Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A

2019-2024

Conservation status assessment for the habitat:

H1140 - Mudflats and sandflats not covered by seawater at low tide

Wales

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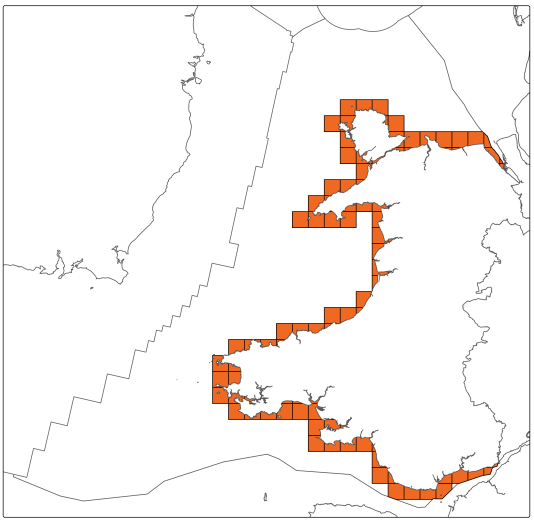
Important note - Please read

- The information in this document represents Wales Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A, for the period 2019-2024.
- It is based on supporting information provided by Natural Resources Wales, which is documented separately.
- The Habitats Regulations reporting 2019-2024 Approach Document provides details on how this supporting information contributed to the UK Report and the fields that were completed for each parameter.
- Maps showing the distribution and range of the habitat are included.
- Explanatory notes (where provided) are included at the end. These provide additional audit trail information to that included within the assessments. Further underpinning explanatory notes are available in the related country reports.
- 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 not relevant to this habitat (section 11 National Site Network coverage for Annex I habitats).

Further details on the approach to the Habitats Regulations Reporting 2019-2024 are available on the JNCC website.

Assessment Summary: Mudflats and sandflats not covered by seawater at low tide

Distribution Map



Range Map

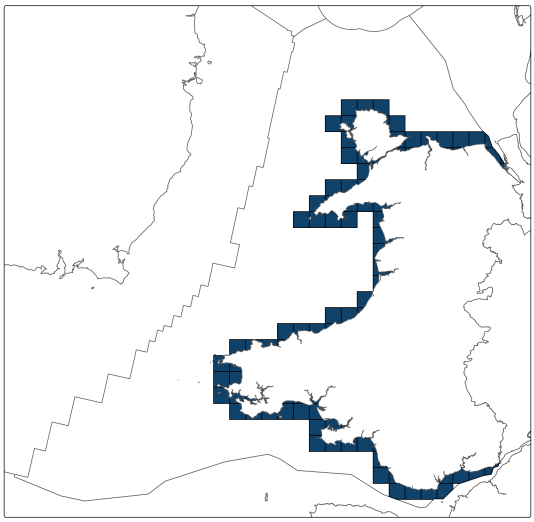


Figure 1: Wales distribution and range map for H1140 - Mudflats and sandflats not covered by seawater at low tide. Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil 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.

The range of mudflats and sandflats is determined by physical and geological processes and was not related to the biological communities or processes supported by them. Therefore, the mapped range was considered equivalent to the surface area (distribution) of the habitat.

Table 1: Table summarising the conservation status for H1140 - Mudflats and sandflats not covered by seawater at low tide. Overall conservation status for habitat is based on assessments of range, area covered by habitat, structure and functions, and future prospects.

Overall Conservation Status (see section 10)

Unfavourable-bad (U2)

Breakdown of Overall Conservation Status

Range (see section 4)	**Favourable (FV)**
Area covered by habitat (see section 5)	**Unfavourable-inadequate (U1)**
Structure and functions (see section 6)	**Unfavourable-bad (U2)**
Future prospects (see section 9)	**Unfavourable-bad (U2)**

List of Sections

National Level

1. General information

1.1 Country	Wales
1.2 Habitat code	H1140 - Mudflats and sandflats not covered by seawater at low tide

2. Maps

2.1 Year or period	1996-2010
2.2 Distribution map	Yes
2.3 Distribution map; Method used	Complete survey or a statistically robust estimate

2.4 Additional information

No additional information

Biogeographical Level

3. Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs	MATL

3.2 Sources of information

See section 13 References

4. Range

4.1 Surface area (km²)	415.99
4.2 Short-term trend; Period	2010-2024
4.3 Short-term trend; Direction	Stable
4.4 Short-term trend; Magnitude	

a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
4.5 Short-term trend; Method used	Based mainly on extrapolation from a limited amount of data
4.6 Long-term trend; Period	1996-2024
4.7 Long-term trend; Direction	Stable
4.8 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Rate of decrease	
4.9 Long-term trend; Method used	Based mainly on extrapolation from a limited amount of data

4.10 Favourable Reference Range (FRR)

a) Area (km²)	
b) Pre-defined increment	Current range is less than 2% smaller than the FRR
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

4.11 Change and reason for change in surface area of range

a) Change	No
b) Genuine change	

c) Improved knowledge or more accurate data	
d) Different method	
e) No information	
f) Other reason	
g) Main reason	

4.12 Additional information

No additional information

5. Area covered by habitat

5.1 Year or period	2010-2024
5.2 Surface area (km²)	
a) Minimum	419.12
b) Maximum	419.12
c) Best single value	420
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	2018-2024
5.6 Short-term trend; Direction	Decreasing
5.7 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	Decreasing 0 - 12%
d) Unknown	No
e) Type of estimate	Best estimate
f) Rate of decrease	Decreasing <=1% (one percent or less) per year on average
5.8 Short-term trend; Method used	Based mainly on extrapolation from a limited amount of data

5.9 Long-term trend; Period	1994-2018
5.10 Long-term trend; Direction	Decreasing
5.11 Long-term trend; Magnitude	
a) Minimum	0.1
b) Maximum	6.2
c) Confidence interval	
d) Rate of decrease	Decreasing <=1% (one percent or less) per year on average
5.12 Long-term trend; Method used	Based mainly on extrapolation from a limited amount of data
5.13 Favourable Reference Area (FRA)	
a) Area (km²)	
b) Pre-defined increment	Current area is less than 2% smaller than the FRA
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

5.14 Change and reason for change in surface area of range

a) Change	Yes
b) Genuine change	Yes
c) Improved knowledge or more accurate data	No
d) Different method	No
e) No information	No
f) Other reason	No
g) Main reason	Genuine change

5.15 Additional information

No additional information

6. Structure and functions

6.1 Condition of habitat (km²)

Area in good condition	
ai) Minimum	134.125
aii) Maximum	134.125
Area not in good condition	
bi) Minimum	280.397
bii) Maximum	280.397
Area where condition is unknown	
ci) Minimum	4.587
cii) Maximum	4.587
6.2 Condition of habitat; Method used	Based mainly on expert opinion with very limited data
6.3 Short-term trend of habitat area in good condition; Period	2013-2024
6.4 Short-term trend of habitat area in good condition; Direction	Stable
6.5 Short-term trend of habitat area in good condition; Method used	Based mainly on expert opinion with very limited data

6.6 Typical species

Has the list of typical species changed in comparison to the previous reporting period?	No
6.7 Typical species; Method used	

6.8 Additional information

Typical species were not used directly in the assessment of conservation status for habitat structure and function as a comprehensive list of typical species for each habitat

was not available. However, the status of typical species was considered when the condition of individual sites was assessed using Common Standards Monitoring Guidance. Common Standards Monitoring (CSM) data was used to assess the area of habitat in 'good' and 'not good' condition (field 6.1). Species were a component of the attributes assessed under CSM. Therefore, an assessment of species is considered to have formed part of the reporting under field 6.1 which supported the Habitats Structure and Function assessment (field 10.3).

7. Main pressures

7.1 Characterisation of pressures

Table 2: Pressures affecting the habitat, including timing and importance/impact ranking. Pressures are defined as factors acting currently and/or during the reporting period (2019–2024). Rankings are: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Pressure	Timing	Ranking
PA17: Agricultural activities generating pollution to surface or ground waters (including marine)	Ongoing and likely to be in the future	Medium (M)
PJ01: Temperature changes and extremes due to climate change	Only in future	Medium (M)
PJ06: Wave exposure changes due to climate change	Only in future	Medium (M)
PJ10: Change of habitat location, size, and / or quality due to climate change	Only in future	Medium (M)
PJ11: Desynchronisation of biological / ecological processes due to climate change	Only in future	Medium (M)
PJ12: Decline or extinction of related species (e.g. food source / prey, predator / parasite, symbiote, etc.) due to climate change	Only in future	Medium (M)
PD05: Development and operation of energy production plants (including infrastructure)	Ongoing and likely to be in the future	Medium (M)
PF10: Residential, commercial and industrial activities and structures generating marine pollution	Ongoing and likely to be in the future	High (H)
PF15: Modification of coastline, estuary and coastal conditions for built-up areas	Ongoing and likely to be in the future	High (H)

PG01: Marine fish and shellfish harvesting causing reduction of species/prey populations and disturbance of species (professional)	Ongoing and likely to be in the future	Medium (M)
PG03: Marine fish and shellfish harvesting activities causing physical loss and disturbance of seafloor habitats	Ongoing and likely to be in the future	Medium (M)
PH08: Other human intrusions and disturbance not mentioned above	Ongoing and likely to be in the future	Medium (M)
PI02: Other invasive alien species (other than species of Union concern)	Ongoing and likely to be in the future	Medium (M)
PJ04: Sea-level rise due to climate change	Only in future	Medium (M)
PK02: Mixed source marine water pollution (marine and coastal)	Ongoing and likely to be in the future	High (H)

7.2 Sources of information

See section 13 References

7.3 Additional information

No 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, surface area or structure and functions of the habitat type
8.3 Location of the measures taken	Both inside and outside National Site Network
8.4 Response to measures	Medium-term results (within the next two reporting periods, 2025–2036)

8.5 List of main conservation measures

Table 3: Key conservation measures addressing current pressures and/or anticipated threats during the next two reporting periods (2025–2036). Measures are ranked by importance/impact: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Conservation measure	Ranking
MC03: Adapt/manage renewable energy installation, facilities and operation (excl. hydropower and abstraction activities)	Medium (M)
MF02: Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructure, operations and activities	High (H)
MF03: Reduce impact of outdoor sports, leisure and recreational activities (incl. restoration of habitats)	Medium (M)
MF06: Reduce/eliminate marine pollution from industrial, commercial, residential and recreational areas and activities (incl. contamination with litter)	High (H)
MF08: Manage changes in hydrological and coastal systems and regimes for construction and development (incl. restoration of habitats).	High (H)
MG01: Management of professional/commercial fishing, shellfish and seaweed harvesting (incl. restoration of habitats)	Medium (M)
MI03: Management, control or eradication of other invasive alien species	Medium (M)
MK01: Reduce impact of mixed source pollution	High (H)

8.6 Additional information

No additional information

9. Future prospects

9.1a Future trends of parameters

ai) Range	Overall stable
bi) Area	Negative - decreasing <=1% (one percent or less) per year on average
ci) Structure and functions	Negative - slight/moderate deterioration

9.1b Future prospects of parameters

aii) Range	Good
bii) Area	Poor
cii) Structure and functions	Bad

9.2 Additional information

No additional information

10. Conclusions

10.1 Range	Favourable (FV)
10.2 Area	Unfavourable-inadequate (U1)
10.3 Specific structure and functions (incl. typical species)	Unfavourable-bad (U2)
10.4 Future prospects	Unfavourable-bad (U2)
10.5 Overall assessment of Conservation Status	Unfavourable-bad (U2)
10.6 Overall trend in Conservation Status	Deteriorating

10.7 Change and reason for change in conservation status

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

10.7 Change and reason for change in conservation status trend

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

10.8 Additional information

No additional information

11. UK National Site Network (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network (km^2)

a) Minimum	
b) Maximum	
c) Best single value	353.005
11.2 Type of estimate	Best estimate
11.3 Habitat area inside the network; Method used	Based mainly on extrapolation from a limited amount of data
11.4 Short-term trend of habitat area within the network; Direction	Stable
11.5 Short-term trend of habitat area within the network; Method used	Based mainly on extrapolation from a limited amount of data
11.6 Short-term trend of habitat area in good condition within the network; Direction	Stable
11.7 Short-term trend of habitat area in good condition within the network; Method used	Based mainly on expert opinion with very limited data

11.8 Additional information

No additional information

12. Complementary information

12.1 Justification of percentage thresholds for trends

No justification information

12.2 Other relevant information

No other relevant information

13. References

Biogeographical and marine regions

3.2 Sources of information

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Main pressures

7.2 Sources of information

No sources of information

14. Explanatory Notes

Field label	Note
2.1: Year or period	The range map for mudflats and sandflats is based on NRW's Intertidal Phase I survey (1996 – 2005) (Wyn et al., 2006) and an update in 2010 for a section of coast in Tremadoc Bay (Egerton et al., 2010). The survey covered all of Welsh shores, and whilst the data was gathered over several years and small localised changes are bound to have occurred, the data set provides a comprehensive broadscale map of sand and mudflat distribution and extent across Wales. Confidence in the mapped values is good, though it should be recognised that localised natural habitat changes and the height of the tide on the day a shore was visited will affect the accuracy of the value. The feature maps are over 20 years old. Areas of intertidal mudflat and sandflat that are known to have changed, through casework and the review of aerial photography have been updated within this reporting round.
4.2: Short-term trend; Period	The range map for mudflats and sandflats is based on NRW's Intertidal Phase I survey (1996 – 2005) (Wyn et al., 2006) and an update in 2010 for a section of coast in Tremadoc Bay (Egerton et al., 2010). The survey covered all of Welsh shores, and whilst the data was gathered over several years and small localised changes are bound to have occurred, the data set provides a comprehensive broadscale map of sand and mudflat distribution and extent across Wales. Confidence in the mapped values is good, though it should be recognised that localised natural habitat changes and the height of the tide on the day a shore was visited will affect the accuracy of the value. The feature maps are over 20 years old. Areas of intertidal mudflat and sandflat that are known to have changed, through casework and the review of aerial photography have been updated within this reporting round.

4.3: Short-term trend; Direction	The feature maps are over 20 years old. Areas of intertidal mudflat and sandflat that are known to have changed, through casework and the review of aerial photography have been updated within this reporting round.
4.4: Short-term trend; Magnitude	Assessment of trends has included consideration of any recorded anthropogenic changes in habitat extent and range from casework (e.g. new intertidal land claim and losses through dredging). There have been some known reductions in extent. Whilst these may be significant at a local scale, their effect on the overall range of the habitat across Wales is relatively small. There are losses and gains adjacent to saltmarsh, but these are likely to be in dynamic equilibrium.
4.6: Long-term trend; Period	The range map for mudflats and sandflats is based on NRW's Intertidal Phase I survey (1996 – 2005) (Wyn et al., 2006) and an update in 2010 for a section of coast in Tremadoc Bay (Egerton et al., 2010). The survey covered all of Welsh shores, and whilst the data was gathered over several years and small localised changes are bound to have occurred, the data set provides a comprehensive broadscale map of sand and mudflat distribution and extent across Wales. Confidence in the mapped values is good, though it should be recognised that localised natural habitat changes and the height of the tide on the day a shore was visited will affect the accuracy of the value. The feature maps are over 20 years old. Areas of intertidal mudflat and sandflat that are known to have changed, through casework and the review of aerial photography have been updated within this reporting round.
4.8: Long-term trend; Magnitude	Assessment of trends has included consideration of any recorded anthropogenic changes in habitat extent and range from casework There have been some known reductions in extent. Knowledge of these is primarily limited to the SAC suite.

	Whilst these may be significant at a local scale, their effect on the overall range of the habitat across Wales is relatively small.
5.1: Year or period	The feature maps are over 20 years old. Areas of intertidal mudflat and sandflat that are known to have changed, through casework and the review of aerial photography have been updated within this reporting round.
5.2: Surface area	Best single value = 420 km2 (Data from JNCC) NRW derived value = 419.12 Km2 min = 419.12 max = 420 The area map for mudflats and sandflats is based on NRW's Intertidal Phase I survey (1996 – 2005) (Wyn et al., 2006) and an update in 2010 for a section of coast in Tremadoc Bay (Egerton et al., 2010). The survey covered all of Welsh shores, and whilst the data were gathered over several years and small localised changes are bound to have occurred, the data set provides a comprehensive broadscale map of sand and mudflat distribution and extent across Wales. Confidence in the mapped values is good, though it should be recognised that localised natural habitat changes and the height of the tide on the day a shore was visited will affect the accuracy of the value. The feature maps are over 20 years old. Areas of intertidal mudflat and sandflat that are known to have changed, through casework and the review of aerial photography have been updated within this reporting round. Full extent of the feature as derived from JNCC version of feature maps. NRW feature maps state additional 19.4 km2 which are accounted for through GIS processing and changes in saltmarsh and dune extents. This covers any gains and losses that are referred to elsewhere in this

	document. The value includes definite and probable intertidal sandflats and mudflats, but does not account for changes in dynamic systems, where sediment levels have fluctuated. These are assumed to be in dynamic equilibrium, such that, whilst the location of the feature may change, there remains the same extent of the resource. Casework records have been considered, in order to understand changes in area covered by mudflat and sandflats. Casework records are within the last 6 years, or ongoing that influence the cover in the last 6 years. Losses resulted from: • Developments, including coastal defences, outside of N2K sites, and not requiring a HRA. • Construction of sea defences. • Illegal placement of structures in the intertidal. • Changes to saltmarsh or sand dune, where it is part of a dynamic coastline, considered to be in equilibrium and where coastal habitats are trending in one direction.
5.6: Short-term trend; Direction	Additional coastal defence works at Colwyn Bay and Y Rhyl Actual values (above) do not reflect decreasing area, but known losses along the coast (amounting to 0.01%) are known and recorded.
5.9: Long-term trend; Period	The range map for mudflats and sandflats is based on NRW's Intertidal Phase I survey (1996 – 2005) (Wyn et al., 2006) and an update in 2010 for a section of coast in Tremadoc Bay (Egerton et al., 2010). The survey covered all of Welsh shores, and whilst the data was gathered over several years and small localised changes are bound to have occurred, the data set provides a comprehensive broadscale map of sand and mudflat distribution and extent across Wales. Confidence in the mapped values is good,

	though it should be recognised that localised natural habitat changes and the height of the tide on the day a shore was visited will affect the accuracy of the value. The feature maps are over 20 years old. Areas of intertidal mudflat and sandflat that are known to have changed, through casework and the review of aerial photography have been updated within this reporting round.
5.10: Long-term trend; Direction	Assessment of trends has included consideration of any recorded anthropogenic changes in habitat extent and range as a result of anthropogenic activities and casework
5.11: Long-term trend; Magnitude	There are gains and losses due to fluctuations in saltmarsh and sand dune extent, some of which will be to maintain the natural dynamic equilibrium and some as a result of interventions in the tidal prism of the estuary, resulting in shifting habitat distributions. It is not possible to fully assign cause and effect of these changes. There is also a small amount of loss due to construction of promenades, quay sides and car parks, resulting in permanent loss of the feature.
5.14: Change and reason for change in surface area	Causes of losses to area extent • Conwy Quay – loss of habitat • Pt of Ayre converted to saltmarsh • Borth coastal defence – loss of habitat • Baglna Bay coastal defence – loss of habitat • Swansea University campus sea defences – loss of habitat • Margam Coast defences – loss of habitat • Aberavon sea defence – loss of habitat
6.1: Condition of habitat	The 2024 intermediate Cycle 3 WFD assessment has created differences across the waterbodies. The means of

analysis has resulted in more areas previously considered as Unknown, as now being recorded 'Good' or 'Not Good'. These are areas of feature that are on the periphery of the waterbody boundaries, where the poor waterbody boundary does not encapsulate the full transitional or coastal area of habitat.

The area in good/not good/unknown condition of structure and function was assessed using collated available evidence. Evidence used included data from intersecting WFD waterbody classification. Where an intersecting waterbody status, for anything other than water quality contaminants, was less than 'good' the structure and function of this feature were assessed as 'Unfavourable' e.g. WFD waterbodies that fail for DIN or OppMac are unfavourable, since a fail for a determinand under WFD is deemed to be of ecological significance. Manuel Nicolaus & Barry (2015) completed a survey in 2014, including Tenby, which showed imposex to be below the OSPAR Ecotoxicological Assessment Criterion (EAC) (The level of imposex in the more sensitive gastropod species (~30–~100 % of the females have imposex) indicates exposure to TBT) concentrations below the EAC derived by OSPAR for TBT, e.g. adverse effects in the more sensitive taxa of the ecosystem caused by long-term exposure to TBT are predicted to be unlikely to occur.)

The recent condition assessments (Jackson-Bué et al. 2025) have the water quality contaminants as a secondary indicator, meaning that they would not fail an area of feature if that was the only failure. In the GIS, it is possible to describe the areas of failure at a higher resolution than has been the case in the Condition Assessments, such that, where a whole SAC may fail in the Condition Assessment, the spatial distribution of the failure can be presented as more specific areas within the SAC. Values are based on the finer level of resolution that is possible using the GIS.

Waterbody boundaries do not reflect coastal processes, sediment cells or hydrography. For this reason, the WFD results from a particular sampling location may not be appropriate for the feature in the rest of the waterbody. There has not been the opportunity to verify that a WFD sampling location is appropriate to use for the feature across the spatial extent of the waterbody. For example, extensive tracts of north cardigan Bay are 'not good' due to mercury levels, but no evaluation has been done to the appropriateness of this outcome, since the sampling location is likely to be a long way from some parts of the feature. Low confidence should be associated with applying WFD results to feature condition.

Some locations such as the Dee estuary have a moderate DIN under WFD, deemed detrimental to this feature.

IS&F is deemed to be below ‚Good' where:

- There are coastal developments/structures that have the potential to cause habitat loss through coastal squeeze, and/or cause an increase in wave energy and erosion through reflection of waves from structures;

- disturbance from bait digging or boat moorings;

- dredging or dumping sites;

- loss other than natural fluctuations;

- WFD failure for DIN, saltmarsh, seagrass, phytoplankton, opportunistic macroalgae, hydrological issues.

Extensive Condition Assessments have been carried out for marine SACs in 2024/25, which provide additional evidence of changes (Jackson-Bué et al. 2025).

A number of locations are unfavourable due to high levels of Dissolved Inorganic Nitrogen, derived from the

catchment. This includes the Dee estuary, Holyhead and Cymyran Sound, Braint estuary, Pwllheli estuary (Afon Erch), Ystwyth estuary, Teifi estuary, all estuaries in Pembrokeshire and Carmarthenshire, the open coast from Oxwich Point to Lavernock Point (Bristol channel) and the Wye estuary. Two of these also have high levels of Opportunistic macroalgae.

The IQI is an indication of either physical or nutritional disturbance in the sediments. The IQI condition indicator failed in Conwy Bay, west Anglesey and the Severn estuary. These are all based on grab sampling inshore, so there is a risk that the outcome of this measure is not applicable to this feature in the intertidal zone. West Anglesey IQI investigation demonstrated that the outcome was not reliable, and so has been put as 'Unknown' in this report (Moore 2023).

The WFD seagrass tool produced a fail for the Outer Loughor estuary (Burry Inlet), based on a reduction in extent and density of seagrass.

Bromo diphenyl ethane (BDPE also known as PBDEs), a flame retardant (a forever chemical), was recorded in the Dee, Conwy, Mawddach, Daugleddau estuaries, and on the open coast in east Anglesey, north and mid Cardigan Bay, inner Milford Haven inlets, Carmarthen Bay, Swansea Bay and from St Donut's to Lavernock Point. Along with water quality contaminants (others that failed are Zinc (Ystwyth, Ogmore), Mercury (Dee, Conwy, east Anglesey, Y Foryd), Polycyclic Aromatic Hydrocarbons (PAH) (Dee and Inner Milford Haven), these did not place the feature as Unfavourable, unless they were additional to another condition indicator failure.

An activity may pass a Habitats Regulations Assessment (HRA), based on there being no adverse effect on site integrity arising from the proposal or plan. However, there are circumstances where the plan is adjusted or the HRA

	has failed to identify impacts. It is possible that there are negative effects due to incomplete (anticipated) recovery from disturbances identified in the HRA. Where the HRA has not fully protected the features of a SAC, then further action is being undertaken to rectify this, which will result in future reporting being more favourable. Levels of litter have not been used in the assessment condition, since there is currently no evidence to suggest that it is affecting the condition of the feature. Omissions from assessment - No data have been drawn from: - Cockle surveys in Dee or Burry Inlet - Fishing activities on the feature - Intertidal litter - Monitoring information associated with marine licences and HRA in SACs. - In some locations, there may be changes in sediment levels and therefore the extent of intertidal sediments, that are natural and not near areas of active coastal defence construction. This is due to time constraints in preparing this document.
6.4: Short-term trend of habitat area in good condition; Direction	(2013 values: Good = 42.128 Km2, Not Good = 374.53 km2) (2018 values: Good = 62.97 Km2, Not good = 337.90 Km2) 2024 values: Good = 134.134 Km2, Not good = 252.331 Km2 Increase in recorded 'Good' is largely accounted for by

	different methods of mapping condition (including uncertainty on the effects of fishery activities) and changes in the way WFD waterbodies failures for chemical determinands are dealt with.
6.5: Short-term trend of habitat area in good condition; Method used	Followed methods that are utilised in the condition assessments Increase in recorded 'Good' is largely accounted for by different methods of mapping condition (including uncertainty on the effects of fishery activities) and changes in the way WFD waterbodies failures for chemical determinands are dealt with.
7.1: Characterisation of pressures	The levels of Pressure and Threat listed are based on those recorded in the NRW Actions Database for each of the SACs. The frequency of occurrence of each Pressure or Threat across the SACs, the extent of the Pressure or Threat and the severity have been considered to produce a final level for each Pressure or Threat. The full extent of the effect of an activity has been considered, which typically extends beyond the immediate footprint of the activity. Pressures and Threats taken from the Actions Database and translated to the latest EU pressure/threat codes. Some adjustment required to differentiate between codes and to prioritise the pressures and threats. PA17: Agricultural activities generating pollution to surface or ground waters (including marine) Waterbody failures due to diffuse nutrients from agriculture affect some estuaries and bays, particularly Milford Haven Waterway (NRW, 2014), Carmarthen Bay and Y Foryd) (NRW, 2013; Edwards, 2014; Haines & Edwards, 2016). Diffuse pollution is derived primarily from agricultural activities, resulting in raised levels of nutrient (nitrogen and phosphorus) and sediment run off. In Milford Haven Waterway this is resulting in raised levels of suspended silt,

silt deposition and increased plant growth. Raised turbidity and silt deposition is likely to be affecting algae (including maerl) and seagrass, whilst dense and widespread macroalgae overlying sediment flats is having negative consequences for sediment biota and generating eutrophication and smothering impacts when it is washed up on the strandlines, sediment flats, reefs and saltmarsh. There is the possibility that high turbidity and sedimentation has contributed to the dramatic decline in live maerl (over 90% reduction) in the last decade, this is currently being investigated (Bunker & Camplin, 2007; Bunker, 2011; Bunker et al., in prep; Moore & Mercer, in prep).

High levels of nutrients are reported by Jones & Unsworth (2016) at the Zostera marina seagrass bed at Gelliswick.

There is an increasing body of evidence potentially linking episodes of poor shellfish hygiene quality and WFD shellfish protected area guideline failures (E. coli in shellfish flesh) with livestock (primarily sheep) grazing practices on the marsh in the Burry Inlet (primarily Llanrhidian Marsh). Food Standards Agency (FSA) shellfish hygiene monthly data sets correlate with seasonality of sheep grazing patterns, i.e. low grazing levels and E. coli in winter, rising through spring and summer as lambs are growing and declining in autumn as livestock is sent to market. This pattern is counter to expected river flow or rainfall related CSO spill patterns typically observed in the north of the estuary. Peak E. coli measurements are when the marsh floods during spring tide events. Reports of elevated E. coli in shellfish flesh in the Burry South shellfish beds, have occurred in the summer months around spring tides and saltmarsh inundation, that cannot be attributed to any other pollutant sources other than the saltmarsh. An hydrodynamic model study illustrates impacts of wash off from the marsh and its likely impact on shellfish beds in the proximity of North Gower (Burry South shellfish harvesting areas). What is still uncertain is the relative scale of the various sources (diffuse including the marsh and point

sources mostly water company assets) (Environment Agency, 2013; Abu-Baker et al., 2017; Ahmadian et al., 2016).

PC13: Mining and extraction activities not referred to above

Waste water from mines in mid Wales has resulted in sediments in and adjacent to these catchments having raised heavy metals. Estuary sediments particularly hold a legacy of heavy metals which are a threat to water and surface sediment quality, should it be disturbed in the future (including from river spate and changing river channels).

PD01: Wind, wave and tidal power (including infrastructure)

Investment and requests for licensing are on the increase for wind, wave and tidal power installations. Each of these are likely to require infrastructure that may cross intertidal sediment areas.

PD05: Development and operation of energy production plants (including infrastructure).

Extent of effects in intertidal sediments is considered relatively localised. Thermal impacts from the discharged cooling water at Pembroke Power station 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. There is no evidence for effects on mortality and reduced survival of typical species, such as larval and juvenile vertebrates and invertebrates through their impingement and entrainment; biocide or heated water.

PD06: Transmission of electricity and communications (cables)

The UK government's commitment to achieving 50 GW of offshore wind generating capacity by 2030 means this

growth is going to continue at a rapid pace over the next five years at least. This represents a threat to intertidal habitats; which can lead to permanent loss of extent and poor condition within the cable corridor. However, legislation should ensure that there is mitigation measures and compensation habitat where appropriate (NRW, 2025a).

PE02: Shipping lanes and ferry lanes transport operations.

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. Significant amounts of large vessel anchoring and dredging potentially impact intertidal sediments through siltation and turbidity effects. Further work is required to identify links between silt levels and the various shipping activities. Pressure from occasional spills (e.g. Sea Empress) and continued presence and reworking of historic oil. TBT levels are reducing but pressure from use of antifoulants on recreational boats and commercial shipping is still present.

PE03: Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging)

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, coastal defences and

- sea walls and significant jetty and harbour wall constructions.

PF04: Development and maintenance of beach areas for tourism and recreation

Localised development and maintenance of beach areas at resorts in north and south Wales, with much more widespread littering from recreational activities. Some beaches remain open to access by tourist motor vehicles, resulting in compaction and possible changes sediment drainage.

PF05: Sports, tourism and leisure activities.

There are numerous beaches where disturbance, compaction and waste result from unregulated vehicle access for recreational purposes.

PF06: Deposition and treatment of waste/rubbish from built-up areas

There are 265 landfill sites along the Welsh coast that have the potential to release waste directly into the marine environment based on present day flooding and coastal erosion data (Robbins et al. 2023). H1330 (Atlantic Salt Meadow) was assessed as having high sensitivity to chemical contamination and medium sensitivity abrasion / disturbance of the substrate on the surface of the seabed and smothering and siltation, nutrient enrichment and organic enrichment (Robbins et al. 2023).

Concentrations of coastal landfill sites occur around the Dee Estuary, Burry Inlet and the Severn Estuary in Wales with the Dee Estuary and Burry Inlet in particular, supporting a significant proportion of Atlantic Salt Meadow (Robbins et al. 2023).

PF10: Residential, commercial and industrial activities and structures generating marine pollution

Marine macro-pollution (e.g. plastic bags, lost and discarded fishing gear and other anthropogenically derived debris) is often found in depositional areas and on strandlines. There is an increasing trend in marine litter on

Welsh beaches (Nelms et al., 2017; Marine Conservation Society, 2024). (MCS BeachWatch Wales Data 1996-2012.xls), which is directly relevant to intertidal mudflats and sandflats.

In general, the key physical impact of litter is likely to be linked to ingestion of plastic. 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 communities and recommendations of any appropriate management action. Monitoring, reporting and method development under MSFD and OSPAR will help increase knowledge and confidence in the future.

Discharges associated with population centres (sewage) as well as industrial areas. Available nutrient levels, contaminants in sediments and/or poor water quality is present in several locations (e.g. Milford Haven Waterway, Carmarthen Bay, Swansea Bay). Below 'Good' WFD water body assessments tend to reflect this.

Open coast areas are relatively unpolluted, but several estuaries and bays adjacent to large catchments have raised levels of nutrients and contaminants. Nutrients are largely diffuse input from agriculture etc., but also storm water overflow and STW discharges. Contaminant inputs are from diffuse (urban and industrial run off) as well as point source industrial discharges. 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 in an adjacent catchment e.g. Milford Haven

Waterway, Holyhead Harbour. 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. Pollution to groundwater also contributes to diffuse nutrient input (NRW 2014).

There is pressure from chronic input of hydrocarbons in port and recreational harbour areas, especially Milford Haven Waterway, though indications are that hydrocarbon contaminant loads there are decreasing (Little, 2009). Bioaccumulation of contaminants indicates some levels high enough to cause adverse effects to biota (Langston et al., 2011).

PF15: Modification of coastline, estuary and coastal conditions for built-up areas

Recorded small losses or modification of habitat are associated with the creation and maintenance of infrastructure along the coast (e.g. Milford Haven Waterway). There are 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 (carried forward from NRW, 2013/2018). 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) (carried forward from NRW, 2013/2018). 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 (carried forward from NRW, 2013/2018).

Outside of SACs, there is no requirement for a HRA, such that these activities are not effectively regulated. These activities also affect the hydrological flow within the estuary.

PF17: Active abstraction of water for built-up areas

Reduced flows in rivers result in low flow rates in estuaries and potentially higher concentrations of pollutants from water treatment sites.

PG01: Marine fish and shellfish harvesting causing reduction of species/prey populations and disturbance of species (professional)

Commercial cockle fisheries occur on Mudflats and Sandflats. HRAs are completed for these fisheries where they may affect SAC features, but not for other areas. Cockle gathering is managed under The Cockle Fishing Management and Permitting (Specified Area) (Wales) Order 2024 with annual cockle stock assessments informing TACs.

Collection of mussel subject to Minimum Conservation Reference Size (MCRS) and HRA, if undersize and potentially affecting SAC features.

PG02: Marine fish and shellfish harvesting causing reduction of species/prey populations and disturbance of species (recreational)

Bait collection and crab shelters are present, often in sensitive sheltered and tide-swept habitats.

Bait digging is locally intensive. Voluntary management measures were implemented at the Gann but were not successful, but recent reports show a reduction in activity levels. Further research to clarify the impact and consider the management options available has been carried out. Sensitive habitats such as seagrass at Angle Bay and muddy gravels at Gann Flats are being impacted.

Collection of cockle and razor fish can occur from unclassified beds for personal consumption in Mudflats and Sandflats.

PG03: Marine fish and shellfish harvesting activities causing physical loss and disturbance of seafloor habitats

Bait collection (boulder turning) and crab shelters are present, often in sensitive sheltered and tide-swept habitats. Bait digging is locally intensive and has generated clear habitat damage and modification in some areas, with sensitive seagrass and muddy gravels impacted (e.g. Milford Haven).

Commercial shellfisheries are active in some areas on Mudflats and Sandflats and include winkle picking (with associated boulder turning and ecosystem effects), mussel laying and harvesting, and cockle gathering. Where the activities may affect SAC features and are regulated, HRAs should be undertaken, though protection for Annex 1 habitats outside MPAs is less stringent. Cockle gathering is managed under The Cockle Fishing Management and Permitting (Specified Area) (Wales) Order 2024 with annual cockle stock assessments informing TACs. Collection of mussel is subject to MCRS and HRA if undersize.

Collection of shellfish for personal consumption also occurs and there is limited but increasing collection of other molluscs (e.g. razor fish) by hand (intertidally, widespread).

Access to and from shellfish beds or aquaculture assets,

particularly vehicular, can, like harvesting activity, cause physical damage or disturbance to sediment habitats and this occurs in some locations.

No single fishery is especially extensive but the aggregation of the wide variety of fishery activities pressures occurring on the feature could total up to significant pressure and future threat.

The Welsh Government's Welsh National Marine Plan identifies opportunities for further development of shellfisheries in Wales. The Plan also contains a series of environmental policies that apply equally to all developments and these are designed to ensure development is sustainable and impacts on protected site feature condition and conservation objectives is mitigated.

Where fishing activities are regulated this provides some safeguards to protect Annex I habitats. However, where this is not the case (i.e. outside of Protected Sites and unregulated fisheries) it leaves mudflats and sandflats under potential threat.

PG19: Marine aquaculture generating marine pollution.

Aquaculture, depending on the type, scale and intensity, can cause local water quality changes. For example from elevated suspended sediment on harvest, pickup and relay and from suspended shellfish faeces/pseudofaeces. In those areas where it may affect SAC features, marine aquaculture in Wales is subject to HRA, which will consider water quality impacts.

The WNMP has a sector objective for aquaculture that aims 'to facilitate the development of sustainable aquaculture in Welsh waters, including promoting innovative finfish, shellfish and marine algal businesses and associated supply chains”. The aquaculture resource area identified intersects with large sections of Intertidal Mudflats &

Sandflats. For species already cultivated, the Plan identifies potential for the future development of additional production capacity and options for value added processing. Oysters, scallops, clams and abalone are identified as examples of potential new species for cultivation, along with consideration of potential for sustainable finfish and marine algal aquaculture production. The WNMP also contains a series of environmental policies that apply throughout Welsh seas that should help to ensure that all development is sustainable, including ENV_02: Marine Protected Areas. Where Regulating and Several Orders are applied for, this also provides some safeguards to protect Annex I habitats through HRA processes, although these orders are not compulsory. However, the majority of aquaculture developments require multiple permissions (e.g. landowner lease, FHI, possible marine licence) which are subject to HRA if within or near EM (Welsh Government, 2019).

PG21: Introduction and spread of new species in aquaculture (including GMOs).

The spread of INNS from aquaculture is a possibility. There may be pressure for aquaculture expansion into new sheltered areas such as Milford Haven Waterway. Cultivation of triploid Magallana gigas Pacific oysters in the Milford Haven and Menai Strait is considered a threat due to known spread of this species and damage to habitats at other locations in the UK. Climate change will increase the chances of reaching the spawning temperature threshold. In those areas where it may affect SAC features, marine aquaculture in Wales is subject to HRA, which will consider INNS impacts.

The WNMP has a sector objective for aquaculture that aims 'to facilitate the development of sustainable aquaculture in Welsh waters, including promoting innovative finfish, shellfish and marine algal businesses and associated supply chains”. The aquaculture resource area identified intersects with large sections of Intertidal Mudflats &

Sandflats. For species already cultivated, the Plan identifies potential for the future development of additional production capacity and options for value added processing. Oysters, scallops, clams and abalone are identified as examples of potential new species for cultivation, along with consideration of potential for sustainable finfish and marine algal aquaculture production. The WNMP also contains a series of environmental policies that apply throughout Welsh seas that should help to ensure that all development is sustainable, including ENV_02: Marine Protected Areas. Where Regulating and Several Orders are applied for, this also provides some safeguards to protect Annex I habitats, although these orders are not compulsory, in addition the majority of aquaculture developments require other permissions which are subject to HRA (Welsh Government, 2019).

PH08: Other human intrusions and disturbance not mentioned above.

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) as well as multiple small illegal placement of boulders and waste material. As an unregulated and largely unrecorded activity this is a significant threat to the feature, especially when associated with coastal squeeze from sea level rise.

PI02: Other invasive alien species (other than species of Union concern)

Species of significance include Crepidula fornicata, Magallana (Crassostrea) gigas and Sargassum muticum (Bohn, 2014). Modification of habitat and associated community is observable in areas of high density (particularly Milford Haven Waterway). During this reporting round, C. fornicata has spread from the south-west, into north Wales,. S. muticum forms a complete zone

in the lower intertidal in some locations (Menai Strait). Milford Haven is a hot spot, with a high UK diversity of non-natives being present (Mieszkowska & Sugden, 2025).

PI04: Plant and animal pathogens and pests.

Grid based monitoring of shellfish populations of estuary sediment flats important for SPA bird features (Burry Inlet, Three Rivers) previously showed a significant decline in cockle populations and cockle population dynamics parameters (population size structure, wet and dry weight). This has been attributed to mass mortality events, precise cause undetermined, but possibly related to parasite load. Recent improvements in cockle abundance have not reinstated previous levels (Moore, 2012). Monitoring of mussel populations (bed area, density, wet & dry weight) shows an increasing trend in most parameters (Moore, 2012).

PJ01 Temperature changes and extremes due to climate change

Extremes in climate have been noted over a number of years, although no effect has, as yet been recorded in the fauna and flora of intertidal sediment habitats. Extreme conditions challenge the species that have evolved to survive in a limited range of temperatures and other parameters and may be significantly compromised by repeated extremes.

PJ03: Changes in precipitation regimes due to climate change

As the final destination of river flows, increased flow from catchment will change the salinity profile within Estuaries, potentially resulting in shifts in the location and extent of habitats and communities in Mudflats and Sandflats and in their quality. An indirect impact of increased precipitation over land (which is projected to increase over the UK and

Wales in winter due to climate change) is increased delivery of sediments, nutrients and pollution from rivers. It is important to note, however, that changes in water quality around the coast would also be affected by other factors such as land and sea use, or pollution from other terrestrial and marine sources, not just changes in riverine discharges (Oaten et al., 2021).

PJ04: Sea-level rise due to climate change.

PJ06: Wave exposure changes due to 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). Recent assessment has shown very significant losses to all intertidal habitat features from anthropogenic structures causing coastal squeeze within both hold the line policy areas and from assets within 'no active intervention" and 'managed retreat" policy areas. Significant natural losses from coastal squeeze associated with high ground have also been predicted within the assessment period (present to 2155) (Oaten J, et al 2024). Actual losses for intertidal sediments within the period of the Article 17 short-term trend are relatively significant. The Assessment of scale of loss for the period 2005-2025 identified a loss of saltmarsh and intertidal mudflat habitats in the order of 444 Ha. Over this period only about 30Ha of these losses have been compensated for. Although only estimates of loss they were based on old (PAG3) sea level rise projects so it can be assumed that the losses are an underestimate as there have subsequently been two UKCP sea level rise revisions.

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).

So far, one realignment site has been established as part of this programme with the aim of creating approximately 39 ha of intertidal habitat, (although the majority of this is expected to develop into saltmarsh). However, this site is still developing and the new features are not yet attributable to Natura 2000 features. Other potential realignment sites around Wales are being progressed. Therefore, the short-term trend in area is likely to be declining due to sea level rise offset and infilling of estuaries, forming into saltmarsh. There is, however, a lack of evidence to confirm this, therefore the direction is listed as uncertain.

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 (PJ01) are likely to act in combination, with and exacerbate, localised temperature changes associated with current and future power stations (Wylfa Newydd) due to power station cooling water.

Likely increased storminess and subsequent wave action will drive changes on sedimentary shores, shifting areas of erosion and accretion. This is likely to influence future strategies for coastal defence and possible further intervention with hard structures.

PJ07: Cyclones, storms, or tornados due to climate change

The trajectory of storminess in the future is unclear (Bricheno et al 2025). Likely increased storminess and subsequent wave action will drive changes on sedimentary shores, shifting areas of erosion and accretion. This is likely to influence future strategies for coastal defence and possible further intervention with hard structures.

PJ10: Change of habitat location, size, and / or quality due to climate change

PJ11: Desynchronisation of biological / ecological processes due to climate change

PJ12: Decline or extinction of related species (e.g. food source / prey, predator / parasite, symbiote, etc.) due to climate change

PJ10, PJ11, PJ12: Climate change and ocean acidification cause direct and indirect pressures which can significantly alter the environmental conditions (e.g. decreases in pH, increases in sea surface temperature) necessary for benthic ecosystem processes and functions (OSPAR, 2023a). Calcifying organisms are thought to be vulnerable to ocean acidification under climate change, with some

models predicting up to 13% of cold water coral reefs being in low-aragonite areas (Hoppit & Schmidt 2022, Moore & Smale 2020). Climatic models predict there will be changes to area of suitable habitat in the future depending on the climatic scenario (Moore & Smale, 2020). Other studies suggest ecosystem-level responses could remain stable over long periods of time, depending on the species involved (Moore & Smale, 2020). While confidence in evidence has increased from low to medium, there are still knowledge gaps meaning we are unable to fully assess the scale of benthic species and community responses in relation to climate

PJ13: Change of species distribution (natural newcomers) due to climate change

Offshore, there is evidence to suggest climate change is causing changes in benthic infaunal invertebrate species distributions and range shifts of local species, with some increase in warm-water affinity species especially in the South-West. Climatic models predict this trend will continue (Moore & Smale, 2020).

PK02: Mixed source marine water pollution (marine and coastal).

There is an assortment of sources to pollution to the marine environment that are difficult to quantify and apportion. Diffuse pollution is derived primarily from agricultural activities, with abandoned mines being the second likely cause of failure of a WFD waterbody. The former is due to raised levels of nutrient (nitrogen and phosphorus) and sediment run off, whilst the latter is due to metal contamination. Waterbody failures due to diffuse nutrients from agriculture affect some estuaries and bays, particularly Milford Haven Waterway (NRW, 2014), Carmarthen Bay and Y Foryd) (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. Raised turbidity and silt deposition is likely to be affecting algae, whilst dense and widespread macroalgae overlying mud and sandflats is having negative consequences for sediment biota and generating eutrophication and smothering impacts when it is washed up on the strandlines, reefs and saltmarsh. PK03: Mixed source air pollution, air-borne pollutants. Nitrogen input is particularly cumulative in areas with existing high nitrogen loads such as the Milford Haven, where there are inputs from LNG plants and the power station as well as water borne oxides of nitrogen. Small amounts of other air born pollutants are likely to be derived from other industries across Wales.
8.5: List of main conservation measures	MK01: Reduce impact of mixed source pollution. 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. Remediation work continues for capturing mine water and removing heavy metal contaminants (Jarvis et al., 2014). Diffuse Water Pollution Thematic Action Plan (TAP) (see below) Marine Litter TAP (see below) MF02: Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructure, operations and activities

The National Habitat Creation Program (NHCP) 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 NHCP 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 NHCP 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).

There is however a limitation on the effectiveness of the NHCP in maintaining coherence of the National Site Network as the offset provision only relates to the point at which a man made structure is improved beyond its current design. Consequently a large proportion of the coastal squeeze losses within both hold the line and all other SMP2 policies are continuing to cause an impact on the MPA through coastal squeeze process which is assigned to 'general degradation" (Article 6/2 HD). There is no current funding to support direct mitigation of these losses. The scale of loss is now identified as being very significant (Oaten et al 2024).

General regulatory framework for assessment of environmental impacts prior to development, plans and projects.

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.

Voluntary management measures were implemented on

the Gann flats but were not successful. As a result, a byelaw is being developed in an attempt to reduce the impact of bait digging at this location.

Invasive Species and Pathogens TAP (see below)

Flood and Coastal Erosion Risk Management TAP (see below)

MF06: Reduce/eliminate marine pollution from industrial, commercial, residential and recreational areas and activities (incl. 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.

Diffuse Water Pollution TAP (see below)

Marine Litter TAP (see below)

MF08: Manage changes in hydrological and coastal systems and regimes for construction and development (incl. restoration of habitats).

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.

Within the NRW Actions database 185 actions were listed relating to coastal squeeze, 49 of these were under control and 61 complete.

The Pen Llŷn a'r Sarnau SAC has an objective to restore the 'Estuaries' feature (of which Intertidal Mudflats and Sandflats 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 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) (Atkins 2010, Halcrow 2012(a), Halcrow 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. (see section 9.1b).

Modification of coastline, estuary and coastal conditions and the associated hydromorphological pressures on the intertidal habitats of the MPA in particular are fairly synonymous with the 'hold the line” policy areas identified in the SMP2. NRWs Coastal Adaptation Programme is now integrated with the National Habitat Creation with a focus on managing the adaptation of hold the line policy areas subject to particular vulnerability from coastal erosion and rising sea levels. This complex process of assessing the best plan for coastal adaptation and realising opportunities for maintaining the coherence of the National Site Network though marine habitat creation involves developing a portfolio of coastal adaption plans for vulnerable areas

around Wales's coastline that have been consulted upon and fully appraised. The projects are managed and delivered by NRWs 'Project and Programme Delivery Team” and typically involve prioritised sites that are evaluated through a five-case business model and due diligence of costs, risks, and benefits, leading to a fully (public and stakeholder consulted) preferred option for sustainable flood risk management. The projects can be delivered in a phased approach governed by available resources, the condition of failing FRM assets and through consultation with Welsh Government (Flood and Coastal Erosion Risk Management) and key stakeholders.

Additional 'mitigation” for impacts on Heavily Modified Water Bodies (HMWBs) through managed realignment and soft engineering or Natural Flood Risk Management also interface with the NHCP and CAP programmes. These also relate to Water Framework Directive drivers for offsetting hydromorphological impacts on the achievement of favourable condition or potential. Habitat creation and its associated tidal exchange into new areas of developing saltmarsh may also support other pressures such as nutrient considerations, as the new habitat will maintain coherence or increase the area of the marine carbon and nutrient cycles.

MF03: Reduce impact of outdoor sports, leisure and recreational activities (incl. restoration of habitats)

General regulatory framework for assessment of environmental impacts prior to development, plans and projects.

Local authority byelaws restricting use of vehicles on the shore.

Voluntary exclusion zone for bait digging on Gann Flats.

MG01: Management of professional/commercial fishing,

shellfish and seaweed harvesting (incl. restoration of habitats)

Key measures are in place to mitigate fisheries related pressures and threats identified in this assessment and are managed by Welsh fisheries legislation.

The UK's fisheries management framework is based on the Fisheries Act 2020 (HM Government, 2020) which sets out the legal framework for managing UK fisheries post EU exit. The Act contains seven key objectives to guide decision making including the sustainability objective, the precautionary objective, the ecosystem objective, and the scientific objective.

The Fisheries Act 2020 requires Fishery Policy Authorities to produce Fishery Management Plans (FMPs). FMPs will set out details for managing specific fish stocks or fisheries at maximum sustainable yield or explain why that has not been possible and what needs to be done to achieve MSY. The 2028 Cockle FMP will be relevant for assessing and managing the interactions of relevant fishing activities with Mudflats and Sandflats fish and shellfish species in Welsh waters. The FMPs will aim to ensure stocks are fished sustainably in line with the ecosystem objective which will include consideration of impacts on benthic habitats. The plans will be reviewed and if necessary updated every 6 years.

Cockle gathering is managed under the Cockle Fishing Management and Permitting (Specified Area) (Wales) Order 2024 with annual cockle stock assessments informing TACs.

Collection of mussel subject to MCRS and HRA if undersize. Key measures which are in place to mitigate fisheries related pressure and threats identified in this assessment (G01 & G03) are driven by nationallegislation and covers the wider sea area. Management of

shellfisheries is, to an increasing degree, taking account of the protected nature of mudflats in SACs. The Welsh National Marine Plan includes sustainable blue Growth – aquaculture, in planned AquacultureResource Areas, this will ensure that aquaculture will be managed sustainably to avoid impacts from infrastructure, intertidal assets and access to sites. 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).

The Marine and Coastal Access Act (MCAA) 2009 (HM Government, 2009) aims to improve management and protection of the UK marine and coastal environment. It has eight key elements, including fisheries management and marine enforcement

Voluntary management measures were implemented at the Gann Flats to manage the intensity of bait digging but were not successful, although recent reports show a reduction in activity levels. As a result, a byelaw is being developed in an attempt to reduce the impact of bait digging at this location.

Marine Fisheries TAP (see below)

MF06: Reduce/eliminate marine pollution from industrial, commercial, residential and recreational areas and activities (incl. contamination with litter)

Some steps have been made towards controlling the use of single use plastics. 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 single use plastic bags.

Environmental Protection (Microbeads) (Wales) Regulations 2018 was voted on and passed by the Welsh Assembly in June 2018 (http://www.assembly.wales/laid%20documents/sub-ld11558-em/sub-ld11558-em-e.pdf) – the actual legislation is not yet published, but the Explanatory Memorandum was prepared by the Department for Economy, Skills and Natural Resources and laid before the National Assembly for Wales on the 18th May 2018.

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 Monday (28 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.

MC05: Adapt/manage fossil energy installation, facilities and operation.

General regulatory framework for assessment of environmental impacts prior to development, plans and projects.

Consents are required to develop a power station and associated cable lines. Over the past reporting period, for projects that have a capacity of 1-100MW capacity, project developers were required to gain approval from the Marine Management Organisation (Section 36 Electricity Act). In the future, projects will be required to gain approval from Welsh Government (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 required (Marine and Coastal Access Act, 2009) and the licence application is reviewed by NRW. Each application requires an Environmental Impact Assessment and Habitat Regulations Assessment (where within or adjacent to a Natura 2000 site). 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.

MJ02: Implement climate change adaptation measures.

The National Habitat Creation Program has been put in place by the Welsh Government to identify and progress opportunities for managed retreat of the coastal line, in order to mitigate losses of intertidal habitats as a result of man-made constraints where Hold The Line policies of the Shoreline Management Plan have been maintained.

Flood and Coastal Erosion Risk Management TAP (see below)

MI03: Management, control or eradication of other invasive alien species.

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 (INNS), especially those that threaten native or protected species and habitats.

The UK is a signatory to the Ballast Water Convention 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 (Sambrook et al., 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.

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 2009, 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.

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.

MC03: Adapt/manage renewable energy installation, facilities and operation (excl. hydropower and abstraction activities)

HRA in SACs. Due consideration of listed features (e.g. Section 7).

MC06: Reduce impact of service corridors and networks.

HRA in SACs. Due consideration of listed features (e.g.

Section 7).

MC13: Other measures related to extraction and energy exploitation activities

HRA in SACs. Due consideration of listed features (e.g. Section 7). Continued remedial works on old mine drainage.

ME01: Reduce impact of transport operation and infrastructure.

HRA in SACs. Due consideration of listed features (e.g. Section 7).

MH03: Reduce impact of other specific human activities

Management of eroding old waste disposal dumps on the coast.

MJ01: Implement climate change mitigation measures

Some habitats, notably saltmarsh and seagrass, when in equilibrium or expanding, can be valuable carbon capture systems. These habitats can offer greater benefit to climate change mitigation than other habitats.

Evidence from the NRW Actions Database, the Priority Improvement Plans (PIPs) and Site Management Reports has been used. There are few active measures that can be applied, but there are a considerable number of investigations proposed, to improve understanding of the pressures and threats on a site. The Natura 2000 LIFE project also brought together Thematic Action Plans to resolve some of the pressures and threats as follows:

• Thematic Action Plan for Flood and Coastal Erosion Risk

Management

• Thematic Action Plan for Diffuse Water Pollution

• Thematic Action Plan for Invasive Species and Pathogens

• Thematic Action Plan: Marine Litter

• Thematic Action Plan: Marine Fisheries

Thematic Action Plan: Flood and Coastal Erosion Risk Management

- Implementation of appropriate coastal management - >£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.

Thematic Action Plan: Diffuse Water Pollution

– Investigation, Direct Management and Management Agreements (incl Glastir) 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.

Thematic Action Plan: Invasive Species and Pathogens

- 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.

Thematic Action Plan: Marine Litter

- 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 Thematic Action Plan: Marine Fisheries - 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. - 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.
9.1:Future trends and prospects of parameters	Range: Assessment of trends has included consideration of any

	recorded anthropogenic changes in habitat extent and range from casework There have been some known reductions in extent. Knowledge of these is primarily limited to the SAC suite. Whilst these may be significant at a local scale, their effect on the overall range of the habitat across Wales is relatively small.
10.1: Range	Conclusion on Range reached because: (i) the short-term trend direction in Range surface area is stable; and (ii) the current Range surface area is approximately equal to the Favourable Reference Range.
10.2: Area	Conclusion on Area reached because:(i) the short-term trend direction in Area is decreasing by 1% per year or less; (ii) the current Area is approximately equal to the Favourable Reference Area; and iii) there has been no significant change in distribution pattern within range
10.3: Specific structure and functions	Conclusion on Structure and function reached because: i) habitat condition data indicates that more than 25% of the habitat is in unfavourable (not good) condition; ii) short-term trend in area of habitat in good condition is stable; and iii) expert opinion determines that there are significant issues for this habitat.
10.4: Future prospects	Conclusion on Future prospects reached because: (i) the Future prospects for Range are good; (ii) the Future prospects for Area covered by habitat are poor; and (iii) the Future prospects for Structure and function are bad.
10.5: Overall assessment of Conservation Status	Overall assessment of Conservation Status is Unfavourable-bad because two of the conclusions are Unfavourable-bad.
10.6: Overall trend in Conservation Status	The overall trend is Deteriorating because the short-term trend in range is stable, the short-term trend in area is decreasing, and the short-term trend in structure & function is stable.
11.1: Surface area of the habitat type inside	Value derived from NRW ArcMap mapping of the feature (Reg9a_MudflatsSandflats_2024_WFD_SSSI_Final).

the pSCIs, SCIs and SACs network	Value includes SAC where the feature is A-C grade and SSSI where sediments are part of the feature of the SSSI (i.e. there is some protection specifically for this feature).
11.4: Short-term trend of habitat area within the network; Direction	Changes in extent varies according to the N2K site, such that overall, it is unclear what the trajectory is.
5.13: Favourable Reference Area (FRA)	The UK-level FRV for surface area was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current habitat extent and trends.
4.10: Favourable Reference Range (FRR)	The UK-level FRV for range was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current distribution and trends.