reefs, Sandbanks report submissions). A28 (Agricultural activities generating marine pollution) is ranked as high but was removed from list and merged under this code due to high number of threats identified. Agriculture is generating raised levels of nutrient and sediment run off affecting some adjoining bays (e.g. Milford Haven Waterway and Carmarthen Bay) (NRW, 2014; NRW, 2013; Edwards, 2014; Haines & Edwards, 2016). In Milford Haven Waterway this is resulting in raised levels of suspended silt, silt deposition and increased plant growth (NRW, 2013). The dominant sources of DIN were assessed to be from agricultural losses in the Milford Haven Waterway. Agricultural land is considered to be the primary source of diffuse pollutants impacting on water quality within waterbodies in the related catchment area to Milford Haven (NRW, 2014). Raised turbidity and silt deposition is likely to be affecting subtidal algae, whilst dense and widespread macroalgae overlying mud and sand flats is having negative consequences for sediment biota and generating eutrophication and smothering impacts when it is washed up on the rias strandlines, reefs and saltmarsh (NRW, 2013). High levels of nutrients were reported in Jones and Unsworth (2016) at seagrass bed at Gelliswick Bay (although no evidence that this represents reduction over time). There is also the possibility that sedimentation has contributed to the substantial decline in live maerl (over 91.7% reduction) in the last decade, this is currently being investigated (Assessed as High Pressure in NRW Art 17 2018 Maerl Report) (Bunker et al., in prep; Moore & Mercer, in prep). However, the causes are unknown and are likely due to a complex combination of factors (including the presence of non-native slipper limpets). The key water bodies overlapping with Carmarthen Bay, Swansea Bay, Caernarfon Bay and Milford Haven Waterway have recently failed for Dissolved Inorganic Nitrogen element (WFD Classification 2015). Included in F21 (Industrial or commercial activities and structures generating marine pollution (excluding marine macro- and micro-particular pollution) but removed due to low number of threat codes: Available nutrient levels, contaminants in sediments and/or poor water quality is present in several locations

that are associated with industrial discharges. Below 'Good' WFD water body assessments tend to reflect this. Contaminant inputs are from diffuse (urban and industrial run off) as well as point source industrial discharges (NRW, 2013). Sediments adjacent to capped landfill discharge in Milford Haven Waterway have significantly raised contaminant levels (PAH & metals). Contaminant levels are greatest where industry is associated with the bay or adjacent catchment e.g. Milford Haven Waterway (NRW, 2013) There is pressure from chronic input of hydrocarbons in port and recreational harbour areas, especially Milford Haven Waterway, although indications are that hydrocarbon contaminant inputs there are decreasing (Little, 2009). Bioaccumulation of contaminants indicates some levels are high enough to cause adverse effects to biota (Langston et al., 2012). There are acute inputs from occasional spills (e.g. Sea Empress) and there remains the potential for further very significant pollution events (NRW, 2013). Groundwater contamination from the oil industry (and historical hydrocarbon infrastructure) is present in some limited areas (e.g. Milford Haven Waterway), typically related to infrastructure failures, accidents and historical war-time events (NRW, 2013). F22: Residential or recreational activities and structures generating marine macro- and micro- particulate pollution (e.g. plastic bags, Styrofoam) F23: Industrial or commercial activities and structures generating marine macro- and micro- particulate pollution (e.g. plastic bags, Styrofoam) Pressure: Medium; Threat; Medium Due to reporting limitations only F22 pressure/threat has been submitted. However, the origin of litter is not well known and could also be related to F23. Therefore, the narrative relates to both codes. Marine macro-pollution (e.g. plastic bags and other anthropogenically derived debris) is often found in depositional areas and on strandlines. Lost fishing gear (including angling line, hooks and weights and lobster pots) has been found amongst and around subtidal reefs (e.g. NARC, 2015 & 2016). There is an increasing trend in marine litter on Welsh beaches (Nelms et al., 2017), which is directly relevant to intertidal mudflats and sandflats (NRW Article 17 Intertidal Mudflats and Sandflats Report). Marine macro-pollution (e.g. plastic bags, lost fishing line and other anthropogenically derived debris) has been found entangled in sessile reef biota (NRW, 2013; e.g. NARC, 2015 & 2016). Litter (assumed mainly plastic particles) was frequently recorded as present in welsh sublittoral bay grab data sets (NRW 2016-2018 Large Shallow Inlet and Bay Grab Data). In general, the key physical impact of plastic particles is likely to be linked to ingestion. Several invertebrate and fish species have been shown to ingest plastic in field and laboratory experiments. Negative (and some negligible) impacts of ingestion of plastic have been observed on marine species but the research on the impacts of litter in the marine environment is in its infancy and impacts are poorly understood (Bergmann, et al 2015; Gall & Thompson, 2015; Galloway & Lewis, 2016). Further assessment of the impacts is required to aid understanding of the extent and the likely impact of litter on the function of infaunal and epifaunal communities and recommendations of any appropriate management action. Monitoring, reporting and method development under MSFD and OSPAR will help increase knowledge and confidence of this issue in the future. G01: Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species: Pressure: Medium; Threat: Medium The condition of typical fish species populations associated with Welsh Large Shallow Inlets and Bays (Kay and Dipper, 2009) were considered using available ICES/IUCN assessments (ICES reports 2015-2018/IUCN website). Many of the commercial species were assessed as undefined by ICES usually where there remains insufficient information on which to base substantive advice. In assessment areas encompassing Welsh bays some relevant fish species were recently assessed to be fished (fishing pressure) above minimum sustainable yield reference points (whiting [7.a, 7b-c & e-k], sole [7.f & g], cod [7. e-k], herring [7.a South of 52 degree 30'N, 7.g-h, and 7.j-k], haddock [7.b-k] and mackerel [subareas 1-8 and 14, and in Division 9.a]) in some cases above FPA (Sole [7.f & g], cod [7.e-k] & Herring [7.a South of 52 degree 30'N, 7.g-h, and 7.j-k]) or Flim (Whiting [7.a]). Some species were assessed as being below Bpa and

therefore \increased risk\ (cod [7.a] & Herring [7.a South of 52 degree 30'N, 7.g-h, and 7.j-k]) or being at \reduced reproductive capacity\ (whiting [7.a], sole [7.a], cod [7.e-k] & seabass [4.b-c, 7.a & 7.d-h]). Plaice (7.a and 7.f & g), Haddock (7.a) and Herring (7.a North of 52 degree 30'N) were fished below or at MSY reference points and were assessed to be at full reproductive capacity (ICES reports 2015-2018/IUCN website). The spawning stock biomass of some species were also estimated to be notably reduced compared to non-recent levels (reductions were observed in spawning stock biomass estimates over the past 40-50 years) (e.g. sole [7.a and 7.f & 7.g], whiting [7.a] and cod [7.e-k]). Because of a marked decline in the UK; both whiting and sole species were included on the Welsh Biodiversity Action Plan (BAP) list and subsequently on the Environment Act (2016) Priority Species List and are therefore of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales (covered under Section 7, Environment (Wales) Act 2016 [Welsh Government, 2016]; JNCC BAP reports, 2010; various ICES advice reports). Some shark species are classified as vulnerable (e.g. tope in European waters) or critically endangered (e.g. spurdog in North East Atlantic) by the IUCN with key threats being identified as overfishing. Some commercial ray species were assessed to be 'unknown' by ICES but 'Near Threatened' by the IUCN (blonde ray, thornback ray, and small eyed ray) in European waters (IUCN website, accessed 2018). This related to estimated long-term or short-term declines in population and/or range in the north east Atlantic. Threats to rays are consistently identified as fisheries. However, it should be noted that recent data produced by ICES shows variable recent stock size indications (blonde ray = no info, thornback = The stock size indicator shows an increasing trend since 1994, small eyed ray = below average in recent years but recently increased) (ICES advice reports, 2016). In summary, there is ongoing concern about some commercial fish populations in the wider sea area which are associated with Welsh bay annex I habitat. It should be noted that the majority of fishing related whiting mortality is a consequence of discards in the Nephrops fishery (ICES whiting report, 2017, area 7.a); there is no specific Nephrops fishery in Welsh waters. Whilst the information held in the ICES/IUCN assessments provides some wider context, there is very little evidence of the current removal of these typical species from the vicinity of Welsh bays. It should be noted that the Welsh fishing fleet consists of mainly small (<10m) boats (MMO, 2016) which concentrated on shellfish fishing (Seafish, 2017) and issues relate to the wider sea area. The information available demonstrates that there is a lack of fisheries data that could be used in the assessment and that the available data are of low confidence. It is unclear how long it will take for relevant fish populations to recover to an abundance equal to or greater than that required to achieve maximum sustainable yield and/or fishing pressure to be less than or equal to that required for maximum sustainable yield. Commercial shell fisheries are active in some areas and include winkle picking and mussel collection (NRW, 2013; NRW Article 17 Reef Report). A potentially increasing intertidal fishery for razor shells has been observed at beaches in south and north wales, this is unregulated, further evidence is required to quantify any impacts. Whelk (Buccinum undatum) fishing is not currently considered to operate within sustainable limits. Llewellyn (2017) stated that \The current management measure of a pan EU MCRS of 45 mm is not protecting the spawning stock in Wales and as such the stock is in danger of recruitment overfishing. Additionally, there is no protection for whelks throughout their reproductive season which will exemplify the effect of recruitment overfishing.\ There is currently a consultation on the best way forward for managing the fishery. E03: Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging): Pressure: Medium; Threat: Medium Note: Shipping lanes and ferry lanes transport operations related issues were identified under code E02; these represent a medium pressure and threat but were excluded from the submitted list due to reporting limitations. Key issues were anchoring (specifically in St Brides bay and Milford Haven) generating seabed impacts on reef and sediment communities, vessel manoeuvring impacting estuary habitats through siltation and turbidity effects and oil pollution and

(NRW, 2013). Milford Haven Waterway supports one of the UK's biggest ports. Investment in port infrastructure generates frequent plans that have had consequences for the ria (e.g. significant damage to Wales' only maerl bed) (NRW, 2013). These activities also affect the hydrological flow within Milford Haven. As a consequence of low levels of effects of: - navigational and development related dredging (Milford Haven Waterway); - land claim associated with marinas (consented), harbour projects, slipways and coastal defences - sea walls and significant jetty and harbour wall constructions. Reductions in extent and quality of the only known Welsh Maerl bed in Milford Haven have been observed (Bunker et al., in prep & Moore & Mercer, in prep). The maerl bed is subject to raised water turbidity and silt deposition which are thought to be partly due to capital and maintenance dredging operations. The maerl bed is situated adjacent to areas that have been previously dredged. The Milford Haven Dredging Strategy document (Revision 2) 2016, indicates that according to their multibeam surveys in the region of South Hook there has only been a very small build up in areas above 10m (Anthony D. Bates Partnership LLP, 2016). Multibeam, however, is not a sensitive tool for measuring the sort of changes in sediment composition that would affect the survival of maerl and a small build up may be of significance (Article 17 2018 Maerl Report). The maerl bed is bisected by a large jetty that was refurbished between 2005-2008. This resulted in impacts on the bed, some of which are evident on the CCW side scan data (CCW sidescan data, 2009), for example, foot print depressions from jack-up barges and deposition of other construction material. Other impacts included: - The deposition of contaminated material - coal tar coverings of piles were shot blasted and this highly toxic material entered the sea below the jetty - the long-term consequences of this are unknown; - Large LNG vessels berth at the end of the jetty, adjacent to the bed and a small boat passage concentrates small vessel traffic in shallow water over the northern edge of the bed. The propeller wash from these vessels manoeuvring under the jetty in the shallow water has caused localised deterioration of the bed (NRW Article 17 Maerl Report Evidence Pack). Local seagrass beds are likely to be under similar pressures, however, the water quality may be more of an influence (Jones & Unsworth, 2016). Dredging, both maintenance and capital, impact subtidal and intertidal sediments, reef (NRW, 2013) and hydrological flow. Milford Haven Port Authority (MHPA) dredging strategy (2016) (Anthony D. Bates Partnership LLP, 2016) provides further details of rates of maintenance dredging and disposal quantities at sea. Maintenance dredging is also undertaken in Swansea Bay (Marine Charts). In the recent draft Welsh National Marine Plan an objective was set to maintain safe and effective navigational access for shipping, fishing and leisure craft and support future growth and increases in port facilities and vessel size whilst promoting the optimal sustainable use of dredged material and ensuring adequate disposal facilities are available. This suggests that shipping is likely to remain at similar levels or increase in the future. In the plan it is noted that where environmental impacts are predicted in new developments, applicants should include appropriate mitigation measures as an integral part of the proposal in line with the National Policy Statements on Ports (Welsh National Marine Plan, draft). F08: Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures): Pressure: Medium; Threat: Medium Multiple infrastructure development projects in Milford Haven Waterway and Carmarthen Bay. The majority of which are consented, however there are a number of un-regulated coastal defences and shoreline structures particularly in Milford Haven Waterway, these include slipways, gabion baskets, rock armour etc (NRW, 2013). Several recorded small losses or modification of habitat are associated with the creation and maintenance of roads, paths and railroads (e.g. Tremadog Bay, Milford Haven Waterway). Creation of private slipways and hard standing on shoreline reef, and maintenance or establishment of shore defences is increasing in areas where housing has water frontage (e.g. Milford Haven) (NRW, 2013). In some areas the level

of dumped construction materials on some shores is significantly changing the nature of the shore. This includes material lost from failed coastal defences (e.g. gabion baskets). There are several areas where these defences are at the end of their useful life and are beginning to disintegrate (NRW, 2013). D05: Development and operation of energy production plants (including bioenergy plants, fossil and nuclear energy plants): Pressure: Medium; Threat: Medium Pembroke Power Station: The levels of clupeids such as herring and demersal species such as gobies that have become entrained or impinged in the cooling water system at Pembroke Power station are higher than was predicted (Environment Agency, 2011; Jacobs, 2017b). The significance of this is uncertain. Thermal impacts from the discharged cooling water are being monitored (NRW, 2018d). The significance of this is uncertain and currently under investigation (NRW, 2018d). Other than direct localised impacts around the point of discharge, there is, at present, no evidence of significant thermal impacts from this source. However, unpublished data suggest a decline in Patella spp. on rocky shores adjacent to the outfall - the causation is yet to be elucidated (Brazier, in prep) (NRW 2018 Article 17 Reef Report). Impacts have been observed immediately in the vicinity of the outfall (Jacobs, 2017a) on intertidal reef (decrease in some species), wider impacts are currently unknown due to limitations of the monitoring programme. G16: Marine aquaculture generating marine pollution Pressure: Low; Threat: Medium Increased siltation and turbidity arising from marine aquaculture - mussel growing in the Menai Strait (NRW, 2013) (HRA completed for this activity on this site). There may be pressure for expansion into new sheltered areas such as Milford Haven Waterway (e.g. Angle Bay oyster project), Fishguard Bay, Caernarfon Bay, Tremadog Bay and expansion of scale in Conwy Bay with the draft designation of aquaculture strategic resource areas (SRA's). In the draft Welsh Marine Plan an objective was identified to double aquaculture production by 2020, and to further increase production over the lifetime of the plan (Specifically by 2020 to increase: Marine finfish aquaculture to 2,000 tonnes (761 Tonnes in 2012) and Shellfish, especially mussels, to 16,000 tonnes (from 8,376 tonnes in 2012) (Welsh Government, Welsh National Marine Plan, draft).
The Welsh Government's draft Welsh National Marine Plan identifies potential opportunities for development of shellfisheries across Wales. This is accompanied by appropriate safeguards within Protected Sites, to protect the features, and the draft plan also contains a series of environmental policies that apply throughout Welsh seas that should ensure that all development is sustainable. Where Regulating and Several Orders are applied for, this also provides some safeguards to protect Annex I habitats outside of SACs, although these orders are not compulsory, leaving features under these circumstances under potential threat. I02: Other invasive alien species (other than species of Union concern) Pressure: Low; Threat: Medium There is presence of invasive non-native species, particularly on reefs, within bays. Invasive non-native species of significance include Crepidula fornicata (Bohn, 2014), Magallana (Crassostrea) gigas and Sargassum muticum. Modification of habitat and associated community is observable in areas of high density (particularly in Milford Haven Waterway). Presence of species of significance is currently mainly limited to the south and south west coast of Wales, except for the occasional exception (e.g. Didemnum vexillum in Holyhead Harbour that may spread to bay habitats). Milford Haven is a hot spot, with a high UK diversity of non-natives being present (Mieszhowska, 2011; Wood et al., 2015). The future threat of high impact species such as D. vexillum colonisation is high for reef habitat. Aquaculture is a recognised potential pathway for the introduction and spread of invasive non-native species. The Welsh Government's draft Welsh National Marine Plan identifies potential opportunities for development of shellfisheries across Wales. This is accompanied by appropriate safeguards within Protected Sites, to protect the features, and the draft plan also contains a series of environmental policies that apply throughout Welsh seas that should ensure that all development is sustainable. Where Regulating and Several Orders are applied for, this also provides some safeguards to protect Annex I habitats outside of SACs, although

these orders are not compulsory, leaving features under these circumstances under potential threat.
Future cultivation of triploid Pacific oysters in the Milford Haven and Menai strait is also considered a threat due to known spread of this species at other locations in the UK.
Heated water is being discharged from the Pembroke power station outfall but other than direct localised impacts around the point of discharge, there is, at present, no evidence of significant thermal impacts from this source (NRW, 2018d). Monitoring is still being implemented and developed to investigate impacts as a result of the increased water temperatures in the Haven (NRW, 2018d). In combination with predicted warmer waters due to climate change (Hughes et al., 2017), this may increase the prevalence and survival of non-native taxa.
N04: Sea-level and wave exposure changes due to climate change
Pressure: Low; Threat: Medium
Changes in abiotic conditions, including temperature changes, and extreme weather events causing increased run-off of nutrients and pollution, including siltation, that effects the biotic conditions for reef (NRW Article 17 Reef Report Evidence Pack).
As a consequence of climate change: Changes in abiotic conditions, including sea level rise and wave climate are likely to cause the greatest changes in intertidal sediments morphology and dynamism. Natural patterns of erosion and accretion mean that net losses and gains in the extent of this feature can be difficult to quantify. Losses due to coastal squeeze where habitats are caught between rising sea-levels and fixed defences, are predicted by the Shoreline Management Plans (SMPs) (Atkins, 2010; Halcrow, 2012(a); Halcrow, 2012(b), Royal Haskoning 2012) and Jones et al (2011). Actual losses for intertidal sediments within the period of the Article 17 short-term trend are likely to be relatively low. The National Habitat Creation Programme (NHCP) has been set up to create compensation habitat to offset intertidal habitat loss due to coastal squeeze caused by coastal defences owned and maintained by Risk Management Authorities in Wales (which includes NRW and Local Authorities).
For intertidal mud and sand flats temperature changes, flooding and increased precipitation (increasing runoff from land) and changes in acidity due to climate change do not currently have a known effect on the feature. Thermal effects of climate change (N01) are likely to act in combination, with and exacerbate, localised temperature changes associated with current power stations (Milford Haven) due to power station cooling water (NRW Article 17 Intertidal Mud and Sand Flats Report Evidence Pack).
It was also thought that some sediments and reefs would be susceptible to increases in wave exposure if wave exposure increases this is likely to have an impact, however, there isn't evidence to be able to predict this locally (Woolf & Wolf, 2013) (NRW, 2017: NRW Actions Database, Internal data source). D01: Wind, wave and tidal power, including infrastructure Pressure: None; Threat: Medium A tidal lagoon in Swansea bay will cause direct habitat loss (within the footprint of the lagoon wall) and is likely to alter sediment composition within and outside the lagoon structure. The lagoon will also result in loss of intertidal habitat, including loss of biogenic reef (Sabellaria alveolata) (although measures have been included within the project plan to attempt recreation of new habitat) (Tidal Lagoon Swansea Bay, 2015). It is currently uncertain as to whether this project will go ahead, the UK government has turned down the proposal to enter into a contract for difference for payment for energy generated, but the developers are still pursuing the project as a live development proposal and the marine license application is still in determination by NRW. There is also potential for future test and demonstration of wave and tidal energy devices in Milford Haven and the Pembrokeshire Demonstration zone but these are in the early stages of development. It is likely that this sector will develop further in the next few years due to availability of WEFO funding.

8.1 Status of measures	The majority of most important conservation measures relating to this habitat type have been identified and are taken or planned to some degree. This is considered to be a low confidence assessment because the ability of these measures to fully address known and potential pressures and threats is uncertain.
8.2 Main purpose of the measures taken	The majority of main conservation measures relating to this habitat focus on issues relating to (d). This is considered to be a low confidence assessment because the ability of these measures to fully address known and potential pressures and threats is uncertain.
8.3 Location of the measures taken	Most of key measures (WFD & fisheries controls) are undertaken in general waters, however important measures are taken only in SACs such as HRA and specific fisheries controls.
8.4 Response to the measures	This is considered to be a low confidence assessment because the timeframe of these measures to address known and potential pressures and threats is uncertain.

8.5 List of main conservation measures	Measures identified either by national legislation, thematic action plans or outputs from the actions database and consultation with NRW staff. 11 medium and high ranked measures were identified, these were assessed and the top 10 most important measures were submitted (as per guidance). CJ01: Reduce impact of mixed source pollution (Rank: High): Key measures which are in place to mitigate water quality related pressure and threats identified in this assessment are driven by European legislation and cover the wider sea area: The Water Framework Directive (WFD) aims to maintain the \high and good status\ of waters where it exists, prevent any deterioration in the existing status of waters and to restore at least \good status\ in relation to all waters. The mechanism by which this is to be achieved under the WFD is through the adoption and implementation of River Basin Management Plans and Programmes of Measures for each of the identified River Basin Districts. The programme of measures will be incorporated in to the delivery plan for updated river basin management plans. The aim is to have the programme of measures operational by December 2018. NRW are reviewing progress currently. Many measures planned aim to deal with issues causing WFD coastal and estuarine waterbody failures for ecological and chemical elements. The Programme of measures delivers many of the statutory requirements for other directives and associated legislations e.g. Marine Strategy Framework Directive, Urban Waste Water Directive, Bathing Waters Directive and Eel Regulations. Related measures are relevant for large areas of Large shallow inlet and bays, therefore, pressure ranked high. NRW Thematic Action Plan (see NRW, 2015a for more detail): A thematic action plan for diffuse water pollution was developed under the LIFE N2K Project highlighting the actions needed to improve evidence collection and understanding as associated with this issue on N2K sites in Wales. Details can be found in the plan on the NRW website (http://naturalresources.wales/about-us/our-projects/nature-projects/life-n2k-wales/life-n2k-thematic-action-plans/?lang=en). Diffuse Water Pollution - Investigation, Direct Management and Management Agreements are the main mechanisms to manage diffuse water pollution: Raise the profile of breaches in cross-compliance affecting N2K habitats and features (terrestrial, freshwater and marine) and target compliance monitoring. Risk assessments to be carried out on catchments of N2K sites which have high priority diffuse pollution issues/risks and which are failing under the WFD. Measures put in place throughout the river catchment, through the WFD reduce and control levels of pollutant, including nutrient levels. Examples of new or improved mechanisms may include: - Small-scale standalone capital grant scheme to address diffuse pollution issues. - Development of nutrient management initiatives. - Training for farmers/landowners regarding reducing diffuse pollution, waste management and farm nutrient budgeting. - Catchment Level Rural Sustainable Drainage Systems pilot projects. CA13: Reduce/eliminate marine pollution from agricultural activities (Rank: High) See CJ01 for general details on programme of measures to reduce marine water pollution more generally. Examples specifically relating to nutrients are; Welsh Government are currently considering putting in place a Nitrate Vulnerable Zone in areas relevant to Milford Haven which will facilitate the reduction of diffuse nutrients entering the waterbody originating from the wider area. Other examples of related measures are the Building Resilience in Catchments Project, Blue Green Algae Group, incident response follow-ups targeting specific diffuse runoff issues and the recruitment of an Agricultural Officer at NRW. CG01: Management of professional/commercial fishing (including shellfish and seaweed harvesting) (Rank: High): Key measures which are in place to mitigate fisheries related pressure and threats identified in this assessment are driven by national and European legislation and cover the wider sea area. The Common Fisheries Policy measures and the Scallop Orders are the key measures which will help protect habitats and improve fish stock levels. The Common Fisheries Policy (CFP) manages common resources, seeks to ensure that fishing and aquaculture are environmentally, economically and socially sustainable. Reform of this policy came into effect from 2014 including measures to

protect endangered stocks, and the ending of discards. Measures (mainly effort controls and technical measures based on scientific advice) implemented over time should (and have in some cases) improve poor stock levels. A pilot project, the 'Sustainable Shellfish Pilot Initiative', sponsored by numerous organisations, strives to resolve some of the issues of persistent ghost fishing from lost gear (see Pembrokeshire Marine SAC (2018)). The Marine Strategy Framework Directive (MSFD) 2009 aims to achieve Good Environmental Status (GES) of the EU's marine waters by 2020. The MSFD has 11 descriptors, one of which is commercial fisheries (D3) (target = Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock), other descriptors also have relevance for marine fisheries including Biodiversity (D1), Food webs (D4) and Seafloor integrity (D6). Marine and Coastal Access Act (MCAA) 2009 is a system to improve management and protection of the UK marine and coastal environment. It has eight key elements, including fisheries management and marine enforcement. The legislation allowed Welsh Government to rationalise management of marine fisheries in Wales by transferring functions of the two Sea Fisheries Committees and the Marine Fisheries Agency (MFA) to the Welsh Government. It also expanded the remit of marine fisheries management organisations to conserve marine ecosystems. Voluntary management measures were implemented at the Gann to reduce the impact of bait digging at this location but were not successful. As a result, a byelaw is being developed. The Scallop Fishing (Wales) (No.2) Order 2010 restricts fishing effort (e.g. closed season, engine capacity, amount of dredges, number of boats permitted to fish), fishing location (predominantly not within PAs or close to shore) and species size restrictions (size of scallop). Furthermore, in recent years all vessels using scallop dredges are required to have a functioned vessel tracking system (iVMS) installed (SI 2012 2729). The Welsh Government has a clear and evidence led process for assessing the impacts from fisheries, including HRAs (where appropriate) and the 'Assessing Wales Fishing Activities' (AWFA) project. Fishing activities that require a permit e.g. scalloping, mussel dredging are subject to the HRA process which looks at the impact pathways from the activity on the feature and the AWFA is delivering evidenced based assessments on the impacts from fishing activities on protected features. Outside of protected areas, and for fisheries that are not licensed, typically further offshore, the habitats present and the intensity of fishing is less well understood. Investigatory actions identified in thematic action plans should improve understanding and aid better management in the future (one example of this is assessing welsh fisheries project currently underway by NRW). NRW staff liaise with fisheries groups and individuals who are represented on the MCZ Advisory Committee, with a view to establishing a means to avoid fishing in areas where higher densities of seafans are known to occur. A voluntary code of practice has been established with commercial fishermen to prevent the use of monofilament tangle nets within 50 m of the coast of Skomer Island. Combined this legislation, management and investigation aims to improve and maintain fish stocks and reduce impact of fishing to marine species and habitats. Measure is ranked as High as related pressure and threat G01/G03 ranked medium and low respectively and is relevant to a wide area (offshore and inshore). NRW Thematic Action Plan: Marine Fisheries (NRW, 2015b): A thematic fisheries action plan was developed under the LIFE N2K Project highlighting the actions needed to improve fisheries evidence collection and understanding as associated with N2K sites in Wales. Work is underway to address some of the priorities identified. Details of the plan can be found on the NRW website (http://naturalresources.wales/about-us/our-projects/nature-projects/life-n2k-wales/life-n2k-thematic-action-plans/?lang=en). - Investigation is the most frequently identified mechanism against marine fisheries issues / risks. This mechanism is identified for use where a better understanding and evidence base of the direct and indirect effects on habitats and species is required, to enable the development of management actions where appropriate. - Direct management is cited as a mechanism to address marine fisheries issues/risks, indicating

where action is required by the competent authority, the Welsh Government or NRW. This mechanism has been used to highlight the need for further development of cockle fisheries management for Carmarthen Bay and Estuaries SAC. The overarching objective of this action is to integrate environmental assessment and subsequent management for the cockle fishery, taking account of the direct and indirect effects of the removal of cockles on SPA features. Cockle fishery is regulated in the Dee estuary, Malltraeth, Traeth Melynog, Red Wharf Bay, 3 Rivers and Burry Inlet. Intertidal shellfish aquaculture must pass a Habitat Regulations Assessment within existing N2K sites. - Targeted education, awareness raising and liaison as a mechanism can be used to develop projects to educate or inform people about the impacts that activities can have on features and to encourage more sustainable behaviours. A single action was recorded under this mechanism for Anglesey Saltmarsh SAC to address impacts from access for sea fisheries (e.g. cockling, winkle picking, mussels collection) on the mudflats and their typical species (e.g. Zostera), and vehicle access across the sediment flats. CF10: Manage changes in hydrological and coastal systems and regimes for construction and development (Rank: Medium) Compensation for the loss of intertidal habitats as a result of coastal squeeze caused by flood and coastal erosion schemes is delivered through the National Habitat Creation Project (NHCP). This is in response to the Welsh Government's statutory obligation for compensatory measures under Article 6(4) of the Habitats Directive, relating to offsetting the impacts of coastal squeeze on Natura 2000 sites. The Shoreline Management Plans (SMP) (Atkins, 2010, Halcrow 2012(a) & 2012(b) & Royal Haskoning 2012), which identify the most sustainable approach to managing the flood and coastal erosion risks to the coastline in the short medium and long term have been produced for the whole of the Welsh coast, however, these plans have yet to be fully implemented. CC05: Adapt/manage fossil energy installation, facilities and operation (Rank: Medium) This conservation measure relates to D05. Consents are required to develop power stations. Over the past reporting period, for projects that have a capacity of 1-100MW project developers were required to gain approval from Natural Resources Wales (Marine Licensing under Part 4 of The Marine and Coastal Access Act) and the Marine Management Organisation (Section 36 Electricity Act) (Section 39 Wales Act 2017). For larger projects (>100MW) developers are required to gain approval from the UK government (Nationally Significant Infrastructure Projects - Planning Act 2008). For all projects such as these a marine licence is also required (Marine and Coastal Access Act, 2009). The licence application is determined by NRW. Each application usually requires an Environmental Impact Assessment and Habitats Regulation Assessment (where within or adjacent to a Natura 2000 site). Based on evidence produced any mitigation required is agreed and implemented as appropriate. The inclusion of mitigation in a project proposal or consent reduces the environmental impact, or potential impact, to a level acceptable under relevant regulatory framework. If there are outstanding unresolved issues then they will be subject to monitoring, mitigation or compensatory measures as appropriate. New power stations in the planning pipeline require full review of the likely impacts of entrainment (fish and invertebrates caught in cooling water inlet), chemical additives and local seawater temperature changes. From April 2019, the consenting requirements for marine energy generation in Wales will change, as requirements of the Wales Act are implemented. CC03: Adapt/manage renewable energy installation, facilities and operation (Rank: Medium): Consents are required to develop a windfarm/tidal lagoon and associated cable lines. Over the past reporting period, for 1-100MW capacity projects developers were required to gain approval from the Marine Management Organisation (Section 36 Electricity Act). For future projects between 1 and 350MW will require electricity generation consent from Welsh Ministers. In the current period, for larger projects (>100MW)), developers are required to gain approval from the UK government (nationally significant infrastructure projects - Planning Act 2008). For all projects such as these a marine licence is required (under Part 4 of the Marine and Coastal Access Act, 2009). The licence application is

determined by NRW. Each application may require an Environmental Impact Assessment and Habitats Regulation Assessment (where within or adjacent to a Natura 2000 site). Based on evidence produced any mitigation required is agreed and implemented as appropriate. The inclusion of mitigation in a project proposal or consent reduces the environmental impact, or potential environmental impact, to a level acceptable under the relevant regulatory framework. This measure relates mainly to D01 and was ranked as medium because it mainly relates to Swansea Bay which may impact a relatively small area (relative to welsh resource) but the measure could help mitigate significant impacts (in relation to direct habitat loss/change and indirect impacts) also, this process potentially prevents development at a wider-scale at other bays. CF08: Reduce/eliminate marine contamination with litter (Rank: Medium): This conservation measure relates to pressure and threat F22 & F23. European policies aim to reduce the effect of marine litter, which has recently been well publicised as an issue. The Marine Strategy Framework Directive (MSFD) (descriptor 10) requires EU Member States to ensure that, by 2020, properties and quantities of marine litter do not cause harm to the coastal and marine environment. Pollution of the seas from plastics and microplastics is one of the three major areas of the Strategy for Plastics, adopted by the European Commission on 16th January 2018; most of the proposed Actions are directly or indirectly related to marine litter, including its international dimension. Initiatives against plastic pollution of the oceans, flowing from the Strategy are: - consideration of measures against Single Use Plastics and fishing gear - assessment of the need to restrict microplastics intentionally used in products - consideration of measures against microplastics generated during the life cycle of products - The 7th Environment Action Programme calls for the development of an EU-wide quantitative reduction headline target for marine litter, supported by source-based measures and taking into account marine strategies established by Member States. The Circular Economy Package sets a target for reducing by 30% beach litter and list fishing gear until 2020. Example welsh level legislation include: - Plastic bags: The Single Use Carrier Bags Charge (Wales) Regulations 2010 (http://www.legislation.gov.uk/wsi/2010/2880/contents/made) came into force on the 1 October 2011 and brought into effect a charge of 5p for all plastic bags formerly given out for free by retailers. - Environmental Protection (Microbeads) (Wales) Regulations 2018 was voted on and passed by the Welsh Assembly in June 2018 (http://www.assembly.wales/laid documents/sub-ld11558-em/sub-ld11558-em-e.pdf) - Explanatory Memorandum prepared by the Department for Economy, Skills and Natural Resources and laid before the National Assembly for Wales on the 18th May 2018. Voluntary organisations undertake litter removal at specific locations. This includes beach cleans (organised by local groups or the marine conservation society) and subtidal litter removal (see NARC, 2015 & 2016) based in southwest Wales. Future legislation: The EU is looking to create a Directive on single use plastics: http://ec.europa.eu/environment/circular-economy/pdf/single-use_plastics_proposal.pdf. The European Commission (EC) has proposed a full ban on some of the most commonly used and littered disposable plastic products in Europe. The draft \Single-Use Plastics Directive\, announced on 28th May, proposes measures covering a range of items which constitute the most common sources of marine litter in Europe, including 10 single-use plastic products. NRW Thematic Action Plan: Marine Litter (NRW, 2015c): A thematic action plan for marine litter was developed under the LIFE N2K Project highlighting the actions needed to improve evidence collection and understanding as associated with this issue on N2K sites in Wales. Details can be found in the plan on the NRW website (http://naturalresources.wales/about-us/our-projects/nature-projects/life-n2k-wales/life-n2k-thematic-action-plans/?lang=en). - Direct management is the most frequently identified mechanism for addressing marine litter impacts. This mechanism predominantly refers to action required by Local Authorities (LA) to support and help implement measures to remove litter from beaches (e.g. third-party collections and LA beach cleaning), ensuring that approaches

are sensitive to features. - Investigation actions principally relate to improving the evidence base to underpin better management and reduce both sources of marine litter and impacts on features. This includes investigations to develop better understanding of local sources of marine litter and its disposal, and identification or high-risk areas for marine litter. - Targeted education, awareness raising and liaison actions include, for example, developing opportunities to reduce litter at source (locally), including site level awareness. CF02: Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructures, operations and activities (Rank: Medium) The National Habitat Creation Program has been put in place by the Welsh Government to identify and progress opportunities for managed retreat of the coastline, in order to compensate for predicted losses of intertidal habitats as a result of coastal squeeze. Coastal squeeze occurs where habitats are caught between rising sea-level and man-made structures and are reduced in extent over time. The National Habitat Creation Programme provides compensatory habitat for schemes which maintain or upgrade Local Authority or Natural Resources Wales' assets in line with Hold The Line policies within the Shoreline Management Plans. The National Habitat Creation Programme does not provide compensatory habitat for coastal squeeze losses in relation to third party assets, and these are considered on a case by case basis (Welsh Government, 2018). General regulatory framework for assessment of environmental impacts prior to development, plans and projects. 84.8% of Wales' 'Large Shallow Inlet and Bay' area is an Annex I feature that is protected by Welsh SACs, approximately 9% of this is intertidal habitat (reef or sediment). Voluntary management measures were implemented at the Gann to reduce the impact of bait digging at this location but were not successful. As a result, a byelaw is being developed. NRW Thematic Action Plan: Flood and Coastal Erosion Risk Management (NRW, 2015d): A thematic action plan for Flood and Coastal Erosion Risk Management was developed under the LIFE N2K Project highlighting the actions needed to improve evidence collection and understanding as associated with this issue on N2K sites in Wales. Details can be found in the plan on the NRW website (http://naturalresources.wales/about-us/our-projects/nature-projects/life-n2k-wales/life-n2k-thematic-action-plans/?lang=en). Implementation of appropriate coastal management - >(pounds) 44 million across the N2K. Mitigation for the coastal squeeze losses delivered through the National Habitat Creation Project (NHCP). This is in response to the Welsh Government's statutory obligation for compensatory measures under Article 6(4) of the Habitats Directive, relating to offsetting the impacts of coastal squeeze on Natura 2000 sites. NRW Thematic Action Plan: Invasive Species and Pathogens (NRW, 2015e): A thematic action plan for Invasive Species and Pathogens was developed under the LIFE N2K Project highlighting the actions needed to improve evidence collection and understanding as associated with this issue on N2K sites in Wales. Details can be found in the plan on the NRW website (http://naturalresources.wales/about-us/our-projects/nature-projects/life-n2k-wales/life-n2k-thematic-action-plans/?lang=en). Improve awareness of, and compliance with, good biosecurity practices and training amongst NRW staff and contractors e.g. cleaning of boots/tools/vehicles at entry points to N2K sites. Ensure all NRW staff use bilingual biosecurity e-learning resource. Gather evidence on the presence and distribution of invasive non-natives species within sites, and the activities associated with the vectors of spread. There would also be a need to investigate pathways to and from each site, including from high risk areas adjacent to the site. Ongoing INNS pathway management in Wales will help to deliver the above. CI03: Management, control or eradication of other invasive alien species (Rank: Medium): Legislative agreements seek to protect biodiversity, species and habitats, and include provisions requiring measures to prevent the introduction, spread and control of, invasive non-native species, especially those that threaten native or protected species and habitats. The UK is a signatory to the Ballast Water Convention (IMO, 2014) which aims to prevent the spread of harmful aquatic organisms by establishing standards and

procedures for the management and control of ships' ballast water and sediments. These include specific ballast water management standards (e.g. concerning the efficacy of water exchange), the requirement for international vessel traffic to manage ballast water and sediments in accordance with vessel-specific ballast water management plans, and for all such vessel to carry a ballast water record book and an international ballast water management certificate. Through its implementation of the Marine Strategy Framework Directive (MSFD), the UK aims to ensure that INNS introduced by human activities are at levels that do not adversely alter the ecosystems'. The UK's Marine Strategy includes targets to reduce the risk of introduction and spread of non-native species through improved management of high risk pathways and vectors, and for action plans to be developed for key high-risk marine non-indigenous species by 2020. The strategy also sets out indicators for Good Ecological Status (GES) in respect of these INNS targets, and monitoring programmes for measuring progress towards achieving or maintaining GES. In Wales, various statutory and ad-hoc monitoring programmes contribute towards the MSFD INNS evidence baseline. Examples include marine rapid assessment surveys of Welsh marinas carried out in 2011 and 2014. Contingency plans are currently being developed for priority marine INNS species not yet established in Wales. Where potentially high impact INNS have been detected historically, innovative approaches to rapid eradication or control have been implemented where appropriate/technically feasible (e.g. Didemnum vexillum at Holyhead Marina). The impacts associated with INNS are also recognised as potentially significant anthropogenic pressures through the UK's approach to implementing the Water Framework Directive. Impacts from invasive non-native species are considered as part of the assessment of the ecological status of water bodies and, in general terms, measures are adopted to improve status and address impacts, on a water body by water body basis, where INNS are implicated in a water body failing to achieve its objectives. At a national level, specific legislation restricts the spread or release of INNS in the wild. Section 14 of the Wildlife and Countryside Act 1981, for example, contains specific provisions relating to the introduction of new species and provides that it is an offence to release or allow to escape into the wild, any animal which is not ordinarily resident in Great Britain, or those listed in Schedule 9. Of the marine species listed under Schedule 9, Crepidula fornicata and Sargassum muticum is of particular relevance to large shallow inlets and bays. In Wales, anthropogenic activities with the potential to introduce or spread INNS are managed through the implementation of biosecurity risk assessment and management planning under existing regulatory and consenting frameworks. Examples include the marine licensing provisions of the Marine and Coastal Access Act, Habitats Regulations Assessments under the Conservation of Habitats and Species Regulations 2017 and Sites of the Special Scientific Interest (SSSI) consenting procedures under the Wildlife and Countryside Act 1981. Work is ongoing to assess the prevalence of invasive non-native species (INNS) at priority dredge disposal sites in Wales to inform our understanding of INNS distribution and future management advice. Natural Resources Wales and the Welsh Government are standing members of the UK Marine Pathways Group, a coordinated approach to preventing new INNS introductions, early detection and rapid action to prevent the establishment of INNS, and containment and long-term control measures across the UK and Ireland. The Marine Pathways Group, in its earlier project form, produced specific INNS guidance and voluntary best practice for marina operators, boat owners and the aquaculture sector, and led on the identification of locations at high risk of introduction where biosecurity efforts should be focused. Specific Welsh control and eradication projects taken forward under the Marine Pathways banner include The Dee Chinese Mitten Crab Project and determining the extent of Grateloupia turuturu in Wales and feasibility of eradication. NRW Thematic Action Plan: Invasive Species and Pathogens (NRW, 2015e): A thematic action plan for Invasive Species and Pathogens was developed under the LIFE N2K Project highlighting the actions needed to improve evidence collection and understanding as associated with this issue on N2K sites in Wales. Details can be found

	in the plan on the NRW website (http://naturalresources.wales/about-us/our-projects/nature-projects/life-n2k-wales/life-n2k-thematic-action-plans/?lang=en). Improve awareness of, and compliance with, good biosecurity practices and training amongst NRW staff and contractors e.g. cleaning of boots/tools/vehicles at entry points to N2K sites. Ensure all NRW staff use bilingual biosecurity e-learning resource. Gather evidence on the presence and distribution of invasive non-natives species within sites, and the activities associated with the vectors of spread. There would also be a need to investigate pathways to and from each site, including from high risk areas adjacent to the site. Ongoing INNS pathway management in Wales will help to deliver the above. CE01: Reduce impact of transport operation and infrastructure (Rank: Medium): Development of shipping infrastructure is required to go through a regulatory process. For all projects such as these a marine licence is required (Marine and Coastal Access Act, 2009). The licence application is determined by NRW. Each application requires an Environmental Impact Assessment and Habitats Regulation Assessment (where within or adjacent to a Natura 2000 site). Based on evidence produced mitigation is agreed and implemented as appropriate. This generally reduces the impact of developments to an acceptable level. Ranked Medium because it is relevant to a moderate area (ports, e.g. Milford Haven). This code relates to pressure and threat codes E02 & E03.
9.1 Future prospects of parameters	9.1a Future prospects of -range. The occurrence of this habitat is defined by physiographic processes over long timescales. While the physical area of one bay may change (although this is very uncertain) (see 9.1b), the geographic spread and distribution of features is not expected to change within the next 12 years. 9.1b Future prospects of -area Boundaries for Large Shallow Inlets and Bays are based on physiographic features and are therefore unlikely to change, unless there is substantial shift in geomorphology. However, there is potential for the development of a tidal lagoon which would remove areas of habitat in Swansea bay, this is very uncertain at present. 9.1c Future prospects of -structure and function Further work is needed to undertake analysis of this component. The relationship between threats and pressures and current and planned conservation measures is uncertain without further analysis. This is not possible with current resources.
11.4 Short term trend of habitat area in good condition within the network; Direction	We are currently uncertain of the short-term trend in the area of good condition for this feature within SACs. Whilst evidence is available we are unable to assess this field in a meaningful way given current time resources.
11.5 Short term trend of habitat area in good condition within the network; Method used	Whilst evidence is available we are unable to assess this field in a meaningful way given current time resources.