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:

H1310 - *Salicornia* and other annuals colonising mud and sand

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	**1310 - Salicornia and other annuals colonizing mud and sand**

2. Maps

2.1 Year or period	1996-2014
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 Website: http://www.apis.ac.uk/overview/pollutants/overview_N_deposition.htm 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, pp44, 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 Meadow. 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. Dargie, T. 2001. NVC survey of the saltmarsh and other habitats in the Dee and Clwyd estuaries 2000. CCW Contract Science Report no. 450. Environment Agency 2007. Saltmarsh management manual. R&D Technical Report SC030220.

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MarLIN: The Marine Life Information Website:

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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	No
	d) Method	
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

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4.12 Additional information

5. Area covered by habitat

5.1 Year or period	1996-2014		
5.2 Surface area (in km²)	a) Minimum	b) Maximum	c) Best single value 2.1
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
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 1	Maximum 1
	b) Area in not-good condition (km²)	Minimum 0	Maximum 0
	c) Area where condition is not known (km²)	Minimum 1.1	Maximum 1.1
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			

7. Main pressures and threats

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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)	M
Sports, tourism and leisure activities (F07)	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)	M
Sports, tourism and leisure activities (F07)	M
Wind, wave and tidal power, including infrastructure (D01)	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)	H

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		Medium-term results (within the next two reporting periods, 2019-2030)
8.5 List of main conservation measures		

Restore habitats impacted by multi-purpose hydrological changes (CJ03)

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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)

Implement climate change adaptation measures (CN02)

Adapt/manage extraction of non-energy resources (CC01)

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

Adapt/manage exploitation of energy resources (CC02)

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

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 1.9

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

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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

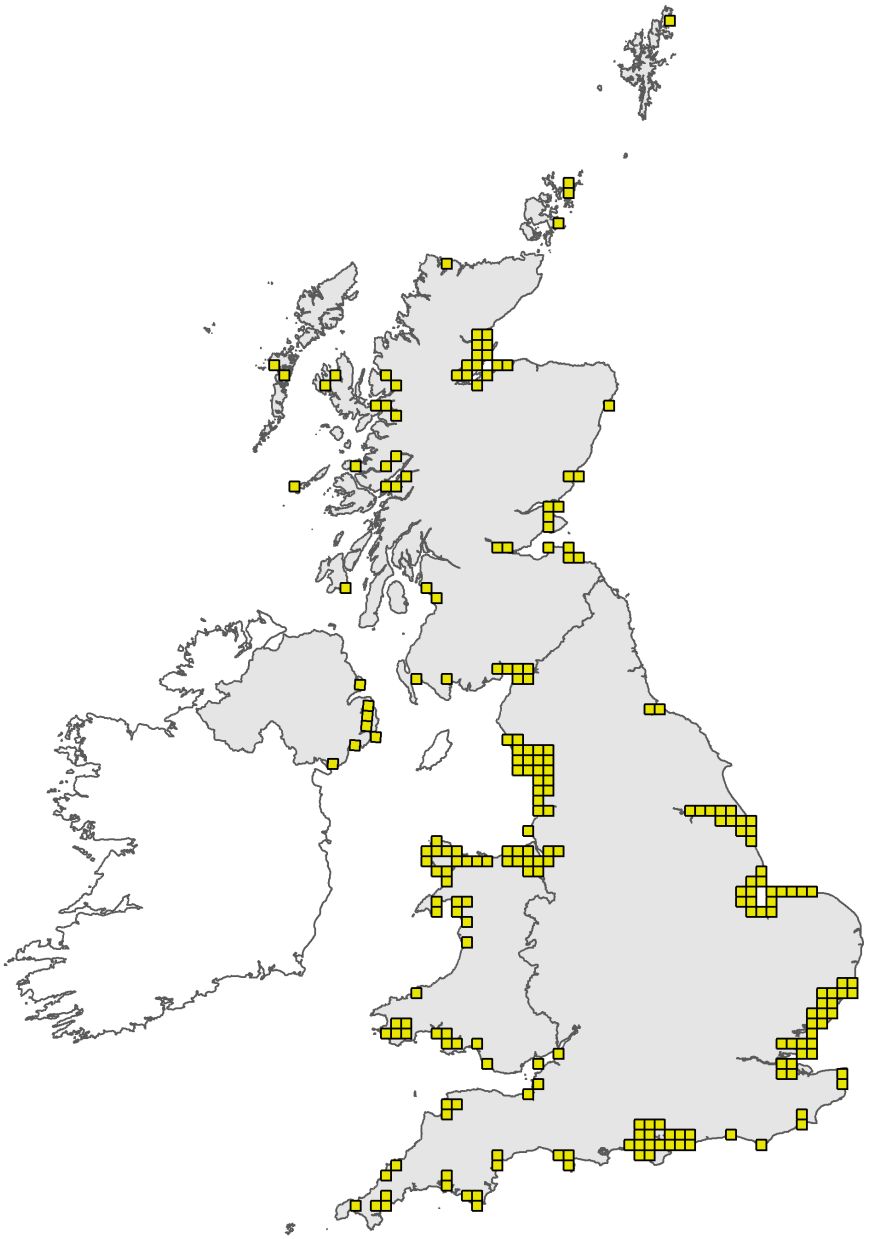

Figure 1: UK distribution map for H1310 - *Salicornia* and other annuals colonising mud and sand. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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

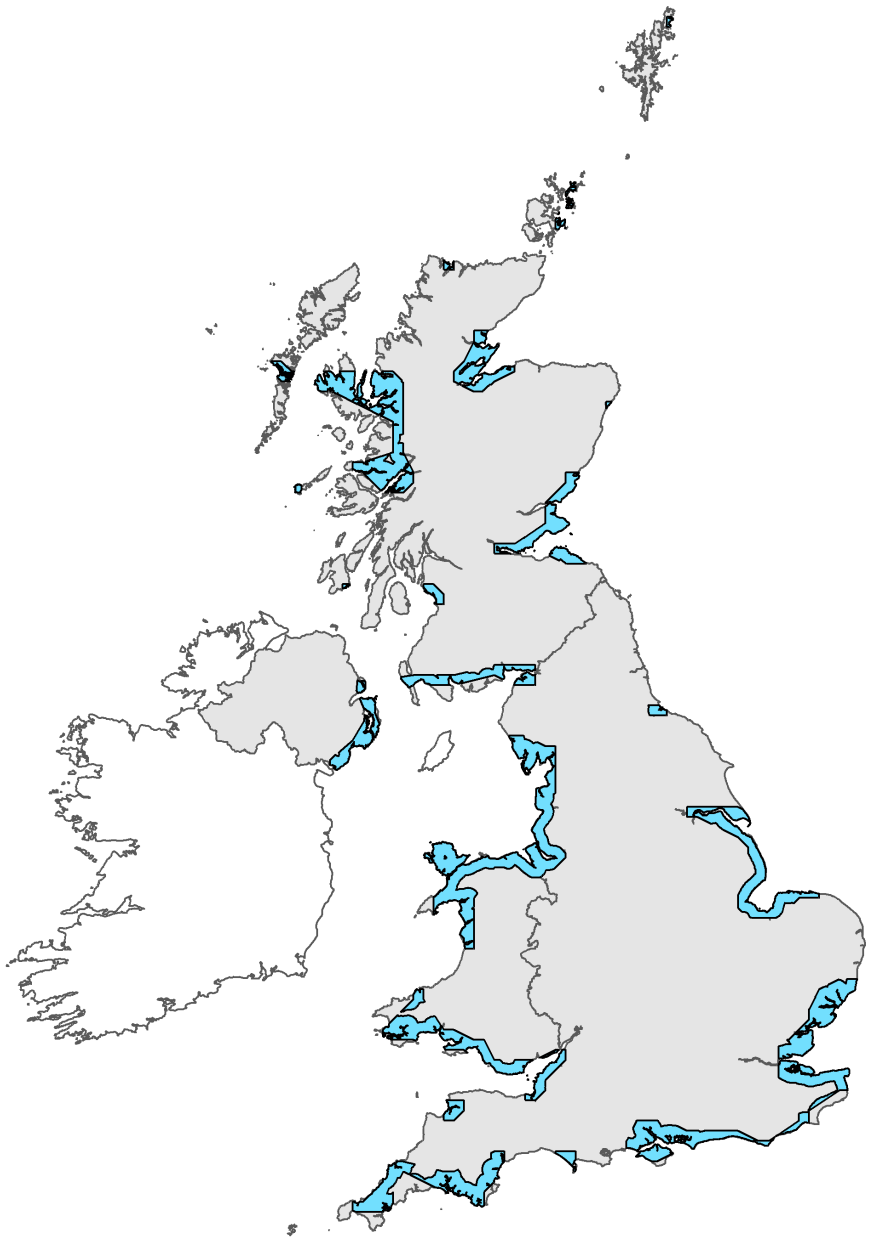

Figure 2: UK range map for H1310 - *Salicornia* and other annuals colonising mud and sand. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority.

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: 1310

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. Detailed processing notes for the 2018 Article 17 extent layer have been produced (Kay & Lewis, 2018). Data Source No 1: Article 17 H1310 Salicornia GIS Layer 2018 (Kay & Lewis, 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 National Vegetation Classification (NVC) survey GIS Layer Detailed National Vegetation Survey (Rodwell (ed.) 2000) infomation exists for the majority of the H1310 feature within SACs in Wales. The Phase II Saltmarsh NVC survey GIS Layer data layer was used where it overlapped with the Phase I Intertidal Biotope Survey (Data sourse no 3) because of the greater level of detail the NVC survey provides. The layer is compiled of a numer of phase II surveys covering the largest saltmarsh sites across Wales- the vast majority of these sites are protected for saltmarsh features. The Phase II survey was based the UK's National Vegetation Classification (NVC) (Rodwell 2000). The NVC communities and mapping categories included within the Article 17 layer were: SM8, proto SM8 and SM9. The Phase II surveys were carried out between 1996 and 2003, targeting saltmarsh vegetation, those which recorded the presence of Salicornia and other annuals colonising mud and sand include: Dargie, (1998, 2001) and 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 comprehensive intertidal biotope survey of the Welsh coast. This element of the Article 17 layer covered much of the Salicornia habitat outside of protected sites. Data Source No.4 Digital Layer: NRW 2013/2014 aerial photograph layer. Some deletions to the 2018 extent layer were made based on the NRW 2013/2014 aerial photograph layer where there were a few obvious losses to the habitat to development. These datasets are reletively old and natural changes due to the dynamic nature of the saltmarsh habitat and potentially anthropogenically induced changes will have occured since their production.

Habitat code: 1310 Region code: ATL

Field label	Note
4.3 Short term trend; Direction	See 4.11
4.11 Change and reason for change in surface area of range	There is no evidence to indicate a genuine change in 10 km square distribution or range of H1310 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	The area estimate of 209.3 ha is derived primarily from NVC surveys of the major Welsh salt marshes and CCWs phase I survey of intertidal biotopes (see section 2.3). 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). However, these datasets are reletively old and natural changes due to the dynamic nature of the saltmarsh habitat and potentially anthropogenically induced changes will have occured since their production.

5.6 Short term trend; Direction	Natural patterns of erosion and accretion means that net losses and gains in extent of the H1310 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 saltmarsh) is predicted to be lost from the SACs within or partially within Wales. 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). To date one scheme at Cwm Ivy has been implemented under the NHCP in partnership with the National Trust with the aim of creating c39ha of intertidal habitat but further NHCP realignment projects are at the planning stage. In addition, a 3.5ha realignment site within the Mawddach Estuary has also been established to provide mitigation for flood defence works. Significant areas of both sites are currently dominated by Salicornia spp. but in the longer term the saltmarsh habitat within these sites is expected to develop primarily into Atlantic salt meadow. The recent/short-term trend in habitat extent is uncertain and will to depend on the extent to which likely gains due to the infilling of estuaries are offset by losses resulting from sealevel rise. SAC monitoring confirmed the continued presence of this feature within 2 SACs however, a full assessment of extent was not carried out. *This figure has been arrived at from the predicted losses set out in the Annexes for the fourSMPs which 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 border site) in the first epoch.
5.10 Long term trend; Direction	See section 5.6 above. In addition to the predicted changes in salt marsh extent set out in section 5.6 there have been additional losses to development within the timescale of the long-term trend. For example, marina developments such as at Conwy. Conversely on the Dee at Talacre Salicornia and other annuals colonising mud and sand has become established where vehicles have been excluded from an area previously used for parking on the beach. Spartina anglica was identified as a pressure in the 2013 H1310 Article 17 Report (Rhind 2013). Spartina anglica now appears to be declining in some parts of Wales where it was previously rapidly increasing, although this has not necessarily benefited H1310. Spartina anglica dominated vegetation declined on the Dee and Clwyd estuaries by 90% between 1987 and 2000 however, within the same time period the Salicornia dominated vegetation declined by almost 60% (Dargie 2000). A Natural England Report on the Management of Spartina anglica within Natura 2000 sites (2016) concluded that a review of literature had failed to provide unequivocal evidence that this species had either a negative or a positive effect of saltmarsh vegetation including Salicornia, although further research and academic review was recommended.
6.2 Condition of habitat; Method used	Minor differences in the mapped habitat extent between 2007 and 2018, have occurred primarily due to the removal of areas lost to development (1.2ha). However, these changes are likely to be trivial in comparison to other, unmapped, fluxes in habitat extent elsewhere and are not large enough to change the overall area figure after rounding.
6.5 Short term trend of habitat area in good condition; Method used	SAC monitoring results, based on vegetation quality record 49% of the as favourable. However, the H1310 habitat is subject to ongoing pressures such as historical land claim and estuary modification, poor water quality and the pressures of climate change (discussed in Section 7).

7.3 Additional information

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. 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. 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 led to considerable losses in saltmarsh extent and altered the structure and function of the vast majority of the estuaries and sheltered bays in Wales, structures such as the cobs on the Glaslyn and on the Cefni have cut off large areas from tidal inundation. H1310 is still responding to these modifications. Flood defences for land claim have the potential to cause coastal squeeze with sea level rise resulting in loss. Sea defences and rock armouring have contributed to declines in sediment supplies (Jones et al., 2011) which could affect the conditions required for this pioneer habitat to develop. The LIFE data lists issues relating to coastal flood defence and erosion control (squeeze) and natural processes and sediment supply within all of the four SACs supporting this feature. 73 actions were listed relating to current issues for coastal squeeze and natural coastal processes and sediment supply across 23 units, 27 of these were under control and 39 were 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) J02: Mixed source marine water pollution (marine and coastal) E02: Shipping lanes and ferry lanes transport operations Life data identifies marine pollution as a pressure on three of the four SACs supporting this feature in Wales. 72 actions have been identified relating to pollution, diffuse, point source and the dumping of waste, sludge and leachates across 31 units, 12 are complete and 9 are under control. Eutrophication of coastal waters caused by Dissolved Inorganic Nitrogen (DIN) and Phosphorous causes enrichment of saltmarshes. This increases in primary production and can lead to overgrowth of macro-algae (Packham and Willis 2007). However, saltmarsh is generally associated with quite high levels of Nitrogen (Boorman & Hazeldean 2012). There are a number of transitional waterbodies where the H1310 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 this feature: Burry Inlet Inner and Outer and Three Rivers Estuary within the Carmarthen Bay and Estuaries SAC, Cefni within the Glannau Mon, Cors Heli SAC and the Artro within the Pen Llyn a'r Sarnau SAC and the Dee. Chemical pollution. Pioneer saltmarsh has been assessed as having a 'Intermediate Intolerance' for heavy metal contamination (Low confidence) and a 'High 'Intolerance' for synthetic compounds (Low Confidence) (MarLIN websites). Intolerance of pioneer saltmarsh vegetation to hydrocarbon contamination is listed as High (Moderate Confidence); oil pollution can affect saltmarsh community structure, fauna and environmental conditions (Packham and Willis 2007 pp. 253). There are several transitional and coastal

waterbodies where H1310 is present which have exceeded WFD targets for pollutants such as Mercury, Tributyltin (associated with vessel antifouling), zinc (associated with mining and contaminated land) and brominated diphenyl ether (flame retardant). These include the Dee, Mawddach, Leri and Dyfi. 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. 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 Dee Estuary SACs (LIFE Data) and as a risk within Pen a'r Llyn Sarnau SAC. Although highlighted as an issue 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 LIFE data identifies issues relating to access and recreation are recorded for the Dee Estuary SAC and the Pen Llyn a'r Sarnau SAC. Access and recreation is listed as a risk within the Carmarthen Bay and Estuaries SAC. There are 8 Actions listed in the Actions Database against Access and Recreation. These relate primarily to use of vehicles. None of these actions are listed as under control. I04: Problematic native species In Wales concern relating to Spartina anglica has declined; the rate of Spartina spread has decreased considerably and is generally known only to be occurring at a low level on sites where estuaries are in filling such as the Cefni estuary. Dargie (2001) estimates a decline of 90% cover of Spartina dominated communities between 1983 and 2000 on the Dee and the Clwyd estuaries. However, Spartina anglica could still be taking up the niche where Salicornia may previously have colonised and without more evidence this species cannot be completely dismissed as a pressure. E03: Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) Two actions listed against this issue within the Dee Estuary SAC in the Actions data base. Dredging has the potential to cause restrictions in the sediment supply and disturbance to natural processes. Within the Dee Estuary SAC this activity is tightly controlled and has been through HRA assessments which ensure that dredging is carried out at a level which does not cause pressure on the SAC features. This activity has been assessed as a threat only. I02: Other invasive alien species (other than species of Union concern) 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. Threats: D01: Wind, wave and tidal power, including infrastructure Options for tidal lagoon power developments which could affect H1310 are being explored. Such developments are likely to alter the tidal range both inside and potentially outside the lagoons leading to losses in extent and damage to the structure and function of this feature. Loss of extent under the footprint of the development is also a risk. 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 2017). Saltmarsh is not only subject to potential temperature increases but to sea level rise and potential increase in storminess. Coastal squeeze due to costal defences is discussed with pressures A33 and F8 above, however, loss of H1310 could occur due to coastal squeeze to natural features such as cliffs or steeper land rise. With coastal squeeze this habitat could become more fragmented leading to declines in quality. In addition, increased wave power could result in accelerated erosion of marshes and hinder seedling establishment G09: Harvesting or collecting of other wild plants and animals (excluding hunting and leisure fishing) Unregulated collection of Salicornia spp. is a risk which has been identified and the scale of which needs to be assessed.

8.5 List of main conservation measures	Conservation measures within the SACs were assessed using the Actions Database, an internal NRW database. CJ03: Restore habitats impacted by multi-purpose hydrological changes 73 actions were listed relating to current issues for coastal squeeze and natural coastal processes and sediment supply across 23 units, 27 of these were under control and 39 were complete. The National Habitats Creation Programme (NHCP) 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 NRW. Saltmarsh is the most likely habitat to develop within re-alignment schemes. To date one scheme at Cwm Ivy has been implemented under the NHCP in partnership with the National Trust with the aim of creating c39ha of intertidal habitat and further NHCP realignment projects are at the planning stage. In addition, a 3.5ha realignment site within the Mawddach Estuary has also been established to provide mitigation for flood defence works. Significant areas of both sites are currently dominated by Salicornia spp. but in the longer term the saltmarsh habitat within these sites is expected to develop primarily into Atlantic salt meadow. The Pen Llyn a'r Sarnau SAC has an objective to restore the 'Estuaries' feature (of which Salicornia and other annuals colonising mud and sand is 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 H1310. However, there are many barriers to achieving restoration on such as scale. The Shoreline Management Plans 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-border catchments) is also contributing to improvements (NRW 2015). CN02: Implement climate change adaptation measures Implementation of climate change adaptation measures including the shoreline management plans, further managed realignment schemes need to be progressed. CF03: Reduce impact of outdoor sports, leisure and recreational There are 8 Actions listed in the Actions Database related to Access and Recreation. These relate primarily to use of vehicles. None of these actions are listed as under control. However, significant improvement is known from the reduction of car parking on the beach at Talacre which is listed as an action which is 'underway'. CG02: Management of hunting , recreational fishing and recreational or commercial harvesting or collection of plants Investigations into the scale and current and potential impacts of unregulated Salicornia collection are ongoing. CI03: Management, control or eradication of other invasive alien species Any increase in the expansion of the non-native red marine seaweed Gracilaria vermiculophylla needs to be monitored and the scale of the threat assessed. CC02: Adapt/manage exploitation of energy resources Energy projects are regulated through planning legislation. 97% of this feature is currently within SACs therefore majority of developments which could potentially affect this feature such as tidal lagoons would require a Habitats Directive Assessment.

9.1 Future prospects of parameters	9.1c. 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. Therefore, the 'natural' processes upon which this feature depends are compromised. The clear majority of these changes were made prior to the designation of protected sites however, estuaries and shorelines continue to respond to them. The Pen Llyn a'r Sarnau SAC has an objective to restore the 'Estuaries' feature of which H1310 is a component intertidal habitat however, there are many barriers to achieving restoration on such as scale. Although 97% of this feature 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 this habitat is dependant on transitional water bodies which are failing WFD targets relating to chemical pollution and DIN. Therefore, pressures such as pollution and coastal defences continue to affect the typical species and other aspects of structure and function of the Salicornia and other annuals colonising mud and sand.
9.1 Future prospects of parameters	9.1a. The future prospects for range are considered to be negative due to the risk of losing this habitat from a small number of grid squares where the area of H1310 is minimal.
9.1 Future prospects of parameters	9.1b. The main threat to H1310 is sea level rise. The losses of intertidal habitat predicted by the Shoreline Management Plans (SMPs) due to coastal squeeze could include a significant proportion of this habitat. 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 SMPs 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 SMPs 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.
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.
11.3 Surface area of the habitat type inside the network; Method used	(See section 2.3)

11.4 Short term trend of habitat area in good condition within the network; Direction	Salicornia and other annuals has only been assessed once during the last two reporting rounds. Therefore, the trend is 'uncertain'.