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:

H1330 - Atlantic salt meadows
(*Glauco-Puccinellietalia maritimae*)

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	**1330 - Atlantic salt meadows (Glauco-Puccinellietalia maritimae)**

2. Maps

2.1 Year or period	1989-2004
2.3 Distribution map	Yes
2.3 Distribution map Method used	Complete survey or a statistically robust estimate
2.4 Additional maps	No

BIOGEOGRAPHICAL LEVEL

3. Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	**Atlantic (ATL)**
3.2 Sources of information	APIS Air Pollution Information System [online] http://www.apis.ac.uk/overview/pollutants/overview_N_deposition.htm ASERA. Good Practice Guidelines for the Severn Estuary European Marine Site. Association of Severn Estuary Relevant Authorities (ASERA). [online] Available at: http://www.asera.org.uk/files/2017/06/Severn-Estuary-EMS-Good-Practice-Guidelines-Information-Sheet.pdf Atkins. 2010. SMP 19, Anchor Head to Lavernock Point (Severn Estuary) Shoreline Management Plan (SMP) Review. Blackstock T. H., Howe E. A., Stevens J. P., Burrows C. R. & Jones P. S. 2010. Habitats of Wales. A comprehensive field survey 1979-1997. University of Wales Press, Cardiff. Boorman, L. 2003. Saltmarsh Review. An overview of coastal saltmarsh, their dynamic and sensitivity characteristics for conservation and management. Report No. 334. Joint Nature Conservation Committee, Peterborough. Boorman, L.A. and Hazelden, J. 2012. Impacts of additional aerial inputs of nitrogen to saltmarsh and transitional habitats. CCW Science Report No: 995, Countryside Council for Wales, Bangor, Wales. Brazier, P., Birch, K., Brunstrom, A., Bunker, A., Jones, M., Lough, N., Salmon, L., & Wyn, G. 2007. When the tide goes out, the biodiversity and conservation of the shores of Wales - results from a 10 year intertidal survey of Wales. The Countryside Council for Wales, Bangor BRIG. 2007. A preliminary assessment of the implications of climate change for the implementation of the UK BAP targets. Bunker, A. Habitat Feature condition assessment - attributes and assessment of current condition, Carmarthen Bay and Estuaries Atlantic Salt Meadows. NRW Internal Document. Burd, F. 1989. The saltmarsh survey of Great Britain. Research and survey in nature conservation. Nature Conservancy Council, Peterborough. Dargie, T. 1998. NVC survey of saltmarsh habitat in the Severn Estuary. CCW Contract Science Report no. 341. Evans, F., Clarke, J. 2000. Ty Gwyn Marsh - National Vegetation Classification (NVC) Survey Saltmarsh Survey. NRW Dataset. Dargie, T. 2000a. Description of the Severn Estuary survey sectors identified in the 1998 NVC survey. CCW Contract Science Report no. 399.

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4. Range

4.1 Surface area (in km²)			
4.2 Short-term trend Period			
4.3 Short-term trend Direction	Stable (0)		
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 d) Method	No	
4.11 Change and reason for change in surface area of range	Improved knowledge/more accurate data The change is mainly due to:	Improved knowledge/more accurate data	
4.12 Additional information			

5. Area covered by habitat

5.1 Year or period	1987-2017		
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value 75.7
5.3 Type of estimate	Best estimate		
5.4 Surface area Method used	Complete survey or a statistically robust estimate		
5.5 Short-term trend Period	2007-2018		
5.6 Short-term trend Direction	Uncertain (u)		
5.7 Short-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval

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

5.8 Short-term trend Method used	Insufficient or no data available		
5.9 Long-term trend Period	1994-2018		
5.10 Long-term trend Direction	Uncertain (u)		
5.11 Long-term trend Magnitude	a) Minimum	b) Maximum	c) Confidence interval
5.12 Long-term trend Method used	Insufficient or no data available		
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	Improved knowledge/more accurate data The change is mainly due to: Improved knowledge/more accurate data		
5.15 Additional information			

6. Structure and functions

6.1 Condition of habitat	a) Area in good condition (km²)	Minimum 9.6	Maximum 9.6
	b) Area in not-good condition (km²)	Minimum 47.5	Maximum 47.5
	c) Area where condition is not known (km²)	Minimum 18.5	Maximum 18.5
6.2 Condition of habitat Method used	Based mainly on extrapolation from a limited amount of data		
6.3 Short-term trend of habitat area in good condition Period	2007-2018		
6.4 Short-term trend of habitat area in good condition Direction	Decreasing (-)		
6.5 Short-term trend of habitat area in good condition Method used	Based mainly on extrapolation from a limited amount of data		
6.6 Typical species	Has the list of typical species changed in comparison to the previous reporting period? No		
6.7 Typical species Method used			
6.8 Additional information			

7. Main pressures and threats

7.1 Characterisation of pressures/threats

Pressure	Ranking
Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defences or coastal protection works and infrastructures) (F08)	H
Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams) (A33)	H
Mixed source marine water pollution (marine and coastal) (J02)	H

Agriculture activities not referred to above (A36)	H
Intensive grazing or overgrazing by livestock (A09)	H
Sports, tourism and leisure activities (F07)	M
Problematic native species (I04)	M
Extensive grazing or undergrazing by livestock (A10)	M

Threat	Ranking
Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defences or coastal protection works and infrastructures) (F08)	H
Modification of hydrological flow or physical alteration of water bodies for agriculture (excluding development and operation of dams) (A33)	H
Mixed source marine water pollution (marine and coastal) (J02)	H
Agriculture activities not referred to above (A36)	M
Sports, tourism and leisure activities (F07)	M
Sea-level and wave exposure changes due to climate change (N04)	H
Change of habitat location, size, and / or quality due to climate change (N05)	H
Shipping lanes and ferry lanes transport operations (E02)	M
Wind, wave and tidal power, including infrastructure (D01)	M
Intensive grazing or overgrazing by livestock (A09)	M

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	Maintain the current range, population and/or habitat for the species	
8.3 Location of the measures taken	Both inside and outside Natura 2000	
8.4 Response to the measures	Short-term results (within the current reporting period, 2013-2018)	
8.5 List of main conservation measures		

Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land (CA01)
Restore habitats impacted by multi-purpose hydrological changes (CJ03)
Reduce/eliminate marine pollution from industrial, commercial, residential and recreational areas and activities (CF07)
Reduce/eliminate marine contamination with litter (CF08)
Manage changes in hydrological and coastal systems and regimes for construction and development (CF10)

Maintain existing extensive agricultural practices and agricultural landscape features (CA03)	
Adapt mowing, grazing and other equivalent agricultural activities (CA05)	
Implement climate change adaptation measures (CN02)	
Reduce impact of outdoor sports, leisure and recreational activities (CF03)	
Adapt/manage exploitation of energy resources (CC02)	

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	
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 b) Maximum c) Best single value 64.2
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

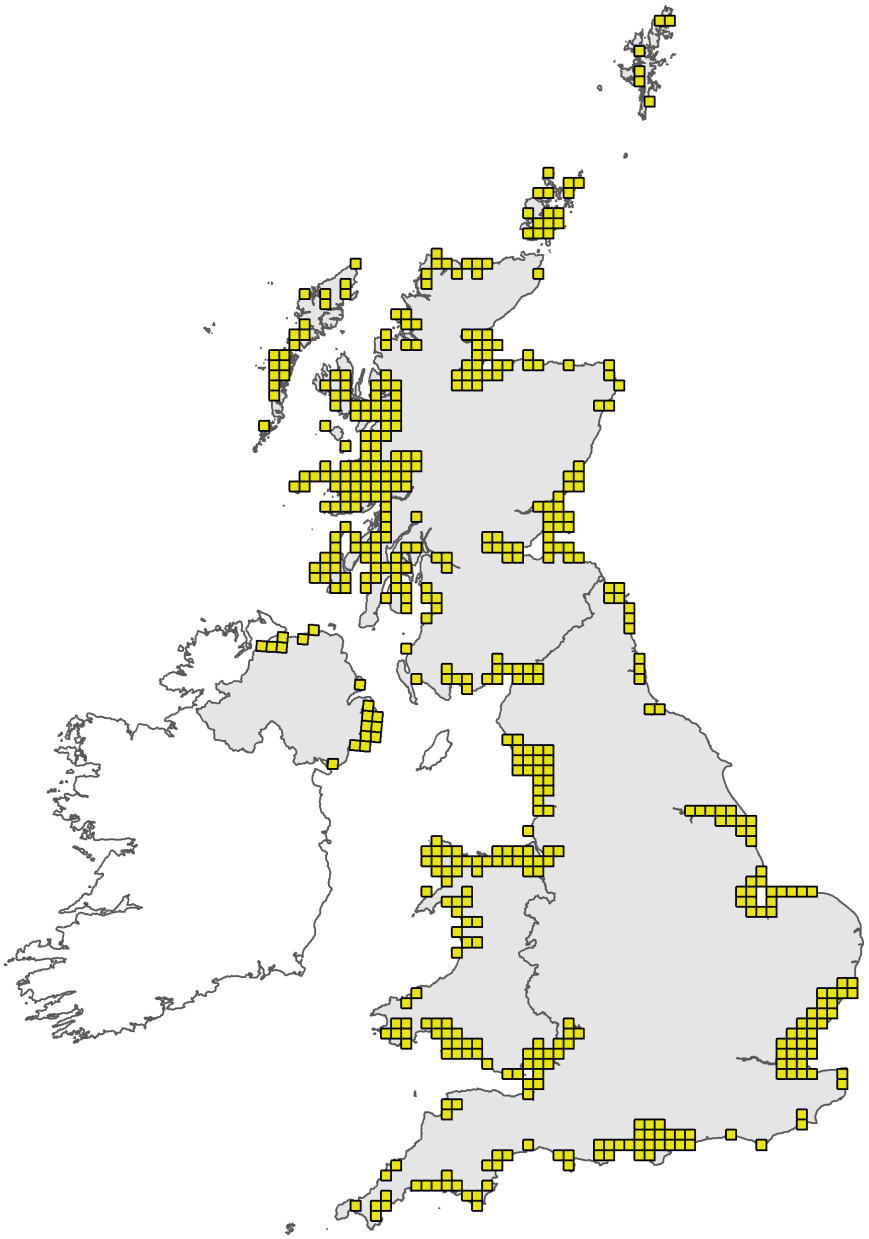

Figure 1: UK distribution map for H1330 - Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

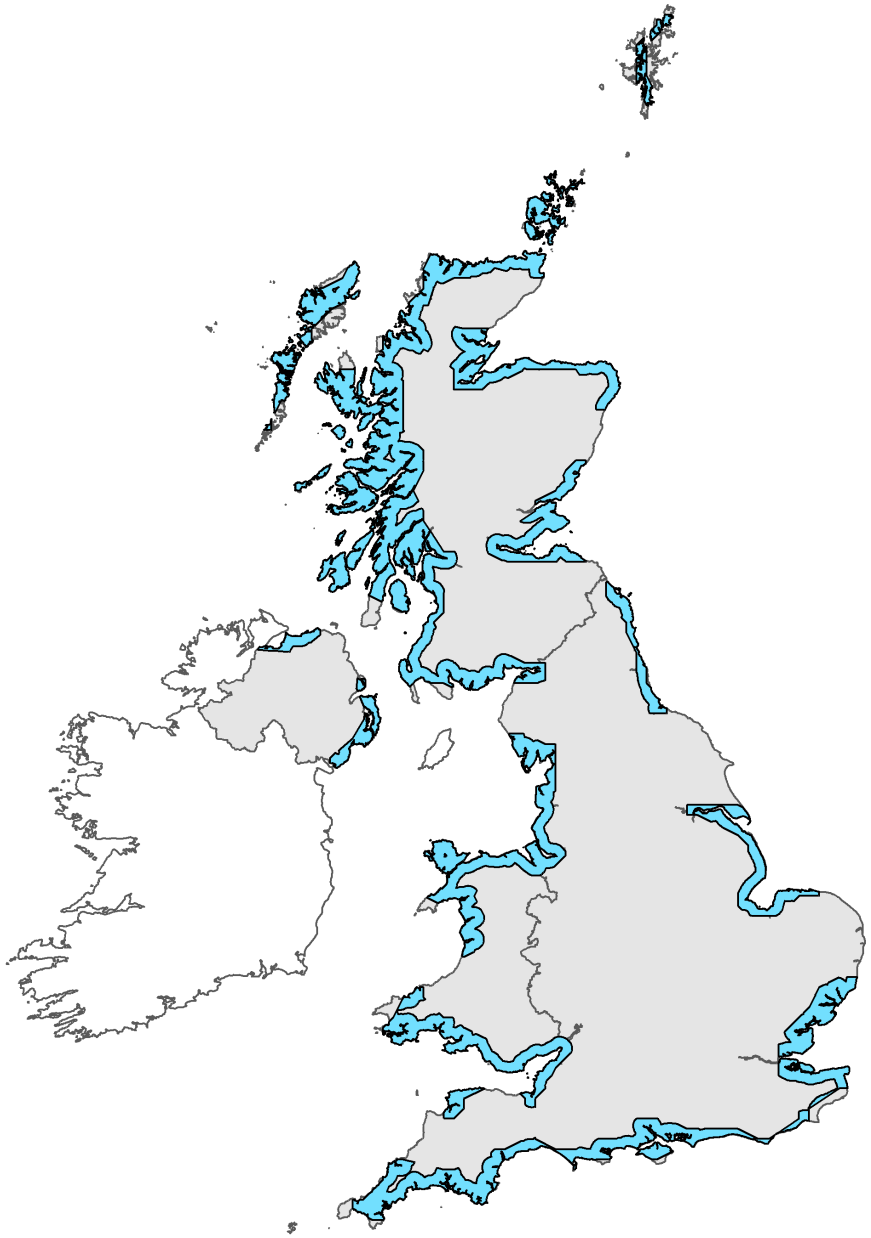

Figure 2: UK range map for H1330 - Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

The range map has been produced by applying a bespoke range mapping tool for Article 17 reporting (produced by JNCC) to the 10km grid square distribution map presented in Figure 1. The alpha value for this habitat was 25km. For further details see the 2019 Article 17 UK Approach document.

Explanatory Notes

Habitat code: 1330

Field label	Note
2.3 Distribution map; Method used	The 10km square distribution and habitat area estimates are derived from a combination of different original sources, summarised below. A single aggregated GIS layer has been created for this habitat across Wales (data source 1 below) pulling together the maps and records from the other listed sources. Data Source No 1: Article 17 H1330 Atlantic Salt Meadows GIS Layer 2018. Detailed notes regarding methods used to compile this layer and alterations made to the 2013 layer and have been written up in a set of processing notes (Lewis & Kay, 2018). This GIS layer updated in 2018 supercedes the layer submitted as part of the Article 17 process in 2013 (below). Data Source No 2: Phase II Saltmarsh NVC surveys A total of 10 Phase II surveys were carried out covering the largest saltmarsh sites accross Wales covering the vast majority of the sites protected for saltmarsh features. The surveys were carried out between 1997 and 2004 targeting saltmarsh vegetation (Dargie, 1998, 2000a & 2001), (Evans and Clarke, 2000),. (Prosser and Wallace, 1997, 1998, 1999a, 1999b, 2002, 2003,2004). Data Source No 3: Phase I Intertidal Biotopes Survey 1996-2004, (Brazier et al., 2007). A comprehansive intertidal biotope survey of the Welsh coast. This element of the Article 17 layer covered much of the Atlantic salt meadows outside of protected sites. Data Source No 4: Phase I Survey (Terrestrial) Phase I Habitat Survey of Wales (Blackstock et al., 2010). Comprehensive survey of broad habitat types across Wales. Data Source No 5: Severn Estuary 2017 NRW Saltmarsh Monitoring Extent Layer GIS layer covering the Severn Estuary SAC digitised to 2017 aerial photographs and ground truthed. (Wilkinson & Anstice, 2018) Data Source No.6 Vegetation survey of maritime cliff and slopes of the Llyn Peninsula. (Prosser & Wallace, 2000). A survey targeting cliff vegetation focusing on sections of soft cliff. One saltmarsh (SM16) polygon was recorded. Data Source No. 7: Updates to 2013 Layer based on 2013/14 aerial photograph layer. Removal of areas lost to development. Other NVC Survey Information The Phase II survey was based the UK's National Vegetation Classification (NVC) (Rodwell 2000). Detailed National Vegetation Survey (Rodwell (ed.) 2000, 1991b, 1992, 1995) infomation exists for the majority of the H1330 feature within SACs in Wales. The NVC data comes from numerous different surveys from 1997 through to 2004 (listed below). All saltmarsh and transitional vegetation was included within the Article 17 layer with the exception of SM7, SM8 and SM9 and which relate to H1240 and H1310. Some of the datasets used are reletively old and changes will have occured since their production due to the dynamic nature of saltmarsh.

Habitat code: 1330 Region code: ATL

Field label	Note
4.11 Change and reason for change in surface area of range	There is no evidence to indicate a genuine change in range of H1330 in Wales since 2013, nor is one considered likely to have occurred.A small number of corrections to the 2013 layer have been made which have resulted in minor changes to the 10km square distribution, with consequent changes to the mapped range.
5.4 Surface area; Method used	Between 1997 and 2004 an initiative to gather Phase II survey information captured detailed NVC information for the majority of the larger and most important estuaries in Wales. Further, comprehensive Phase I vegetation surveys (Brazier et al., 2007 & Blackstock et al.2010) have ensured almost complete coverage of this feature in Wales (see section 2.3). More recent data is now coming available and has been used to update the Article 17 layer on the Severn (Wilkinson & Anstice 2018).

5.6 Short term trend; Direction	Natural patterns of erosion and accretion mean that net losses and gains in the extent of Atlantic salt meadows can be difficult to quantify. Many of the Welsh estuaries are infilling with sediment allowing for growth of the saltmarsh habitat both vertically and at the expense of intertidal sand and mud. However, 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). Within the first epoch (2005 to 2025) the SMPs estimate that 331*ha of intertidal habitat (which includes Atlantic salt meadows) is predicted to be lost from the SACs within or partially within Wales. The figure for predicted losses for intertidal habitats has not been adjusted for estuary infilling or morphological response to sea level rise and in that context, is seen as a worst-case scenario. Actual losses for Atlantic salt meadows with in the period of the short-term trend are likely to be relatively low. Examination of aerial photos between 1989 and 2017 show that for the Welsh section of the Severn there has been a net gain in saltmarsh rather than loss. However, minor losses in the Atlantic salt meadows habitat have occurred within the time period for the short term trend from infrastructure maintenance<1ha on the Dwyryd Estuary within the Pen Llyn a'r Sarnau SAC. The National Habitat Creation Programme 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). So far one realignment site has been established as part of this programme with the aim of creating approximately 39ha of intertidal habitat, the majority of which is expected to develop into saltmarsh habitat. However, this site is still developing and the new saltmarsh is not yet attributable to the Atlantic salt meadows feature. Other potential realignment sites around Wales are being progressed. Therefore, the short term trend in area is likely to be stable with losses in extent of saltmarsh due to sea level rise offset by gains due to expansion within infilling estuaries, however, there is a lack of evidence to confirm this, therefore the direction is listed as uncertain. *This figure has been arrived at from the predicted losses set out in the Annexes for the four SMPs which partially or wholly cover Wales. The highest losses predicted are from within the Severn Estuary where 679 ha are predicted to be lost within the first epoch, however only approximately a third of this is from within Wales and the overall figure above has been adjusted to reflect this. No loss is predicted for the Dee which is a cross boarder site for the first epoch.
5.11 Long term trend; Magnitude	See section 5.6 above. In addition to the predicted and actual changes in salt marsh extent set out in section 5.6 there have been additional losses of this feature to development within the timescale of the long-term trend. For example, marina developments such as at Conwy and the construction of the barrage across the Ely and Taff Estuary mouth which resulted in the loss of Atlantic salt meadows. Two hectares of rip-rap has been placed on the Atlantic salt meadows of the Severn Estuary for flood defence purposes however, this will also have decreased erosion of this feature.
6.1 Condition of habitat	Good: 9.6 Km2 (13%) Not-good: 47.5 Km2 (25%) Not Known: 18.5 Km2(63%) *The extent figures used are taken from the 2018 Article 17 GIS layer which relates only to the area of Atlantic salt meadows in Wales. Percentages add to 101 due to rounding up.

6.2 Condition of habitat; Method used	The extents set out in section 6.1 are derived from site level Condition Monitoring Assessments produced under the NRW SAC Monitoring Programme. Within the previous SAC monitoring reporting round (2007-2012) one of the seven SACs supporting Atlantic Salt Meadow as a recognised feature was reported as 'Favourable', four were reported as 'Unfavourable' and two were not monitored. The Severn Estuary has been monitored within this reporting round (2013-2018). So far data analysis for the Severn shows that the Atlantic Salt Meadow feature at the site is failing against the performance indicators. These SAC Monitoring Condition Assessments, which are based on common standards monitoring, represent a relatively coarse grain assessment of overall habitat condition for the site and mask a significant level of variation in habitat quality, structure and function across the feature. The SAC Monitoring Condition Assessments cover the condition of the habitat and do not assess pressures operating on the site.
6.5 Short term trend of habitat area in good condition; Method used	The overall trend in the area of habitat in good condition is declining. The H1330 habitat is subject to ongoing pressures such as historical land claim and estuary modification, poor water quality, inappropriate grazing and the pressures of climate change (discussed in Section 7) which will be contributing to a deterioration in condition. Monitoring data from the previous two reporting rounds show the overall condition of the Atlantic salt meadows feature was 'Unfavourable' on 5 of the 6 SACs where this feature was monitored. Many of the saltmarshes do not support the full range of zonation; upper marsh is truncated by sea walls and transitional zones to other semi natural habitats are scarce or absent. Where coastal squeeze is thought to be occurring, this is potentially further disrupting zonation. Apriximately two thirds of this feature within SACs is classed as unfavourable. Grazing managment issues (both overgrazing and undergrazing) are highlighted as the cause of poor habitat condition on Pen Llyn a'r Sarnau, Carmarthen Bay and Estuaries and the Severn Estuary. However, positive management is known to have led to localised and often significant impovements in the condition of H1330 at a number of locations. Efforts have been made to reduce grazing on some sites, for example a Glastir agri-environment agreement on common land is now in place over a considerable proportion of the saltmarsh within the Carmarthen Bay and Estuaries SAC however, full recovery my take many years after long term heavy grazing.

7.1 Characterisation of pressures/ threats

The majority of the pressures and threats have been identified and assessed using NRW's Special Sites Actions Data Base which also includes synthesised data from the LIFE N2K project reports. However, in some cases expert judgment was used. The data held in the 'Actions Database' and LIFE N2K data were used to provide a basis for quantifying pressures/threats relating to this habitat within protected sites in this case primarily SACs. The Actions database provides information on 'issues' within the protected sites series, however, these do not always match the pressures listed under Article 17. LIFE Data also highlights pressures and threats for each SAC. This information was then matched to expert judgement on the severity of these pressures/threats to give an overall evaluation of the pressure/threat level across the whole feature. The Atlantic salt meadows feature occurs in 166 SAC management units and is a qualifying (A-C) feature of 7 SACs in Wales. Some of the pressures listed are closely related and may share the same driver for example under-grazing may drive the expansion of invasive native species which may also be exacerbated by atmospheric pollution. Where similar pressures share the same driver sometimes only one pressure has been highlighted to be entered onto the reporting spreadsheet. Pressures 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) & A33: Modification of hydrological flow or physical alternation of water bodies for agriculture (excluding development and operation of dams) Historic land claim has led to considerable losses in saltmarsh extent and affected coastal processes within the vast majority of the estuaries and sheltered bays in Wales. Atlantic salt meadows are still responding to these modifications. Flood defences for land claim have the potential to cause coastal squeeze with sea level rise resulting in loss of Atlantic salt meadows. The LIFE data lists issues relating to coastal flood defence and erosion control within six of the seven SACs supporting this feature, this is not an issue within the Kenfig SAC. 279 actions were listed relating to coastal squeeze and natural processes and sediment supply within the Actions Database, 68 of these were under control and 78 complete. In addition, the SMPs (Atkins, 2010, Halcrow, 2012(a), Halcrow, 2012(b), Royal Haskoning, 2012) predict losses of 331ha of intertidal habitat from the SACs wholly or partially within Wales due to sea level rise between 2005 and 2025. The figure for predicted losses for intertidal habitats has not been adjusted for estuary infilling or morphological response to sea level rise and in that context, is seen as a worst-case scenario. The Dee estuary is not predicted to be affected by coastal squeeze within this first epoch. Saltmarsh may adjust to sea level rise by vertical growth where sediment supply is sufficient.However, sea defences and rock armouring have contributed to declines in sediment supplies (Jones et al., 2011) A09: Intensive grazing or overgrazing by livestock 32 over grazing issues are listed within 14 units within 3 SACs. 1 action is complete, all still need control. Overgrazing is detrimental to the saltmarsh vegetation structure, creating a uniform short sward where grazing intolerant species are absent. J02: Mixed source marine water pollution (marine and coastal) & E02: Shipping lanes and ferry lanes transport operations The Life data identifies marine pollution as an issue on five of the seven SACs supporting this feature in Wales. 153 actions have been identified across 75 units, 14 are complete and 9 are under control. Pollution from diffuse sources, point source discharges and vessel repair, anti-fouling, marine sediment pollution and the dumping of spoil, leachates and sludge are included with in this pressure. Eutrophication of coastal waters with Dissolved Inorganic Nitrogen and Phosphorous causes enrichment of saltmarshes this increases primary production and can lead to overgrowth of increases in macro-algae (Packham and Willis 2007). However, saltmarsh is generally associated with quite high levels of Nitrogen (Boorman & Hazeldean, 2012) although the vegetation of the closed higher marsh and transitions can be more vulnerable to elevated nitrogen levels for example, causing increases in graminoids. The MarLIN website lists saltmarshes as 'Tolerant' of changes in nutrient levels. There are a number of transitional and coastal waterbodies where an Atlantic salt meadows feature

is present which have failed to meet the WFD 'good' or 'high' standard for levels of Dissolved Inorganic Nitrogen. These include the following waterbodies all of which intersect with SACs which support Atlantic salt meadows: Dee, Cefni, Artro, Milford Haven Inner and Outer and the Taf, Tywi and Gwendraeth, and the Burry Inlet Inner and Outer. Fails for increases in opportunistic macro algae have been reported from the Milford Haven Inner water body under WFD monitoring. Chemical pollution. Saltmarsh has been assessed as having a 'Low Intolerance' for heavy metal contamination and an 'Intermediate Intolerance' for synthetic compounds (MarLIN websites). Intolerance of saltmarsh vegetation to Hydrocarbon contamination is listed as High; oil pollution can affect saltmarsh community structure, fauna and environmental conditions (Packham and Willis 2007 pp. 253). There are a number of transitional and coastal waterbodies where Atlantic salt meadows feature is present which have exceeded WFD targets for pollutants such as Mercury, Tributyltin (which is associated with vessel antifouling), zinc (associated with mining and contaminated land) and brominated diphenyl ether (flame retardant). These include the Dee, Mawddach, Leri, Dyfi, Ogmor, Milford Haven Inner and Outer and the Severn Lower. Saltmarsh has been rated as having a High Intolerance for synthetic compound contamination and heavy metal contamination https://www.marlin.ac.uk/habitats/detail/25. Pollution from shipping (E02) is a pressure and a risk; small scale spills and the use of antifoulants contribute to overall pollution, large scale spills could have catastrophic results and remain a threat, primarily for the Pembrokeshire Marine SAC which is adjacent to the port of Milford Haven. 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) Marine litter has been identified as an issue within the Severn Estuary and Dee Estuary SACs (LIFE Data). It is also highlighted as risk for Pembrokeshire Marine SAC, Pen Llyn a'r Sarnau and Carmarthen Bay and Estuaries SACs. The actual area of the feature affected is likely to be relatively small, however, decomposition of marine litter adding to pollution should also be considered. F07: Sports, tourism and leisure activities This pressure and threat relates to all seven SACs supporting Atlantic salt meadows. Fifty-six issues were identified within 25 management units. Use of vehicles on the saltmarsh was the primary issue. Inappropriate use of vehicles, access on foot, horse riding, punt gunning and the establishment of moorings on the saltmarsh were also identified as issues in the actions data base. J03: Mixed source air pollution, air-borne pollutants The critical load for nitrogen deposition set for Atlantic salt meadows feature is 20-30kg/ha/yr. Approximately 3.9% of this habitat occurs where N-deposition exceeds 20kg/ha/yr. Although only a small percentage this is likely to be having a detrimental impact, such as the increase in graminoids and increased in late successional species (APIS website) however, any effects are more likely to be seen in the upper marsh and transitional areas (Boorman and Hazelden, 2012). A10: Extensive grazing or under grazing by livestock Four issues have been identified in 3 units in 3 SACs. Two of these are now complete and under control. Where grazing has declined or ceased a dense monoculture of grasses such as Sea couch, Elytrigia altherica (see I04 below) or Red fescue, Festuca rubra can result. A36: Agriculture activities not referred to above: Grazing type and timing 65 Issues have been identified across 35 units in 6 SACs. Seven of the issues are under control and five actions are complete. This relate to time of year which the stock is allowed onto the marshes; grazing during the main flowering period can be detrimental to the saltmarsh and grazing during the bird breeding season can result in nest failures for the ground nesting redshank. Livestock type can also affect the marsh; sheep rather than cattle grazing can create very uniform sward and cattle are generally required to control the spread of Elytrigia altherica where this is appropriate. C01: Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) C07: Dumping/depositing of dredged materials from marine extraction E03: Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) The actions

database lists 6 issues relating to aggregate extraction, dredging and the dumping of dredged materials have been highlighted for the Severn and Dee Estuaries. Aggregate extraction and dredging have the potential to cause restrictions in the sediment supply and disturbance to natural processes. Within the SACs these activities are tightly controlled and have been through HRA assessments which ensure that they are carried out at a level which does not cause pressure on the SAC features. These activities have been assessed as a threat only. G03: Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats. Seven actions have been identified within the Actions Database across 7 units within 3 SACs. This issue relates to cockling and bait digging. G07: Hunting Wildfowling is occurring on many saltmarshes. Two actions are identified on two SACs related to wildfowling and one action relating to punt gunning. On sites where, certain bird species are protected this is a regulated activity, there are also voluntary codes of practice in place. Regular review of consents will ensure this remains under control. I02: Other invasive alien species (other than species of Union concern) Non-native species are ranked as lows; the saline conditions prevent the more common terrestrial invasive non-native species in Wales becoming established; within the Atlantic salt meadows habitat, only two issues relating to terrestrial non-native species have been reported from 2 SACs. However, at the margins of saline influence at the upper reaches of estuaries other more terrestrial species may affect the transitional vegetation. For example, non-native conifers and broadleaved trees from at Newborough Warren are spreading onto the saltmarsh /dune transition. The non-native red marine seaweed Gracilaria vermiculophylla has recently been recorded on the Dwyryd Estuary forming mats in saltmarsh pans. This is species spreads rapidly and has been assessed as a 'moderate risk' by the GB Non-native Species Secretariat. The establishment of Buttonweed, Cotula coronopifolia has also been reported within the Kenfig SAC. I04: Problematic native species Spartina anglica was listed as a pressure and threat in the 2013 submission. In Wales concern relating to this species have declined; the rate of Spartina spread has decreased considerably and is generally known only to be occurring on sites where estuaries are in filling such as the Cefni estuary at low levels. In addition, stands of Spartina anglica have been shown to develop into Atlantic salt meadows; Dargie (2001) estimates a decline of 90% cover of Spartina dominated communities on the Dee and the Clwyd Estuaries between 1983 and 2000 and major gains in mid-upper marsh communities. However, pressure relating to presence and expansion of this species may still occur in certain site-specific situations. Sea couch Elytrigia altherica is a natural element of high marsh vegetation however, it can form dense monocultures and increase at the expense of other saltmarsh communities as a result of under-grazing. For example, SAC monitoring data for the Welsh section of the Severn indicates that the site is in unfavourable condition due to increases in the extent and distribution of E. altherica where the spread of this species is threatening rare and scarce plant species of the high marsh. Common sea heath (Frankenia laevis) native to the South of England is spreading onto some saltmarsh dune transitions in South Wales. Threats: All current pressures are considered to be ongoing and, in the absence of significant new conservation measures, will continue to apply at a similar level of intensity over the next two reporting rounds. In addition to the ongoing pressures described above the following threats have been identified: N04: Sea-level and wave exposure changes due to climate change Sea level & N05: Change of habitat location, size, and / or quality due to climate change The impacts of climate change on coastal saltmarsh have been assessed as High (BRIG 2007). Saltmarsh is not only subject to the impacts of increasing temperatures and altered precipitation rates but to sea level rise and potential increases in storminess. Coastal squeeze due to costal defence is discussed with pressures A33 and F08 above however, loss of Atlantic salt meadows could occur due to coastal squeeze against natural features such as cliffs or steep land rise. In addition, increased wave power could result in accelerated erosion of marshes. Atlantic salt meadows are likely to become fragmented where coastal squeeze occurs leading to

declines in quality and resilience. However, where topography allows the migration of this habitat inland with sea level rise is a potential response of the marsh to sea level rise. Declines in quality may result with changing conditions such as drought and higher temperatures which could lead to hyper-saline conditions in some instances. D01: Wind, wave and tidal power, including infrastructure Options for tidal lagoon power developments which could affect Atlantic salt meadows are being explored on the coasts of North and South Wales. Such developments are likely to alter the tidal range inside and potentially outside the lagoons leading to losses in extent and damage to the structure and function of the Atlantic salt meadows. Loss of extent under the footprint of the development is also a threat.

8.5 List of main conservation measures	Conservation measures within the SACs were assessed using the Special Sites Actions Database, an internal NRW database. CA01: Prevent conversion of natural and semi-natural habitats, and habitats of species into agricultural land The clear majority of H1330, (92%) of the Atlantic salt meadows feature lies within protected sites. Preventing the conversion of the Atlantic salt meadows to other agricultural land via land claim. CA05: Adapt mowing, grazing and other equivalent agricultural activities CA03: Maintain existing extensive agricultural practices and agricultural landscape features CI05: Management of problematic native species Just 5% of H1330 within the protected sites is within a positive management agreement with NRW (taken from the NRW GIS agreements layer, accessed March 2018), a further 23% of the feature is covered by the Glastir agri-environment scheme. 32 issues relating to over grazing issues are listed within 14 units within 3 SACs. 1 is complete, all still need control. Four issues have been identified in 3 units in 3 SACs relating to under grazing. Two of these are now complete and under control. 65 Issues have been identified across 35 units in 6 SACs relating to grazing type and timing. Seven of the issues are under control and five actions are complete. CJ03: Restore habitats impacted by multi-purpose hydrological changes & CF10: Manage changes in hydrological and coastal systems and regimes for construction and development The National Habitat Creation Programme aims to restore intertidal habitats in Wales to provide compensation habitat for habitat lost to coastal squeeze relating to sea defences owned and maintained by Risk Management Authorities (NRW and Local Authorities). Saltmarsh is the most likely habitat to develop within re-alignment schemes. To date one scheme at Cwm Ivy has been implemented in partnership with the National Trust and c39ha of new saltmarsh habitat is developing however, further projects are at the planning stage. Within the NRW Actions database 185 actions were listed relating to coastal squeeze, 49 of these were under control and 61 complete. The Pen Llyn a'r Sarnau SAC has an objective to restore the 'Estuaries' feature (of which Atlantic salt meadows are a component habitat) where the structure and functions of the estuaries that have been damaged/degraded by the constraints of artificial structures such as flood banks. A reduction in the artificial constraints (such as flood banks) on the tidal limits within the estuaries would provide the potential to increase and re-establish estuary communities that have been reduced or lost to past interventions in the estuaries including Atlantic salt meadows and the full range of zones which this feature encompasses. However, there are many barriers to achieving restoration on such as scale. The Shoreline Management Plans (SMP) 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. (see section 9.1b). CF07: Reduce/eliminate marine pollution from industrial, commercial, residential and recreational areas and activities CF08: Reduce/eliminate marine contamination with litter Implementation and enforcement of water quality regulation (both marine and freshwater) is ongoing work and is making gains in improving water quality. Management of the wider countryside including the implementation of the River Basin Management Plans by NRW and EA (cross boarder catchments) is also contributing to improvements (NRW 2015). Shared multi-agency pollution response plans to deal with major incidences are in place and are regularly updated. CN02: Implement climate change adaptation measures Implementation of climate change adaptation measures including the Shoreline Management Plans, and further managed realignment schemes need to be progressed. The creation of buffer zones with appropriate conservation management to allow for the potential movement of saltmarsh inland where there are no existing barriers would also be beneficial. CF03: Reduce impact of outdoor sports, leisure and recreational activities. Fifty-seven issues relating to erosion and disturbance and inappropriate vehicle use were identified within 25 management units. One action was complete, none were under control. However, guidance and voluntary codes of practice exist in some areas for example: The 'Good Practice Guidelines for the Severn Estuary European Marine Site' produced by the Association of Severn Estuary Relevant

Authorities (ASERA). CI03: Management, control or eradication of other invasive alien species Neither of the two actions identified on the two SACs reported as having issues with non-native species within the NRW Actions Database have been completed. CC01: Adapt/manage extraction of non-energy resources Extraction is regulated through planning legislation and where affecting a SAC this activity is tightly controlled is subject to Habitat Regulation Assessments. CC02: Adapt/manage exploitation of energy resources Energy projects are regulated through planning legislation. Almost two thirds of the Atlantic salt meadows feature is within SACs therefore majority of developments such as tidal lagoons would require a Habitats Directive Assessment.

9.1 Future prospects of parameters	9.1a Future prospects of -range.Despite several ongoing threats to the habitat, statutory protection of the bulk of the sites provides protection against total loss and changes to the 10km2 distribution are considered unlikely in the short term, beyond which the impacts of coastal squeeze could start to become more apparent in terms of extent with potential consequent changes in range. Therefore, the future prospects for range are stable, at least for the next 12 years.9.1b Future prospects of -area The main threat to H1330 is sea level rise. The losses of intertidal habitat predicted by the Shoreline Management Plans (SMPs) by coastal squeeze could represent a significant proportion of this habitat which is already much reduced from its historical extent. Saltmarsh can respond to sea level rise by vertical accretion, however, this is dependent on sediment supply (Jones et al. 2011). The National Habitat Creation Programme is in place to compensate for habitat loss due to coastal squeeze caused by sea defences owned and maintained by Risk Management Authorities (NRW & Local Authorities, and subject to WG grant in aid) which are or will in future cause coastal squeeze. However, this programme does not cover the creation of compensation habitat caused by flood defences outside the remit of Welsh Government funding. The Shoreline Management Plans identify the most sustainable approach to managing the flood and coastal erosion risks to the coastline in the short medium and long term. Although SMPs have been adopted by Local Authorities and are referred to in planning policy and guidance, the implementation of SMPs is often problematic, especially where there has been a change in policy from 'hold the line' to 'no active intervention' or 'managed realignment'. Unless works to maintain a defence require regulation such as a marine licence, there is no specific driver to promote SMP implementation. There are also significant sections of the Welsh coast which are constrained by assets which are in private ownership, including an extensive railway network. Failure to implement the Shoreline Management Plans or to create new saltmarsh within timescales adequate to allow for development of new habitats prior to losses occurring will lead to declines in the extent of this feature. However, there are some good examples of sustainable shoreline policies in place by NGOs for which we are already seeing the results, for example the National Trusts' (NT) 'Shifting Shores' policy; the Cwm Ivy saltmarsh restoration site within the Carmarthen Bay SAC is a joint project between the NT and NRW. Habitat creation to provide compensatory habitat is essential to maintain the extent of this feature into the future however, it should be recognised that timescales needed for salt meadows to develop to a level comparable to reference areas may take decades. 9.1c Future prospects of -structure and function Much of the Welsh coastline has been modified by coastal defences which protect land claimed for agriculture and development including transport links. These have changed the shape of the coastline; constricting natural processes such as channel movements and tidal inundation. Other defences prevent natural erosion, causing declines in sediment supply and distribution. Therefore, the 'natural' processes upon which the Atlantic salt meadows depend are compromised and full zonation of saltmarsh vegetation communities and transitions to semi natural habitats are rare because they have been truncated by the presence of sea walls. The clear majority of these changes have been made prior to the designation of protected sites however, estuaries and shorelines continue to respond to these changes. The Pen Llyn a'r Sarnau SAC has an objective to restore the 'Estuaries' feature of which Atlantic salt meadows is a component intertidal habitat however, there are many barriers to achieve restoration on such as scale Although much of this habitat (92%) is within the protected sites series, many of the actions against the most significant pressures identified in the NRW Actions Database are not yet recorded as 'complete' or 'under control'. In addition, much of the Atlantic salt meadows fall within transitional and coastal water bodies which are failing WFD targets relating to chemical pollution and Dissolved Inorganic Nitrogen, therefore, pressures such as pollution and intensive grazing continue to impact on the typical species and other aspects of structure and function of the Atlantic salt meadows.

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network	This figure includes all habitat within SACs whether as a qualifying feature or otherwise.
11.4 Short term trend of habitat area in good condition within the network; Direction	Atlantic salt meadows have only been assessed as favourable within the Dee Estuary SAC and have only been reported on once in the last two reporting rounds covering the period of the short-term trend. Therefore, the trend in the area of good condition within the network is assessed as 'uncertain'.