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Pembrokeshire Marine / Sir Benfro Forol Special Area of Conservation

Indicative site level feature condition assessments 2018

NRW Evidence Report No: 233

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Summary

This document presents NRW's indicative assessment of the condition of marine features in Pembrokeshire Marine / Sir Benfro Forol Special Area of Conservation (SAC).

Table 1 contains a summary of the indicative condition assessments.

This report is divided into sections as follows:

Section 1: a brief introduction to the importance and need for site level feature condition assessments,

Section 2: a brief description of Pembrokeshire Marine SAC,

Section 3: NRW's indicative condition assessments for the features of Pembrokeshire Marine SAC, including a comparison with previous assessments for the site,

Section 4: NRW's plans for the future development of site level condition assessments,

Annexes explain in detail the process of producing indicative condition assessments.

Table 1: Summary of indicative condition assessments for Pembrokeshire Marine SAC.

Designated Features	Indicative condition assessment	Confidence in assessment
• Large shallow inlets and bays	Unfavourable	Medium
• Estuaries	Unfavourable	High
• Reefs	Unfavourable	Medium
• Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	Unfavourable	Medium
• Mudflats and sandflats not covered by seawater at low tide	Unfavourable	High
• Coastal lagoons	Unfavourable	High
• Submerged or partially submerged sea caves	Unknown	Not Applicable
• Sandbanks which are slightly covered by seawater all the time	Unfavourable	Low
• Grey seal (<i>Halichoerus grypus</i>)	Favourable	Medium
• Allis shad (<i>Alosa alosa</i>)	Favourable	High
• Twaite shad (<i>Alosa fallax</i>)	Favourable	High
• River lamprey (<i>Lampetra fluviatilis</i>)	Unfavourable	Medium
• Sea lamprey (<i>Petromyzon marinus</i>)	Unfavourable	Medium
• Otter (<i>Lutra lutra</i>)	Favourable	High
• Shoredock (<i>Rumex rupestris</i>)	Favourable	High

More detailed explanations of the rationale behind these conclusions can be found in the full indicative condition assessment reports in section 3.

Crynodeb

Mae'r ddogfen hon yn cyflwyno asesiad dangosol CNC o gyflwr nodweddion Ardal Gadwraeth Arbennig Sir Benfro Forol (AGA).

Mae Tabl 1 yn cynnwys crynodeb o'r asesiadau dangosol o gyflwr nodweddion.

Rhennir yr adroddiad hwn yn adrannau fel a ganlyn:

Adran 1: cyflwyniad byr i'r pwysigrwydd a'r angen am asesiadau cyflwr ar lefel safle,

Adran 2: disgrifiad byr o AGA Sir Benfro Forol,

Adran 3: Asesiadau cyflwr dangosol CNC ar gyfer nodweddion AGA Sir Benfro Forol, gan gynnwys cymhariaeth gydag asesiadau blaenorol ar gyfer y safle,

Adran 4: Cynlluniau CNC ar gyfer datblygu asesiadau cyflwr ar lefel safle yn y dyfodol

Mae **atodiadau'n** egluro'n fanwl y broses o gynhyrchu asesiadau dangosol o gyflwr nodweddion.

Tabl 1: Crynodeb o asesiadau dangosol o gyflwr nodweddion ar gyfer AGA Sir Benfro Forol.

Nodweddion Dynodedig	Asesiad dangosol o gyflwr y nodwedd	Hyder yn yr asesiad
• Cilfachau a baeau mawr bas	Anffafriol	Canolig
• Aberoedd	Anffafriol	Uchel
• Riffiau	Anffafriol	Canolig
• Dolydd ar forfeydd arfordir y gorllewin (<i>Glauco-Puccinellietalia maritima</i>)	Anffafriol	Canolig
• Gwastadeddau llaid neu dywod nas gorchuddir gan y môr ar lanw isel	Anffafriol	Uchel
• Morlynnoedd neu lagynau	Anffafriol	Uchel
• Ogofâu môr sy'n danforol neu'n lleddanforol	Anhysbys	Ddim yn berthnasol
• Ponciau tywod sydd fymryn dan ddŵr y môr drwy'r amser	Anffafriol	Isel
• Morlo llwyd <i>Halichoerus grypus</i>	Ffafriol	Canolig
• Herlyn (<i>Alosa alosa</i>)	Ffafriol	Uchel
• Gwangen (<i>Alosa fallax</i>)	Ffafriol	Uchel
• Lamprai'r afon (<i>Lampetra fluviatilis</i>)	Anffafriol	Canolig
• Lamprai'r môr (<i>Petromyzon marinus</i>)	Anffafriol	Canolig
• Dyfrgi (<i>Lutra lutra</i>)	Ffafriol	Uchel
• Tafolen y traeth (<i>Rumex rupestris</i>)	Ffafriol	Uchel

Mae esboniadau manylach o'r rhesymeg y tu ôl i'r casgliadau hyn i'w gweld yn yr adroddiad llawn ar asesu dangosol cyflwr nodweddion.

1. Site level feature condition assessments

Site level feature condition assessments are important for site management. In particular they:

- inform the development of management measures to improve the condition of features
- assist with the prioritisation of resources, and
- help with the assessments of plans and projects.

Marine SACs in Wales cover extensive areas of sea and coast, much of which is challenging and resource intensive to monitor. As a result, assessment of condition can be difficult. It is therefore necessary to use a number of different sources of information and data to inform conclusions. These can vary from, for example, long-term monitoring/surveillance datasets, sampling programs and bathymetric data, to specific data-sets collected primarily for other purposes including Environmental Impact Assessments. For some features, there are very little or no data from which to draw conclusions.

NRW previously undertook preliminary work on full, detailed assessments using all available evidence and assessing all possible attributes. However, this process proved complex and resource intensive. We have therefore concluded that we will not be able to undertake this type of extensive assessment now or in the future, but instead we will develop a new serviceable and streamlined approach that can be embedded in our internal assessment and reporting tools and processes.

As the first stage in developing ongoing streamlined and sustainable site condition assessment and reporting, NRW has undertaken indicative assessments of condition of all marine SAC and Special Protection Area (SPA) sites and features in Wales. During an intensive workshop NRW specialists assessed each feature by using readily available data and information and applying their expert judgement. Further details on the approach taken can be found in Annexes A and B, summary definition in Box 1.

Box 1: Indicative condition assessments - definition and use

The term 'indicative condition assessment' describes the use of readily available evidence and expert judgement in an intensive, collective workshop process to provide an indication of feature and site condition.

The confidence rating associated with the assessments is an **integral** part of the indicative assessment. Confidence levels for feature and site assessments should therefore **always** be quoted alongside the indicative condition result, together with NRW's above definition of 'indicative condition assessment'.

2. Site Description

Pembrokeshire Marine SAC extends from just north of Abereiddy on the north Pembrokeshire coast to just east of Manorbier in the south, and includes the coast of the islands of Ramsey, Skomer, Grassholm, Skokholm, the Bishops and Clerks and The Smalls. The site encompasses areas of sea, coast and estuary that support a wide range of different marine habitats and wildlife, some of which are unique in Wales.

Pembrokeshire Marine SAC is a multiple interest site that has been selected for the presence of eight marine habitat features and seven species features.

For the qualifying habitats and species, the Pembrokeshire Marine SAC is considered to be one of the best areas in the UK for:

- Large shallow inlets and bays
- Estuaries
- Reefs
- Grey seal (*Halichoerus grypus*)

and to support a significant presence of:

- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- Mud-flats and sand-flats not covered by seawater at low tide
- Coastal lagoons
- Submerged or partially submerged sea caves
- Sandbanks which are slightly covered by seawater all the time
- Allis shad (*Alosa alosa*)
- Twait shad (*Alosa fallax*)
- River lamprey (*Lampetra fluviatilis*)
- Sea lamprey (*Petromyzon marinus*)
- Otter (*Lutra lutra*)
- Shore dock (*Rumex rupestris*)

The features are distributed throughout the SAC with no single feature occupying the entire SAC and with features overlapping in some locations. The SAC boundary and the general location of the Annex I habitat features are shown in the feature map¹ on the NRW website. These are indicative maps as the extent of most features is not known precisely and some, such as sandbanks, are dynamic and can be highly mobile.

More information on the site and its features can be found in NRW's conservation advice for the site on our website².

¹ The feature map can be found on the NRW website and information on the map features, data sources and any changes can be found in Annex I of the conservation advice on EMS (Reg 35), (link below).

² <http://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/find-protected-areas-of-land-and-seas/conservation-advice-for-european-marine-sites/?lang=en>

3. Feature level indicative condition assessments

3.1 Large shallow inlets and bays indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Large shallow inlets & bays

Component of habitat feature assessed	Indicative Assessment <i>(Favourable, unfavourable, unknown)</i>	Key evidence type used <i>(Monitoring data, reports or expert judgement)</i>	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Favourable	Expert judgement	High	Low	Low
Structure & function	Unfavourable	Monitoring data, WFD assessment, reports & expert judgement	High	Medium	Medium
Typical species	Unfavourable	Monitoring data, WFD assessment, reports & expert judgement	High	Medium	Medium
Relevant activities <i>(activities directly impacting condition of the feature on this site)</i>	Coastal infrastructure, point source pollution, sediment pollution, bait digging, diffuse water pollution and invasive species.				

Overall Indicative Assessment	Overall Confidence Level
Unfavourable	Medium

Notes section: *The rationale for the assessment conclusion and confidence.*

There are two main areas of Large Shallow Inlet and Bay (LSIB) feature in Pembrokeshire Marine SAC, one part is St. Brides Bay and one is Milford Haven waterway. It is important to read the indicative condition assessments of the overlapping features in these areas, particularly those for the Haven. The state of these features (and their component sub-features) has a direct link to the condition of this feature.

Pembrokeshire Marine SAC Indicative Estuaries feature assessment 2017: Unfavourable

Pembrokeshire Marine SAC Indicative Mudflats and sandflats feature assessment 2017: Unfavourable

Pembrokeshire Marine SAC Indicative Reefs feature assessment 2017: Unfavourable

Distribution & extent:

There have been no significant changes to the distribution and extent of the feature since designation.

This component has been assessed as **favourable**.

Structure & function:

St. Brides Bay: In 2008 there was a big change in sediment granulometry but there is no evidence on the reason for the change.

Milford Haven waterway:

- Exceptionally high suspended sediment loads in the Haven – dredged areas were filling more quickly than expected (winter 2015 – Milford Haven Port Authority (MHPA) request for extra deposit). Neyland dredge disposal sampling showed increased silt levels at certain monitoring points. This could be a consequence of activity management upstream (e.g. agricultural practices or clear felling without adequate management of runoff). There is high confidence that particle size distribution has changed. Sediment levels on reef were very high in 2012 (Skomer MCZ) and in 2014 (Skomer MCZ and intertidal monitoring). This is likely to be due to winter storms (i.e. natural) in Skomer MCZ but in Milford Haven waterway additional sediment is likely to have come down the rivers. The decision to give this a medium confidence reflects the fact that we have not identified where in the catchment the sediment is coming from and how much is anthropogenically derived.
- Wales' only known maerl bed sustained damage as a result of refurbishment to the South Hook Liquid Natural Gas jetty (83% decline in live maerl 2005-2010 (Bunker, 2011).
- Levels of certain contaminants are above statutory guideline concentrations (See Little & Galperin, 2014) (although indications are that hydrocarbon contaminant loads are decreasing (Little, 2009). There is pressure from occasional oil spills and continued presence and reworking of historic oil. Tributyltin (TBT) levels remain high (although the trend is downwards) but pressure from use of antifoulants remains.
- WFD data was used from the six relevant waterbodies (Grassholm Island & The Smalls, Milford Haven Inner, Milford Haven Outer, Pickleridge Lagoon, Solfach Estuary and Pembrokeshire South). Three of these waterbodies have a good overall status

and good chemical status. Three have a moderate overall status one of which has a good chemical status but two have a fail for chemical status. The chemical status fail in the Milford Haven Inner waterbody is for tributyltin (TBT) compounds, mercury and its compounds and brominated diphenylether (BDPE). Milford Haven Outer waterbody fails for mercury and its compounds.

This component has been assessed as **unfavourable**.

Typical species:

- Subtidal seagrass bed (component of LSIB) at Gelliswick Bay – evidence of high levels of nutrients reported in Jones & Unsworth (2016) although no evidence that this represents a deterioration over time. Bait digging is affecting seagrass beds at Angle Bay
- Bait digging in mixed muddy gravel affecting infaunal species in certain areas (e.g. the Gann).
- Between 2011 and 2014 new records were collected for ocean quahog (*Arctica islandica*), extending the known distribution within St. Brides Bay and new records of crayfish (*Palinurus elephas*) in St. Brides Bay and the entrance to Milford Haven. Whilst these could be due to previous under-recording they could be interpreted as providing evidence of a possible increase (or at least, no decrease) in these Section 7³ / OSPAR⁴ species.
- St. Brides Bay infaunal data: 2012 analysis of monitoring data shows variations in species diversity, but did not prove conclusive in terms of condition assessment, so would benefit from a more detailed analysis. No changes were observed in infaunal data from Skomer MCZ.
- Milford Haven waterway is a hot spot for invasive non-native species, (Mieszowska, 2011) including slipper limpet (*Crepidula fornicata*), Japanese wireweed (*Sargassum muticum*), and wakame (*Undaria pinnatifida*). Modification of habitat and associated communities is observable in areas of high density of invasive species e.g. *Crepidula* – especially the maerl bed. There have been significant recent increases of some of these species (e.g. slipper limpet and Japanese wireweed.).
- Wildfowl and wader numbers give an indication of habitat health. Wigeon numbers on the Cleddau complex 2013-2014 gave the lowest count since 2002-2003 which may be related to local food supply. Numbers have increased since but do not quite reach previous levels.
- Native oysters have declined although recent anecdotal evidence suggest that there may be some increase in number of native oyster (monitoring report not yet completed).
- In 2016, an unusually high number of sea fan losses were recorded at Skomer MCZ, especially at the Bull Hole site. The losses are most likely due to mechanical damage (breakages), as remains of colony stalks were located. Activities that could lead to mechanical damage include potting, angling, recreational diving and anchoring, although anchoring is unlikely in this area of strong currents (Newman et. al., 2017). The decline in sea fan population is not enough to fail the whole typical species component. We do not have information on sea fans in the reef feature outside of the MCZ.

³ Section 7 of the Environment (Wales) Act 2016 - biodiversity lists and duty to take steps to maintain and enhance biodiversity

⁴ OSPAR stands for Oslo and Paris conventions, these conventions are managed by the OSPAR commission - <https://www.ospar.org/>

Due to the decline in oyster numbers, bait digging and low Wigeon numbers this component has been assessed as **unfavourable**.

Relevant activities (further information):

- Bait digging is widespread and has generated clear habitat damage and modification in some areas (especially the Gann) - sensitive habitats such as seagrass and muddy gravels are being impacted.
- Pembroke Power Station: The levels of clupeids such as herring and demersal species such as gobies that have become entrained or impinged in the cooling water system at Pembroke Power station are higher than was predicted. The significance of this is uncertain. Thermal impacts from the discharged cooling water are being monitored. Other than direct localised impacts around the point of discharge, there is, at present, no evidence of significant thermal impacts from this source.
- Raised turbidity and silt deposition is likely to be affecting subtidal algae and seagrass but we do not have evidence of change in species composition indicative of anthropogenic impact.
- Invasive species – slipper limpet having an effect on some habitats.

Evidence used: *The evidence used to support the assessment conclusion.*

- Bunker, F. StP. D. and Camplin M. D. (2007). *A study of the Milford Haven maerl bed in 2005 using drop down video and diving*. A report to the Countryside Council for Wales by Marine Seen. CCW Contract Science Report 769. Countryside Council for Wales, Bangor, 174pp + iii.
- Bunker, F. StP. D. (2011). *Monitoring of a Maerl Bed in the Milford Haven Waterway, Pembrokeshire, 2010*. CCW Contract Science Report No. 979. A report to the Countryside Council for Wales by *MarineSeen*, Pembrokeshire 145pp + iii.
- Bunker, F. StP. D. (2012). *Intertidal SAC monitoring Zostera noltei in Angle Bay, Pembrokeshire Marine SAC 2008*. CCW Marine Monitoring Report No: 81, 51pp + ix, Countryside Council for Wales, Bangor.
- Bunker, F. StP. D. (2015). *Intertidal Monitoring of rocky reefs, Pembrokeshire Marine SAC. Population trends for selected species 2005 to 2014*. NRW Evidence Report No: 59, 66pp, Natural Resources Wales, Bangor
- Haycock A. (2015). *Wildfowl and wader counts in the Milford Haven Waterway 2014-2015*. Report to the MHWESG (Milford Haven Waterway Environmental Surveillance Group).
- Jones BL, Richard K. F. Unsworth RKF. (2016). *The perilous state of seagrass in the British Isles*. Royal Society Open Science.
- Langston, W.J., O'Hara, S., Davey, M., Shortridge, E., Pope, E., Harino, N.D. & Vane, C.H. (2012). *Bioaccumulation surveillance in Milford Haven Waterway Phase II (2010)*. Report to the MHWESG (Milford Haven Waterway Environmental Surveillance Group) from the Marine Biological Association UK.
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- Milford Haven Waterway Environmental Surveillance Group Annual Report 2015.
- Morrell, S. (2014). *Rocky Shore Surveillance 2013*. Report to the MHWESG (Milford Haven Waterway Environmental Surveillance Group) from the Field Studies Council Dale Fort Field Centre.
- Newman, P., Lock, K., Burton, M. & Jonesm J. (2015). *Skomer Marine Conservation Zone Annual Report 2014*. NRW Evidence Report No. 69
- NRW Audit commentary for 2013 assessments. H1130: Estuaries. (for JNCC in 2012)
- Rogers, A. (2016). *State of Wildlife in Pembrokeshire, an update 2016*. Pembrokeshire Biodiversity Partnership.
- Wakame Watch Recording Project. <http://wakamewatch.org.uk/>
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>
- Young, H. (2014). *Annual Entrapment Monitoring Report*. RWE nPower. JUKL/B1810700/R33.

3.2 Estuaries indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Estuaries

Component of habitat feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>Monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Favourable	Monitoring data, reports and expert judgement	High	Medium	Medium
Structure & function	Unfavourable	Monitoring data, WFD data, reports and expert judgement	High	High	High
Typical species	Unfavourable	Monitoring data, WFD data, reports and expert judgement	High	Medium	Medium
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	Water pollution: diffuse and point, contaminants in sediments				

Overall Indicative Assessment	Overall Confidence Level
Unfavourable	High

Notes section: *The rationale for the assessment conclusion and confidence.*

The mudflats and sandflats feature and the Atlantic saltmarsh feature are very important sub-features of the Estuary feature for this site. Therefore, the assessments for these features should be read in conjunction with this assessment. The state of these sub-features has a direct effect on the condition of this feature.

Pembrokeshire Marine SAC Indicative Mudflats and sandflats feature assessment 2017: Unfavourable
Pembrokeshire Marine SAC Indicative Atlantic Saltmarsh feature assessment 2017: Unfavourable

Distribution and Extent:

Distribution: No change, **Extent:** Stable.

No change in distribution and extent since designation. Distribution and extent for both saltmarsh and mudflats and sandflats features were assessed as favourable.

This component has been assessed as **favourable**.

Structure and function: Pembrokeshire Marine SAC overlaps with six WFD waterbodies. The estuary feature falls within two waterbodies (Milford Haven Inner and Milford Haven Outer). Both waterbodies have an overall moderate status and a fail for chemical status (these chemical failures are driven by mercury and its compounds in both waterbodies, and by tributyltin (TBT) and its compounds in Milford Haven Inner). Contaminant levels in sediments have been reported as high in the Haven (despite improvements in pollution source control) but historic contaminants are known to be disturbed by construction and dredging (Little, 2009). Levels of certain contaminants are above statutory guideline concentrations (See Little & Galperin, 2014) (although indications are that hydrocarbon contaminant loads there are decreasing (Little, 2009). There is pressure from occasional oil spills and continued presence and reworking of historic oil. Tributyltin (TBT) levels remain high (but the trend is downwards) but pressure from use of antifoulants remains.

Dissolved inorganic nitrogen (DIN) was assessed as moderate in Milford Haven Outer and Milford Haven Inner waterbodies, with opportunistic macroalgae assessed as moderate in the inner Haven but good in the outer Haven. 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. Structure and function for both Atlantic saltmeadows and mudflats and sandflats features were assessed as unfavourable.

This component has been assessed as **unfavourable**.

Typical species: Dissolved inorganic nitrogen (DIN) was assessed as moderate in Milford Haven Outer and Milford Haven Inner waterbodies, with opportunistic macroalgae assessed as moderate in the inner Haven but good in the outer Haven. Angiosperms in Milford Haven Inner waterbody were assessed as high and for Milford Haven Outer waterbody they are assessed as good, with the seagrass sub attribute assessed as high for both waterbodies. However, a new report on subtidal seagrass data indicates decline and stress (Unsworth *et al.*, in prep). The infaunal quality index was assessed for both relevant waterbodies and both were assessed as good.

The levels of clupeids such as herring and demersal species such as gobies that have become entrained or impinged in the cooling water system at Pembroke Power station are higher than was predicted. The significance of this is uncertain.

Typical species for the mudflats and sandflats feature was assessed as unfavourable. Typical species for Atlantic saltmeadows feature was assessed as favourable.

This component has been assessed as **unfavourable**.

Noted activities:

- Bait digging (mudflats and sandflats element)
- Unconsented coastal construction
- Marine INNS: Slipper limpet

Evidence used: *The evidence used to support the assessment conclusion.*

- Duggan-Edwards, M. & Brazier, D.P. (2015). *Intertidal SAC monitoring Zostera noltei in Angle Bay, Pembrokeshire Marine SAC 2013*. NRW Evidence Report No: 55, 38pp + xi, Natural Resources Wales, Bangor.
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3.3 Reefs indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Reefs

Component of habitat feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>Monitoring data, reports or expert opinion</i>)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Favourable	Expert judgement & survey data	High	Medium	Medium
Structure & function	Unfavourable	Monitoring data (e.g. WFD), expert judgement	High	Medium	Medium
Typical species	Favourable	Monitoring data (e.g. WFD), expert judgement	High	Medium	Medium
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	Diffuse pollution, point source pollution, potting and industrial development.				

Overall Indicative Assessment	Overall Confidence Level
Unfavourable	Medium

Notes section: *The rationale for the assessment conclusion and confidence.*

General note: High evidence levels for the Milford Haven Waterway and Skomer MCZ, medium elsewhere in the site.

Distribution & Extent: The extent of the reefs seems to be unchanged, new multibeam data has not been analysed yet. No issues identified, the extent and distribution has not to have changed significantly since designation. Therefore, this component has been assessed as **favourable**.

Structure & Function: The main issue contributing to the unfavourable assessment is high levels of nutrients in the water column (in the Milford Haven waterway but not on the open coast). WFD data was used from the six relevant waterbodies for this feature (Cardigan Bay South, Grassholm Island & The Smalls, Milford Haven Inner, Milford Haven Outer, Solfach Estuary and Pembrokeshire South) four of these waterbodies have a good overall status and good chemical status while two have a moderate overall status and a fail for chemical status (Milford Haven inner and outer). The chemical status fail in the Milford Haven Inner is for tributyltin compounds (TBT), mercury and its compounds and brominated diphenylether (BDPE). Milford Haven Outer waterbody fails for mercury and its components. Milford Haven inner has a moderate for macroalgae and both inner and outer Milford Haven waterbodies were moderate for Dissolved Inorganic Nitrogen (DIN).

Contaminant levels in sediments have been reported as high in the Haven (despite improvements in pollution source control) but historic contaminants are known to be disturbed by construction and dredging (Little, 2009). Levels of certain contaminants (in sediments) are above statutory guideline concentrations (See Galperin & Little, 2014), although indications are that hydrocarbon contaminant loads there are decreasing (Little, 2009).

Thermal impacts from the discharged cooling water are being monitored. Other than direct localised impacts around the point of discharge, there is at present no other evidence of significant thermal impacts from this source.

This component has been assessed as **unfavourable**.

Typical species: There is a lot of good quality data for Skomer marine conservation zone (MCZ). NRW also has a lot of monitoring data for reefs in the site, especially for the Milford Haven Waterway. As the reef feature is large the monitored coverage is limited spatially. Not all the data has been completely worked up yet but preliminary analysis doesn't identify any issues for concern.

No major variations in overall reef trends since 2004 for intertidal rocky shore on Skomer, while sponge assemblages, from data in 2016, appears to be stable.

In 2016, an unusually high number of sea fan losses were recorded at Skomer MCZ, especially at the Bull Hole site. The losses are most likely due to mechanical damage (breakages), as remains of colony stalks were located. Activities that could lead to mechanical damage include potting, angling, recreational diving and anchoring, although anchoring is unlikely in this area of strong currents (Newman et. al., 2017). The decline in sea fan population is not enough to fail the whole typical species component. We do not have information on sea fans in the reef feature outside of the MCZ.

This component has been assessed as **favourable**.

Overall Trend (based on Skomer data only): Declining

Overall Confidence in trend: Medium

Noted Activities:

- Coastal defences,
- Angling (lost recreational angling gear is regularly observed by divers entangled in reef biota),
- Potting (lost commercial fishing pots are also found and retrieved in Skomer MCZ and other locations within the SAC).

Positives: The rocky shores and dive sites outside the Milford Haven Waterway monitored by NRW are generally considered to be in good condition, as well as rocky shores of the Milford Haven Waterway. Change in minimum catch sizes for some crustaceans that are typical species of reef is very positive (Crustacean Legislation Review, February 2016). A project run by Pembrokeshire SAC Relevant Authority Group (RAG) is developing the use of an anti-ghost fishing mechanism for pots that include making “weak links”, escape panels and gear traps to prevent ghost fishing. Local divers and Skomer MCZ are working with fishermen to recover lost pots.

Evidence used: *The evidence used to support the assessment conclusion.*

- Bunker, F. St. P. D. (2015). *Intertidal Monitoring of rocky reefs, Pembrokeshire Marine SAC. Population trends for selected species 2005 to 2014.* NRW Evidence Report No: 59, 66pp, Natural Resources Wales, Bangor
- Galperin, Y. and Little, D.I., 2014. *Forensic Evaluation of Milford Haven Sediment Hydrocarbon Contamination.* Environmental Geochemistry Consulting Supplemental Report to MHWESG. Moorpark, California: Environmental Geochemistry Consulting, 41 pp.
- Langston, W.J., O’Hara, S., Davey, M., Shortridge, E., Pope, E., Harino, N.D. & Vane, C.H. (2012). *Bioaccumulation surveillance in Milford Haven Waterway Phase II (2010).* Report to the MHWESG (Milford Haven Waterway Environmental Surveillance Group) from the Marine Biological Association UK.

- Little D.I. (2009). *Sediment Contaminants & Transport Review*. A report to the MHWESG (Milford Haven Waterway Environmental Surveillance Group).
- Mieszowska N. (2011). *Re-establishment of intertidal rocky shore surveillance*. Report to the MHWESG (Milford Haven Waterway Environmental Surveillance Group) from the Marine Biological Association of the UK.
- Mieszowska N, Adams L, Sugden H. (2016). *MarClim Annual Welsh Intertidal Climate Monitoring Survey 2015*. NRW Evidence Report No 161
- Morrell S. (2014). *Rocky Shore Surveillance 2013*. Report to the MHWESG (Milford Haven Waterway Environmental Surveillance Group) from the Field Studies Council Dale Fort Field Centre.
- Newman P, Lock K, Burton M & Jones J. (2017). *Skomer Marine Conservation Zone Annual Report 2016*. NRW Evidence Report No. 198.
- NRW Monitoring Subtidal Reefs within Welsh SACs, 2001 – 2011.
- NRW Audit commentary for 2013 assessments. H1170: Reefs. (for JNCC in 2012)
- Welsh Government Crustacean Legislation Review, 2016.
<http://gov.wales/topics/environmentcountryside/marineandfisheries/compliance-monitoring/crustacean-legislation-review/?lang=en> Accessed May 2016.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

3.4 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)

Component of habitat feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Favourable	WFD Waterbody Assessments, Reports & expert judgement	High	High	High
Structure & function	Unfavourable	WFD Waterbody Assessments (2015) & expert judgement	High	Medium	Medium
Typical species	Favourable	WFD Waterbody Assessments (2015) & expert judgement	High	Medium	Medium
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	Water pollution point and diffuse. Sediment pollution.				

Overall Indicative Assessment	Overall Confidence Level
Unfavourable	Medium

Notes section: *The rationale for the assessment conclusion and confidence.*

Distribution & extent: The Swansea Bay & Carmarthen Bay Shoreline Management Plan HRA predicted a 1 Ha loss of intertidal habitat (saltmarsh and intertidal mudflat and sandflat combined) due to coastal squeeze for the first epoch (2005 - 2025) for Pembrokeshire Marine SAC (Halcrow, 2012). This assumes that no estuary infilling/morphological response would occur to offset the predicted coastal squeeze, and in that context, is seen as a worst-case scenario. Sensitivity testing was also carried out using a range of sea-level rise scenarios, and this predicted a range of 0.3-1 ha of loss, with 1 ha therefore being a conservative estimate.

The National Habitat Creation Programme is referenced as the mechanism to deliver compensatory habitat within the SMP2 IROPI (Imperative Reasons of Overriding Public Interest) case, but to date no schemes have been delivered to offset the small predicted losses for Pembrokeshire Marine. Note that this is predictive and is relevant in the long-term, it does not currently relate to the condition of this element at this time.

Localised anthropogenic modifications include unauthorised digging up of salt marsh in Pembroke River and the Gann Estuary in the last 6 years. Mitigation measures have been implemented to aid recovery and the localised damage is recovering. We consider recovery is sufficient to not mark this attribute as unfavourable. No other changes to distribution and extent have been recorded since designation.

This component has been assessed as **favourable**.

Structure & function: Pembrokeshire Marine SAC overlaps with six waterbodies however, the Atlantic salt meadows feature, falls within two waterbodies (Milford Haven Inner and Milford Haven Outer). Both waterbodies have an overall moderate status and a fail for chemical status (these chemical failures are driven by mercury and its compounds in both waterbodies and by Tributyltin (TBT) and its compounds in Milford Haven Inner). Milford Haven inner has not been assessed for imposex⁵ but Milford Haven Outer has been and it was assessed as good.

Contaminant levels in sediments have been reported as high in the Haven (despite improvements in pollution source control) but historic contaminants are known to be disturbed by construction and dredging (Little, 2009). Both waterbodies were assessed as moderate for dissolved inorganic nitrogen (DIN). Milford Haven inner waterbody was also assessed as moderate for opportunistic macro-algae which can smother saltmarsh species. This component has been assessed as **unfavourable**.

Typical species: Both relevant waterbodies were assessed for saltmarsh Milford Haven Inner was assessed as high and Milford Haven outer was assessed as good.

⁵ Imposex: Deformities in the reproductive organs of female dogwhelk, used to assess biological levels of tributyltin (TBT).

This component has been assessed as **favourable**.

Noted Activities:

- Flytipping: This occurs in the Pembroke River at Catshole quarry and as a consequence large items of rubbish end up in the saltmarsh. Building rubble has been dumped on the upper edge of the saltmarsh since 2006 at several locations in the Pembroke River.
- Dredging - assessed as having no impact.

Evidence used: *The evidence used to support the assessment conclusion.*

- Environment Agency. (2011). *The Extent of Saltmarsh in England and Wales 2006 – 2009*.
- GIS saltmarsh extent layer for the whole of Wales up to November 2014. Richard West NRW.
- Halcrow (2012). Lavernock Point to St Ann's Head Shoreline Management Plan (SMP2). Appendix H: Statement to Inform a Habitats Regulations Assessment.
- Natural Resources Wales. (2015). *An Assessment of the Trophic Status of the Milford Haven Waterway*. Evidence Report to Welsh Government.
- Prosser MV, Wallace HL. (2003). *Milford Haven saltmarsh survey*. Report to the Milford Haven Waterway Environmental Surveillance Group.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

3.5 Mud-flats and sand-flats not covered by seawater at low tide indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine/ Sir Benfro Forol SAC
Site feature assessed	Mudflats & sandflats not covered by seawater at low tide

Component of habitat feature assessed	Indicative Assessment (Favourable, unfavourable, unknown)	Key evidence type used (monitoring data, reports or expert judgement)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Favourable	Mapping data, local knowledge of activities affecting extent, Shoreline management plan results and expert judgement	High	Medium	Medium
Structure & function	Unfavourable	Monitoring data (inc. WFD), reports and expert judgement	High	High	High
Typical species	Unfavourable	Monitoring data (inc. WFD), reports and expert judgement	High	Medium	Medium
Relevant activities (activities directly impacting condition of the feature on this site)	<ul style="list-style-type: none"> • Bait digging • Water quality issues 				

Overall Indicative Assessment	Overall Confidence Level
Unfavourable	High

Notes section: *The rationale for the assessment conclusion and confidence.*

Distribution and extent: No known changes in distribution or extent. The Swansea Bay & Carmarthen Bay Shoreline Management Plan (SMP) HRA predicted a 1 ha loss of intertidal habitat (saltmarsh (Atlantic salt meadows and intertidal mudflat and sandflat combined) due to coastal squeeze for the first epoch (2005 - 2025) for Pembrokeshire Marine SAC. This assumes that no estuary infilling/morphological response would occur to offset the predicted coastal squeeze, and in that context, is seen as a worst-case scenario. Sensitivity testing was also carried out using a range of sea-level rise scenarios, and this predicted a range of 0.3-1 ha of loss, with 1ha therefore being a conservative estimate. The West of Wales SMP HRA predicts a further 1 ha of loss, specifically of intertidal mudflat and sandflat in the first epoch (2005 – 2025) (Royal Haskoning, 2010). The National Habitat Creation Programme is referenced as the mechanism to deliver compensatory habitat within the SMP2 imperative reasons of overriding public interest (IROPI) case for both plans, but to date no schemes have been delivered to offset the small predicted losses for Pembrokeshire Marine.

Predicted losses are very small and are split across features – the assessors agreed that this wouldn't lead to a conclusion of unfavourable for distribution and extent of this feature. There have been some small, very localised, losses through the unauthorised use of gabions on the foreshore but it was decided that this was not significant when compared to the size of the feature at this site. This component has been assessed as **favourable**.

Structure and function: Habitats Directive monitoring (grab samples) in Milford Haven Inlets over intertidal areas show significant community change where samples have been in areas with excessive macroalgae (SAC monitoring 2015).

Pembrokeshire Marine SAC overlaps with six waterbodies however, the majority of mudflat and sandflat feature, that we have evidence for, falls within two waterbodies (Milford Haven Inner and Milford Haven Outer). Both waterbodies have an overall moderate status and a fail for chemical status (these chemical failures are driven by mercury and its compounds in both waterbodies and by tributyltin (TBT) and its compounds in Milford Haven Inner). Contaminant levels in sediments have been reported as high in the Haven (despite improvements in pollution source control) but historic and the contaminants are known to be disturbed by construction and dredging (Little, 2009).

Warwick (2017) performed a new analysis of grab data (this also applies to estuary and large shallow inlets and bays features) which found degradation in microbenthic assemblage in some stations, although the causes for this were not clear due to lack of data on levels of contaminants being inputted into the sediment. A report by Little (2016) showed not many new inputs, but high levels of contaminants already present, which are vulnerable to disturbance and subsequent biota impacts. Previous disturbance and biota impacts have been noted. Little (2009) states that data may suggest that contaminants are for the most part dispersed, weathered or sequestered in fine sediment areas. Work commissioned by the Milford Haven Waterway environmental surveillance group

(MHWESG) indicates that contaminants remain in the sediments for many years and are disturbed because of construction and dredging (Langston *et. al.*, 2012).

Both waterbodies have a moderate status for DIN (dissolved inorganic nitrogen) Milford Haven inner was assessed as moderate for opportunistic macroalgae. The amount of nuisance green macroalgae on the mudflats in the Milford Haven Waterway is high and in some places, e.g. Sandy Haven and Coshaston Pill sometimes smothers typical species e.g. *Salicornia*.

Bait digging at sheltered shores (e.g. Gann, Angle Bay, and Sandy Haven) has caused changes in sediment surface relief. Mudflats and sandflats not covered by seawater at low tide covers approximately 1,780 ha of the site. The area of bait digging in the inlets stated here is approximately 83.5 ha which equates to 4.7% of the site.

This component has been assessed as **unfavourable**.

Typical species: The WFD infaunal quality index (IQI) was assessed for the Milford Haven Inner and Milford Haven Outer waterbodies, and both were assessed as good. Dissolved inorganic nitrogen (DIN) was assessed as moderate in these two waterbodies with opportunistic macroalgae assessed as moderate in the inner haven but good in the outer Haven. Grab samples for SAC monitoring in Milford Haven Inlets over intertidal areas show significant community change where samples have been in areas with excessive macroalgae (SAC monitoring 2015). The amount of nuisance green macroalgae on the mudflats in the Milford Haven Waterway is high and in some places, e.g. Sandy Haven and Coshaston Pill sometimes smothers typical species e.g. *Salicornia*.

Low IQI (Infaunal Quality Index) scores at several intertidal mud sites in the Haven suggests that the invertebrate community is degraded and is characterised by raised abundance of opportunistic species and lower community diversity and richness, and this may be linked to raised nutrient levels (through organic enrichment and pollution). Some sites show a decline in number of taxa, a decline in species diversity, and other changes that are indicative of stressed communities. There is not much change between 2007 and 2012 though and it is difficult to draw a conclusion from these results. Abundance of some individual species in the community has gone down between 2007 and 2012. For the Gann, changes in infaunal species as a result of bait digging have occurred (Evans *et al.*, 2015). Diversity measures have gone down at some sites including one of the stations at the Gann. There has been a shift towards communities where a few species are dominant at some sites.

Angiosperms in Milford Haven Inner waterbody are assessed as high and for Milford Haven Outer waterbody they are assessed as good, with the seagrass sub attribute as high for both waterbodies. The seagrass (*Zostera noltei*) bed in Angle Bay has shown consistent expansion and increased density. This feature is in good condition, although bait digging and cockling currently cause damage (Duggan and Brazier, 2015)

Bioaccumulation studies conducted for the Milford Haven Waterway Environmental Surveillance Group have shown no general changes 2008-2010 in PAHs (polycyclic aromatic hydrocarbons) uptake by mussels, except for an order of magnitude increase at Angle (Harbour) and Pennar (Pembroke River). In contrast, a downward trend for total PAHs in ragworms was seen overall 2008-2010, again except for higher molecular weight PAHs at Angle and Pembroke River and some upper estuary stations. There are demonstrable linkages between some biota and nearby sediment contaminant trends for PAHs, and also for PCBs (polychlorinated biphenyls) and mercury (Little, 2014). Note that increases in tissue concentrations are likely to be due to disturbance of historic contaminants rather than an increase in contaminant levels.

This component has been assessed as **unfavourable**.

Noted activities:

- INNS (e.g. slipper limpet (*Crepidula fornicata*) also present in the site, no evidence that they are currently impacting this feature.

Evidence used: *The evidence used to support the assessment conclusion.*

- Bean EJ and Appleby TPS. (2014). *Guidelines for Sustainable Intertidal Bait and Seaweed Collection. LEGISLATIVE REVIEW.* University of the West of England. A report for the Pembrokeshire Marine Special Area of Conservation Relevant Authorities Group.
- Bunker F. StP. D. (2012). *Intertidal SAC monitoring Zostera noltei in Angle Bay, Pembrokeshire Marine SAC 2008.* CCW Marine Monitoring Report No: 81, 51pp + ix, Countryside Council for Wales, Bangor.
- Duggan-Edwards, M. & Brazier, D.P. (2015). *Intertidal SAC monitoring Zostera noltei in Angle Bay, Pembrokeshire Marine SAC 2013.* NRW Evidence Report No: 55, 38pp + xi, Natural Resources Wales, Bangor.
- Evans, S., Moon, J., Bunker, A. & Green, M. (2015). *Impacts of Bait Digging on the Gann: An Evidence Review.* NRW Evidence Report No. 81.
- Green, M. & Camplin, M. (In prep). *An analysis of the Macro Benthic Community between 2007 and 2012 (Milford Haven Waterway).* NRW Marine Monitoring Report.
- Langston WJ, O'Hara S, Davey M, Shortridge E, Pope ND, Harino and Vane CH. (2012). *Bioaccumulation surveillance in Milford Haven Waterway Phase II (2012).* Report to the MHWESG from the Marine Biological Association UK. Milford Haven Waterway Environmental Surveillance Group.
- Little, DI. (2009). *Sediment Contaminants & Transport Review.* Milford Haven Waterway Environmental Surveillance Group.
- Little, DI and Galperin Y. (2014). *Milford Haven sediment hydrocarbon and metals contamination: supplemental report on recent contaminant trends.* In Milford Haven Waterway Environmental Surveillance Group Business Report 2014.
- Little D. I., Bullimore, B., Galperin, Y. and Langston W. J. (2016). *Sediment contaminant surveillance in Milford Haven Waterway.* Environ. Monit. Assess. 188 1-30.

- Morris, L. and Perry, F. (In prep). *The Impacts of Intertidal Species Collection*. A report for the Pembrokeshire Marine Special Area of Conservation Relevant Authorities Group.
- Natural Resources Wales. (2015). *An Assessment of the Trophic Status of the Milford Haven Waterway*. Evidence Report to Welsh Government.
- Royal Haskoning (2010). West of Wales Shoreline Management Plan 2: Appendix I: Habitats Regulations Assessment. Report to Pembrokeshire County Council, October 2010.
- Warwick, R. (2017). *Milford Haven Waterway Sediment Macro-benthos Data Analysis and Review 2008-15*. A report to the Milford Haven Waterway Environmental Surveillance Group.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

3.6 Coastal lagoons indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Coastal lagoons

Component of habitat feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>Monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Favourable	NRW monitoring and reports	High	Medium	Medium
Structure & function	Unfavourable	NRW monitoring, WFD data and reports	High	High	High
Typical species	Unfavourable	NRW monitoring and reports	Medium	Medium	Medium
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	<ul style="list-style-type: none"> • Diffuse water pollution • Leaking sluice – Carew lagoon. 				

Overall Indicative Assessment	Overall Confidence Level
Unfavourable	High

Notes section: *The rationale for the assessment conclusion and confidence.*

Distribution and extent: No problems were identified in distribution and extent at this site, no changes have been identified since the site was designated.

This component was assessed as **favourable**.

Structure and function: Carew lagoon has been silting up (increase in sediment depth) as silt laden water enters the lagoon during periods of heavy rain. This alters the topography of the lagoon with an overall reduction in depth, which in turn impacts on the tidal volume of the lagoon and its ability to function. Reduced depth of water due to leaking lock gates exposes sediment more often, which may lead to changes in community composition.

Nutrients: Carew – DIN (dissolved inorganic nitrogen) and DIP (dissolved inorganic phosphorus) are measured in the stream entering the lagoon but have not been highlighted as problematic. Neyland - DIN and DIP are high in the stream running into the lagoon. Pickleridge – The stream running alongside the lagoon has very high levels of DIN and DIP. The tiny streams running directly into this lagoon are not monitored, but an observed algal bloom in 2013, and large amounts of green macroalgae suggest there is a nutrient problem.

As a result of leaking lock gates at Carew lagoon and nutrient problems at Neyland and Pickleridge this component has been assessed as **unfavourable**.

Typical species: Monitoring at Pickleridge lagoon has revealed that the taxonomic distinctness has reduced every year since 2008, and the least taxonomically diverse assemblage of species was recorded in 2013 (the most recent assessment). There are fewer molluscs and nemertea (ribbon worms), although it should be noted that there have never been many taxa at this station. High confidence assigned despite low number of taxa/decrease in taxa due to the existence of long term data set (Green & Camplin, in prep).

This component has been assessed as **unfavourable**.

Positives:

- The improved design fish pass at Neyland represents an improvement for this lagoon.
- Work is currently being carried out on the sluice gate and retaining wall.

Noted activities:

- Management of the quarry near Carew lagoon.

Evidence used: *The evidence used to support the assessment conclusion.*

- Edwards, P. (2014). *Nutrient concentrations in the Milford Haven catchment area*. Tech. memo: TMW14-09 Natural Resources Wales. NRW
- Edwards, P. (2005). *An assessment of the eutrophication risks and impacts in the Milford Haven Waterway*. Environment Agency Wales.
- Green, M., and Camplin, M. (in prep). *Lagoons (Across-Wales)*. NRW Evidence Report
- NRW (2014). *Environmental Pressures on the Milford Haven Waterway*. Report – A&R/SW/13/1
- NRW for JNCC 02/01/2013. Audit commentary for 2013 assessments H1150: Coastal lagoons.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

3.7 Submerged or partially submerged sea caves indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Submerged or partially submerged sea caves

Component of habitat feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>Monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Favourable	Expert judgement, monitoring report	High	Low	Low
Structure & function	Unknown	Expert judgement	High	Not applicable	Not applicable
Typical species	Unknown	Expert judgement	High	Not applicable	Not applicable
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	No activities identified as having a direct impact on feature condition.				

Overall Indicative Assessment	Overall Confidence level
Unknown	Not applicable

Notes section: *The rationale for the assessment conclusion and confidence.*

Distribution & Extent: Based on the original surveys in 2002 (Bunker & Holt, 2003) the distribution and extent is thought not to have changed since designation. Therefore, this component has been assessed as **favourable**.

Structure & Function, Typical species: To the assessors' knowledge there have been no further surveys of sea caves since 2002, therefore with the exception of distribution and extent they cannot conclude anything except "unknown" for structure and function and typical species. Therefore, these components have been assessed as **unknown**.

Although distribution and extent has been assessed as favourable since there have been no surveys since 2002 the overall assessment for this feature on this site has been assessed as **unknown**.

Noted activities:

There is some concern about the increase in coastering in the sea caves on this site but there is no evidence of impact.

Evidence used: *The evidence used to support the assessment conclusion.*

- Bunker, F.StP.D. & Holt, R.H.F. (2003). *Surveys of sea caves in Welsh Special Areas of Conservation*. CCW Marine Monitoring Report No: 6 pp 97. Countryside Council for Wales.

3.8 Sandbanks which are slightly covered by seawater all the time indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Sandbanks which are slightly covered by seawater all the time

Component of habitat feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Distribution & Extent (within site)	Favourable	NRW monitoring & expert judgement	High	Low	Low
Structure & function	Favourable	NRW monitoring, WFD assessments & expert judgement	High	Low	Low
Typical species	Unfavourable	NRW monitoring & expert judgement	High	Low	Low
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	No activities identified as having a direct impact on site condition.				

Overall Indicative Assessment	Overall Confidence level
Unfavourable	Low

Notes section: *The rationale for the assessment conclusion and confidence.*

Distribution & extent: Data available for Turbot Bank only therefore low confidence, last data from 2012/13. Nothing in available data to suggest changes beyond those expected for natural variation for structure and function and distribution and extent components. This component has been assessed as **favourable**.

Structure & function: The Pembrokeshire Marine SAC boundary overlaps with six WFD waterbodies however part of the sandbank feature falls outside the WFD assessment area although it does overlap with two waterbodies (Cardigan Bay South and Pembrokeshire South). Both these waterbodies have an overall good status with good chemical status. Pembrokeshire South was assessed as high for phytoplankton and DIN (dissolved inorganic nitrogen). Cardigan Bay South waterbody was assessed as high for the macroalgae element.

This component has been assessed as **favourable**.

Typical species: Data shows decline in species richness, abundance and diversity (NRW monitoring data). Low confidence due to the age of the data and uncertainty over the cause of the decline (Bergmann *et al.*, 2004). WFD Infaunal quality index (IQI) was not assessed for either of the relevant waterbodies.

Fish as a typical species of the feature was assessed and it was concluded as unknown, not unfavourable. ICES data was not used due its inappropriateness at a local scale.

Based on the NRW monitoring data showing a decline in species richness, abundance and diversity this component was assessed as **unfavourable**.

Evidence used: *The evidence used to support the assessment conclusion.*

- Bergmann, M.J, Hinz, H., Galanidi, M., Shucksmith, R., Rees, E.I.S., Darbyshire, T., Ramsay, K. (2004). *Demersal fish and epifauna associated with sandbank habitats*. Estuarine, Coastal and Shelf Science 60:445-456
- Davidson, K., Gowen, R.J., Harrison, P.J., Fleming, L.E., Hoagland, P., Moschonas, G. (2014). *Anthropogenic nutrients and harmful algae in coastal waters*. Journal of Environmental Management. Vol. 146, 206 – 216
- Lock, K., Burton, M., Newman, P. & Jones, J. (2015). *Skomer Marine Conservation Zone Project Status Report 2014*. NRW Evidence Report No. 66.
- NRW (2015). Pembrokeshire Marine SAC Typical Species Advice 29.10.15. Unpublished internal advice.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>



3.9 Grey seal *Halichoerus grypus* indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine SAC
Site feature assessed	Grey seal (<i>Halichoerus grypus</i>)

Component of species feature assessed	Indicative Assessment (Favourable, unfavourable, unknown)	Key evidence type used (Monitoring data, reports or expert judgement)	Level of agreement	Confidence in evidence	Component confidence level
Population (e.g. size, structure, production, condition of species within site, contaminant burdens)	Favourable	Reports & expert judgement	High	Medium*	Medium
Range (within site)	Favourable	Reports & expert judgement	Medium	Medium*	Medium
Supporting habitats					
<i>Distribution & extent</i>	Unknown	Expert judgement / Casework	Medium	Not applicable	Not applicable
<i>Structure & function</i>	Unknown	Expert judgement / Casework	Medium	Not applicable	Not applicable
<i>Prey availability and quality</i>	Unknown	Expert judgement / Casework	Medium	Not applicable	Not applicable
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	No activities identified as having a direct impact on site condition.				

Overall Indicative Assessment	Overall Confidence Level
Favourable	Medium*

* High at monitored sites

Notes section: *The rationale for the assessment conclusion and confidence.*

Population:

At monitored sites (Ramsey Island, Skomer MCZ (Marloes and Skomer Island) and several North Pembrokeshire coastal sites), pup production has increased (exponentially at Marloes (Bull, *et al.*, 2017a)) over the last decade or more (Bull, *et al.*, 2017a,b; Strong, *et al.*, in prep; Morgan, *et al.*, 2016). The onset and peak of the pupping season has also become earlier over the observed period with no indication of reaching carrying capacity (Bull, *et al.*, 2017a, b; Strong, *et al.*, in prep; Morgan, *et al.*, 2016), suggesting a relationship with climatic or environmental factors is more likely than density dependent processes.

This component has been assessed as **favourable**.

Trend (population only): Recovering (at monitored sites)

Confidence in trend: Medium

Range: From the work commissioned by NRW, known pupping sites have been maintained over the observed period (over a decade) and there is no loss in range (or reduction in pupping site distribution) (Baines *et al.*, 1995; Buche & Stubbins, 2014; Morgan *et al.*, 2016; Strong *et al.*, 2006; Strong *et al.*, in prep). The number of pupping sites may have increased and distribution of pupping sites expanded, but this aspect has not been systematically monitored (or mapped) since Strong *et al.*, (2006). Grey seals range widely in the South and West England and Wales Management Unit as demonstrated by satellite tracking (SCOS 2013, Jones, *et al.*, 2013; Thomson, 2011) and photographic identification (photoID) (Pomeroy, *et al.*, 2015).

This component has been assessed as **favourable**.

Supporting habitats (All): The growth of pup production over at least the last decade (Bull, *et al.*, 2017a, b; SCOS, 2016) suggests that the supporting habitat is functioning well and likely to be of sufficient quality to enable population growth but no direct surveys of habitat quality for the species feature have been carried out.

Information has not been collected on supporting habitats so they have been assessed as **unknown**.

Noted activities:

- No planned activities or plans/projects are considered to adversely affect the feature of the SAC (e.g. Adverse Effect of Site Integrity). The population (at least at those pupping sites monitored) is increasing, reflecting a good quality, functioning supporting habitat, despite present levels of human activity and plans & projects.
- Seals in the SAC are part of a wider population, considered to be at the scale of the SW England and Wales Management Unit. Bycatch in this management Unit (from gillnet fisheries in south-west approaches (outside the site)) is high. Despite this, the population is increasing.

Evidence used: *The evidence used to support the assessment conclusion.*

- Baines, M.E., Earl, S.J., Pierpoint, C.J.L., Poole, J. (1995). *The west Wales grey seal census*. CCW Contract Science Report No. 131. Countryside Council for Wales, Bangor.
- Büche, B., Stubbings, E. (2014). *Grey Seal Breeding Census Skomer Island, (2013)*. Natural Resources Wales, Cardiff.
- Bull, J.C., Börger, L., Banga, R., Franconi, N., Lock, K., Morris, C., Newman, P. & Stringell, T. (2017a). *Temporal trends and phenology in grey seal (Halichoerus grypus) pup counts at Marloes Peninsula, Wales*. NRW Evidence Report No: 155, Natural Resources Wales, Bangor.
- Bull, J.C., Börger, L., Franconi, N., Banga, R., Lock, K., Morris, C., Newman, P. & Stringell, T. (2017b in prep). *Temporal trends and phenology in grey seal (Halichoerus grypus) pup counts at Skomer, Wales*. NRW Evidence Report No: 217, Natural Resources Wales, Bangor.
- Jones, E., McConnell, B., Sparling, C., Matthiopoulous, J. (2013). *Grey and harbour seal density maps*. SMRU report to Scottish Government under Marine Mammal Scientific Support Research Programme MMSS/001/11, Task MR 5 (part), Version 1500
- Keily, O., Lidgard, D., McKibben, M., Connolly, N., Baines, M.E. (2000). *Grey seals: Status and monitoring in the Irish and Celtic Seas*. Maritime Ireland/Wales INTERREG Report No. 3.
- Morgan, L.H., Morris, C.W., Stringell, T.B. (in prep). *Grey Seal Pupping Phenology on Ramsey Island, Pembrokeshire*. NRW Evidence Report No: 156, 18 pp, Natural Resources Wales, Bangor.
- Pomeroy, P., Rosas Da Costa, O. & Stringell, T.B. (2015). *Grey seal movements – photoID*. SCOS Briefing Paper. In SCOS 2014. Scientific Advice on Matters Related to the Management of Seal Populations: 2014.
- SCOS, (2013). *Scientific Advice on Matters Related to the Management of Seal Populations: 2013*. Special Committee on Seals, SMRU, University of St Andrews.
- SCOS, (2016). *Scientific Advice on Matters Related to the Management of Seal Populations: 2016*. Special Committee on Seals, SMRU, University of St Andrews.
- Strong P.G., Lerwill J., Morris S.R. & Stringell, T.B. (2006). *Pembrokeshire marine SAC grey seal monitoring 2005*. CCW Marine Monitoring Report No: 26; redacted version. 51pp.
- Strong P.G., Lerwill J., Morris S.R., Moir, R., Morgan, L., Quinton S. & Stringell, T.B. (In Prep). *North Pembrokeshire grey seal pup production trends 1992 to 2014*. NRW Evidence Report. Natural Resources Wales, Bangor.
- Thompson, D. (2011). *Grey Seal Telemetry Study*. In: Anon (ed) Assessment of Risk to Marine Mammals from Underwater Marine Renewable Devices in Welsh waters Phase 2 - Studies of Marine Mammals in Welsh High Tidal Waters. RPS for Welsh Government.

3.10 Allis shad *Alosa alosa* & Twaite shad *Alosa fallax* indicative condition assessment

The indicative condition of these features at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Allis & Twaite Shad (<i>Alosa alosa</i> & <i>Alosa fallax</i>)

Component of species feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>Monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Freshwater population variables	Favourable	Garrett 2015	High	Medium	Medium
Marine habitat	Favourable	WFD 2015 Assessment & expert judgement	High	High	High
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	No activities identified as having a direct impact on site condition.				

Overall Indicative Assessment	Overall Confidence level
Favourable	High

Notes section: *The rationale for the assessment conclusion and confidence.*

Freshwater population variables: Allis and twaite shad are closely related and are known to hybridise. Allis shad are much rarer and although their presence is suspected in the Wye and Usk, there are no recent confirmed records. Genetic studies show that populations in the Wye, Usk, Tywi and Severn all show evidence of significant levels of past or current hybridisation (Hardouin *et al.* 2013). Hybrids are particularly prevalent on the Tywi, where about 75% of twaite shad contain allis shad genes, though this is more likely to reflect past hybridisation.

The Welsh side of the Bristol Channel contains almost all the known UK populations of shad. This assessment uses data from the Afon Tywi SAC. It is likely that juvenile and adult fish from Severn Estuary SAC use Pembrokeshire Marine, but no specific fish monitoring data are available so the same data used for the Carmarthen Bay and Estuaries indicative shad assessment for freshwater population variables is used here:

Population assessment data are spatial and based on egg surveys with DNA quality assurance (Hardouin *et al.*, 2013, Stone 2015). These indicate that spawning occurs mainly in the lower river below Nantgaredig, but are unable to reflect the likely impact of the Nantgaredig abstraction. Temperature studies have shown that the Tywi is too cold to support a viable shad population above Llandeilo (Knights 2014). A fish counter is present at Nantgaredig but shad have proved technically difficult and relatively labour-intensive to monitor in this way: consequently, only limited data are available.

This component has been assessed as **favourable** but medium confidence based on the distance from the Afon Tywi SAC.

Marine habitat: Shad are coastal feeders and are not thought to use the inner and outer haven areas of the site. The most relevant waterbodies for this feature on this site are Grassholm Island & the Smalls and Pembrokeshire South. Both waterbodies have been assessed as good for overall status and chemical status. Coastal water quality is good therefore considered favourable for this feature.

This component has been assessed as **favourable**.

Evidence used: *The evidence used to support the assessment conclusion.*

- Garrett, HM, (2015). *Afon Tywi SAC shad spawning assessment 2015 (Alosa alosa & Alosa fallax), incorporating classification of 2013 and 2014 survey data.* NRW Evidence report no 87. 29pp, Natural Resources Wales, Bangor.
- Hardouin, E.A., Stuart, S., Andreou, D. (2013). *Monitoring Allis and Twaite Shad: quality assurance and species identification using molecular techniques.* NRW Evidence Report No: 1, 41pp, Natural Resources Wales, Bangor.

- Knights AM. (2014). *Modelling the response of the twaite shad (Alosa fallax) population in the Afon Tywi SAC to a modified temperature regime*. 48pp. NRW Evidence Report No. 6. Bangor, Natural Resources Wales. JNCC (2005), Common Standards Monitoring Guidance for Freshwater Fauna, Version - August 2015, ISSN 1743-8160 (Online)
- JNCC (2015). *Common Standards Monitoring Guidance for Freshwater Fauna*, Version - October 2015, ISSN 1743-8160 (Online)
- Stone, D.M. (2015). *Monitoring Allis and Twaite Shad: quality assurance and species identification using molecular techniques*. NRW Evidence Report 53. Bangor, Natural Resources Wales.
- Thomas, R. & Garrett, H. (2013). *2nd Reporting Cycle Condition Assessments (2007-2012): Afon Tywi SAC*.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

3.11 River lamprey *Lampetra fluviatilis* indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro SAC
Site feature assessed	River Lamprey (<i>Lampetra fluviatilis</i>)

Component of species feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>Monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Freshwater population variables	Favourable	Monitoring data and report (Garrett <i>et al.</i> , 2013)	High	High	High
Marine habitat	Unfavourable.	WFD 2015 assessment & expert judgement	High	Medium	Medium
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	Water quality issues				

Overall Indicative Assessment	Overall Confidence level
Unfavourable	Medium

Notes section: *The rationale for the assessment conclusion and confidence.*

Freshwater population variables: The supporting datasets are good and based on a specific NRW monitoring programme following relevant Joint Nature Conservation Committee (JNCC) common standards monitoring (CSM) guidance (2005; 2015) and WFD Assessment 2015. Lamprey (*Lampetra* spp.) cannot be reliably identified to species at the larval stage, so there is inherent uncertainty in the population assessment. The individual population variables are as follows: Age Structure: Pass, Distribution: Pass, Larval Density: Pass, this gives an assessment of favourable.

This component has been assessed as **favourable**.

Marine habitat: The WFD Assessment indicates failures of some parts of the marine habitat (inner and outer Haven) due to DIN (dissolved inorganic nitrogen) and toxic chemicals. WFD data was used from the six relevant waterbodies (Cardigan Bay South, Grassholm Island & The Smalls, Milford Haven Inner, Milford Haven Outer, Solfach Estuary and Pembrokeshire South) four of these waterbodies have a good overall status and good chemical status while two have a moderate overall status and a fail for chemical status. The chemical status fail in the Milford Haven Inner is for tributyltin (TBT) compounds, mercury and its compounds and brominated diphenylether (BDPE). Milford Haven Outer waterbody fails for mercury and its components.

This component has been assessed as **unfavourable**.

Evidence used: *The evidence used to support the assessment conclusion.*

- Carpenter, G. (2012). *Afonydd Cleddau SAC EA assessment of recent actual flows 2006 – 2011*. EA. Llandarcy.
- Garrett, H., Hatton-Ellis, T.W. & Thomas, Rh. (2013). *Afonydd Cleddau Population Attribute Condition Assessment for Brook, River and Sea Lamprey 2012*. CCW Staff Science Report No. 13/8/1. NRW-13-008997.
- JNCC, (2005). *Common Standards Monitoring Guidance for Freshwater Fauna*, Version - August 2015, ISSN 1743-8160 (Online)
- JNCC, (2015). *Common Standards Monitoring Guidance for Freshwater Fauna*, Version - October 2015, ISSN 1743-8160 (Online)
- Thomas, Rh., Hatton-Ellis, T.W. & Garrett, H. (2013). *Water Quality Assessments for River Special Areas of Conservation: Second Habitats Directive Reporting Round (2007-2012)*. 12/8/2. Bangor, Countryside Council for Wales. CCW Staff Science Reports.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

3.12 Sea lamprey *Petromyzon marinus* indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Sea lamprey (<i>Petromyzon marinus</i>)

Component of species feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Freshwater population variables	Unfavourable	Monitoring data and reports (Clabburn, 2015; Garrett <i>et al.</i> , 2013).	High	Low	Low
Marine habitat	Unfavourable	WFD 2015 assessment & expert judgement	High	Medium	Medium
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	Water quality issues				

Overall Indicative Assessment	Overall Confidence level
Unfavourable	Medium

Notes section: *The rationale for the assessment conclusion and confidence.*

Freshwater population variables: The supporting datasets are based on a specific NRW monitoring programme following relevant Joint Nature Conservation Committee (JNCC) common standards monitoring (CSM) guidance (2005; 2015). As with all migratory fish, the assessment is based on data from the inflowing river (Afonydd Cleddau), as relevant marine data have not been collected. Although sea lamprey ammocoetes are distinct from *Lampetra* ammocoetes, they are typically much less frequent in samples and so can be difficult to detect. Therefore, sea lamprey ammocoete data are always poor. DIDSON monitoring in the river has however also indicated that sea lamprey numbers are very low. New methods such as eDNA might provide additional insights into the distribution and status of this species in the Cleddau catchments.

The individual population variables are as follows: Ammocoetes: Fail, Adult Run: Fail.

This component has been assessed as **unfavourable**.

Marine habitat: WFD assessment indicates unfavourable status of the marine habitat through dissolved inorganic nitrogen (DIN) and toxic chemicals. WFD data was used from the six relevant waterbodies (Cardigan Bay South, Grassholm Island & The Smalls, Milford Haven Inner, Milford Haven Outer, Solfach Estuary and Pembrokeshire South) four of these waterbodies have a good overall status and good chemical status while two have a moderate overall status and a fail for chemical status. The chemical status fail in the Milford Haven Inner for tributyltin (TBT) compounds, mercury and its compounds and brominated diphenylether (BDPE). Milford Haven Outer waterbody fails for mercury and its compounds.

This component has been assessed as unfavourable.

Noted activities:

- Barriers to migration.

Evidence used: *The evidence used to support the assessment conclusion.*

- Carpenter, G. (2012). *Afonydd Cleddau SAC EA assessment of recent actual flows 2006 – 2011*. EA. Llandarcy.
- Clabburn P. (2015). *DIDSON Assessment of adult sea lamprey migration on the Western Cleddau*.
- Davies R. (2016). *Sea Lamprey Monitoring on the River Tywi 2011-2014*. NRW Report NFAT/16/02.
- Garrett, H., Hatton-Ellis, T.W. & Thomas, Rh. (2013). *Afonydd Cleddau Population Attribute Condition Assessment for Brook, River and Sea Lamprey 2012*. CCW Staff Science Report No. 13/8/1. NRW-13-008997.
- JNCC, (2005). *Common Standards Monitoring Guidance for Freshwater Fauna*, Version - August 2015, ISSN 1743-8160 (Online)
- JNCC, (2015). *Common Standards Monitoring Guidance for Freshwater Fauna*, Version - October 2015, ISSN 1743-8160 (Online)

- Thomas, Rh. & Garrett H. (2013). *2nd reporting Cycle Condition assessments (2007-2012): Afonnydd Cleddau SAC*.
- Thomas, Rh., Hatton-Ellis, T.W., Garrett, H. (2013). *Water Quality Assessments for River Special Areas of Conservation: Second Habitats Directive Reporting Round (2007-2012)*. 12/8/2. Bangor, Countryside Council for Wales. CCW Staff Science Reports.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

3.13 Otter *Lutra lutra* indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Otter (<i>Lutra lutra</i>)

Component of species feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>Monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Population (<i>e.g. size, structure, production, condition of species within site, contaminant burdens</i>)	Favourable	Monitoring data, reports & expert judgement	High	Medium	Medium
Range (within site)	Favourable	Reports	High	High	High
Supporting habitats					
Distribution & extent	Favourable	Monitoring data & reports	High	High	High
Structure & function	Favourable	Reports & expert judgement	High	Medium	Medium
Prey availability and quality	Unknown	Not applicable	High	Not applicable	Not applicable
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	No activities identified as having a direct impact on site condition.				

Overall Indicative Assessment	Overall Confidence Level
Favourable	High

Notes section: *The rationale for the assessment conclusion and confidence.*

Note: For the otter feature the population and range attributes were felt to be the most important components with supporting habitat, although important, as less important in these indicative condition assessments. It was agreed that they should not fail the feature if the population and/or range were favourable. This is because less is known about these supporting habitats as they relate to otter in European marine sites (EMS).

Population: The hydrometric area of the 2009/10 otter survey relevant to this site is the Cleddau. The Cleddau hydrometric area has consistently provided some of the highest proportions of positive sites⁶ since the first national survey in 1977/8 and the 2009-10 survey was no exception, with 97% of sites positive (Strachan, 2015). This suggests that the catchment may be at, or close to, carrying capacity for otters, with any negative sites reflecting the snapshot nature of the survey rather than a real absence of otters.

Although an increase in the number of positive sites may not necessarily equate to an increase in the number of otters present (Strachan, 2015) it appears that otter populations are recovering well. Kean, Lyons & Chadwick (2013) show that despite the population increase, there are indications which suggests that otters may not be in optimal reproductive health. There is a general trend of bioaccumulation decreasing in otters.

This component has been assessed as **favourable**.

Trend (population only): Recovering

Confidence in trend: Medium

Range: The Article 17 reporting (reporting to Europe) ranked the threat of “Roads, paths, railroads” as of medium importance for otters. In this site evidence suggests that these kind of barriers are not a major problem for otters. Although otters are likely to be using the marine site are periodically killed on the roads, Wilkinson and Chadwick (2012) did not identify any sites with 4 or more road traffic accident casualties since 2000.

This component has been assessed as **favourable**.

Supporting Habitat and Species

Distribution and extent: Liles (2015) states that there appears to have been very little change in the good quality and high availability of cover in which otters can lie up and breed since 2002. Evidence (from sightings of cubs) suggests that otters breed on some of the 27 coastal stream sites. Potential breeding sites were also identified in this report. The work undertaken on behalf of the Relevant Authority Group has enabled a high confidence to be given the favourable condition assessment of this attribute.

⁶ Positive sites are survey sites which show sign of the presence of otters, this is calculated against a baseline survey in 1977-78.

Although the target has been met it is important to recognise that there are still improvements that can be made. Some breeding site enhancement work is planned for the river sites connecting with Pembrokeshire Marine SAC (*Pers. comms.* Chris Lawrence, NRW).

This component has been assessed as **favourable**.

Structure and Function: No long term decrease in vegetation cover at otter access points have been identified in recent fieldwork. Recent (2014) engineering work at Pembrokeshire Mill Pond Barrage (a well-known access point) included mitigation for otter access during the work. No modifications to shore structure was noted in any of the surveys on this site (Liles, 2003, Liles, 2005 & Liles, 2009, Parry 2008, Parry 2010, Parry *et al.*, 2010, Parry 2012).

This component has been assessed as **favourable**.

Prey availability and quality: There is very little evidence of the amount or quality of prey for otters at this site. There is no data on prey contamination.

This component has been assessed as **unknown**.

Evidence used: *The evidence used to support the assessment conclusion.*

- Hobbs, G.I., Chadwick, E.A., Bruford, M.W. and Slater, F.M. (2011). *Bayesian clustering techniques and progressive partitioning to identify population structuring within a recovering otter population in the UK*. Journal of Applied Ecology 48: 1206–1217.
- Kean E.F., Lyons, G., & Chadwick, E.A. (2013). Persistent organic pollutants and indicators of otter health. A CHEM Trust report.
- Liles, G. (2003). *Otter (Lutra lutra) activity and habitat availability on the Pembrokeshire coast and Milford Haven waterway, within the Pembrokeshire Marine candidate Special Area of Conservation*. A report for the Pembrokeshire Marine SAC Relevant Authorities Group, Milford Haven.
- Liles, G. (2005). *Pembrokeshire Marine Special Area of Conservation Otter (Lutra lutra) Volunteer survey*. A report for the Pembrokeshire Marine SAC Relevant Authorities Group.
- Liles, G. (2009). *Otter (Lutra lutra) activity on the open coast & islands within the Pembrokeshire Marine Special Area of Conservation*. A report to the Pembrokeshire Marine SAC Relevant Authorities Group.
- Parry, G.S. (2012). *Otter prey items on Ramsey and the associated Pembrokeshire coastline*. This was a follow-up survey to continue the Ramsey work. *Lutra lutra activity on the open coast & islands within the Pembrokeshire Marine Special Area of Conservation*. A report to the Pembrokeshire Marine SAC Relevant Authorities Group.
- Parry, G.S. (2008). *Diet of the Eurasian otter (Lutra lutra) with the Pembrokeshire marine SAC region*. Swansea University. Swansea.

- Parry, G.S. (2010). *Otter diet on Ramsey Island*. Report prepared for the Pembrokeshire Marine SAC relevant authorities group.
- Parry, G.S., Cox, B., Burton, S. & Forman, D.W. (2010). *Diet of coastal foraging Eurasian otters (Lutra lutra L.) in Pembrokeshire south-west Wales*, European Journal
- Strachan, R. (2015). *Otter Survey of Wales*. Natural Resources Wales. Published by Natural Resources Wales. <https://naturalresources.wales/evidence-and-data/research-and-reports/wales-otter-report-2009-10/?lang=en>
- Walker, L.A, Lawlor, A.J., Chadwick, E.A., Potter, E., Pereira, M.G. & Shore, R.F. (2011). *Inorganic elements in the livers of Eurasian otters, Lutra lutra, from England and Wales in 2009 - a Predatory Bird Monitoring Scheme (PBMS) report*. Centre for Ecology & Hydrology, Lancaster, UK.
- Wilkinson, C. and Chadwick, E.A. (2012) *Otter casualties in South Wales: Recommendations for Mitigation*. Cardiff University Otter Project.

3.14 Shore dock *Rumex rupestris* indicative condition assessment

The indicative condition of the feature at this site at the time of assessment

Date	May 2017
Site name	Pembrokeshire Marine / Sir Benfro Forol SAC
Site feature assessed	Shore dock (<i>Rumex rupestris</i>)

Component of species feature assessed	Indicative Assessment (<i>Favourable, unfavourable, unknown</i>)	Key evidence type used (<i>monitoring data, reports or expert judgement</i>)	Level of agreement	Confidence in evidence	Component confidence level
Population (e.g. size, dynamics and/or structure)	Favourable	Monitoring data and expert judgement	High	High	High
Distribution & Extent	Favourable	Monitoring data and expert judgement	High	High	High
Relevant activities (<i>activities directly impacting condition of the feature on this site</i>)	No activities identified as having a direct impact on feature condition				

Overall Indicative Assessment	Overall Confidence level
Favourable	High

Notes section: *The rationale for the assessment conclusion and confidence.*

Population size: It is difficult to set limits for this attribute as the limited population data available shows quite large fluctuations in the numbers seen each year. It is important that a sustainable population of *R. rupestris* is maintained at the site; however, without further research it is not known what constitutes a sustainable population. In addition, as this is the only known population on the west Wales coast it provides a crucial seed source.

At Watery Bay a count of at least 100 has been chosen as the current limit for the number of flowering or fruiting stems, to reflect the annual population counts made here since discovery (mean count is 112).

At Hooper's Point a count of at least 25 has been chosen as the current limit for the number of flowering or fruiting stems, to reflect the annual population counts made since discovery (mean count is 28).

Reproductive capability: Flowering or fruiting is used as a practical surrogate for reproductive capability. However, there is a concern that there are low numbers of younger vegetative plants and the absence of seedlings is causing concern.

This component has been assessed as **favourable**.

Extent & Distribution: Populations are vulnerable to incidents such as rockfall – one such incident partly buried the population at the Hooper's Point end of the site. Suitable habitat is limited in extent; coincidence of cliff niches and constant freshwater source are needed. Known existing colonies are in locations at low risk from anthropogenic activities but allowing the natural coastal erosion cliffs is desirable (indeed unstoppable) and the coastline should not be stabilised.

This component has been assessed as **favourable**.

Current Performance Indicators: Extent and distribution – "*R. rupestris* must be present in at least 2 locations i.e. Watery Bay & Hooper's Point in 4 years out of 6". This indicator needs to be re-visited to reflect that if a population is lost from one of the two sites (for more than 2 years), that NRW are happy with this because it is "natural" disturbance.

Natural processes and climate change are having an effect on the feature:

- Main colony at Hooper's Point partly covered in a **rock fall**.
- Raised level of beach at Hooper's Point **increased the depth of water table** = negative impact on recruitment, flowering and fruiting.
- **Winter storms**, scouring upper beach = destroying plant colonies.
- **Summer storms**, increasing salt load on plant surfaces stressing plants and reducing vigour.

Noted activities:

This species is at low risk from anthropogenic activities at this site

Evidence used: *The evidence used to support the assessment conclusion.*

- Hudson, J. (2012). Pembrokeshire Marine SAC. *Rumex rupestris* (1441). SAC Monitoring report.

3.15 Comparison with previous assessments

The indicative condition assessments were compared to previous assessments for these features at the site level carried out between 2005 – 2007. The earlier assessments were carried out in more detail and different data and evidence sources were sometimes used; as a result, current and previous assessments are not directly comparable, although they do both give an indication of the condition of the feature at the time of assessment.

Feature	2005 - 07 assessments	2017 indicative assessments
Large shallow inlets and bays	Unfavourable	Unfavourable
Estuaries	Unfavourable	Unfavourable
Reefs	Unfavourable	Unfavourable
Atlantic salt meadows (<i>Glaucopuccinellietalia maritimae</i>)	Unfavourable	Unfavourable
Mudflats and sandflats not covered by seawater at low tide	Unfavourable	Unfavourable
Coastal lagoons	Favourable	Unfavourable
Submerged or partially submerged sea caves	Favourable	Unknown
Sandbanks which are slightly covered by seawater all the time	Unfavourable	Unfavourable
Grey seal (<i>Halichoerus grypus</i>)	Favourable	Favourable
Allis shad (<i>Alosa alosa</i>)	Not Assessed	Favourable
Twaite shad (<i>Alosa fallax</i>)	Not Assessed	Favourable
River lamprey (<i>Lampetra fluviatilis</i>)	Unfavourable	Unfavourable
Sea lamprey (<i>Petromyzon marinus</i>)	Unfavourable	Unfavourable
Otter (<i>Lutra lutra</i>)	Favourable	Favourable
Shoredock (<i>Rumex rupestris</i>)	Not Assessed	Favourable

4. Future development of site level assessments

Following this full round of indicative site condition assessments, we are now developing a permanent, sustainable, site level feature condition reporting process that can be delivered on a regular basis. We are planning a series of projects to work towards this goal. It is unlikely that resources and suitable evidence sources will all be available at any given time to monitor and report on all features, or to report to the same level of confidence. Our aim, however, is to develop, over the coming few years, an assessment and reporting process that is of practical use in informing effective site management for the maintenance or improvement of feature and site condition.

Annex A: Process used to produce indicative condition assessments

The process to produce indicative feature condition assessments at the site level centred around a workshop approach that applied readily available evidence and expert judgement to provide an *indication* of features condition. Figure A1 summarises the process of producing indicative condition assessments, and Figure A2 provides a summary definition of NRW's meaning of indicative site level feature condition assessments and advice on how they should be used.

Figure A1: Summary of the procedure undertaken

Stages undertaken to produce indicative site level condition assessment reports for Welsh European marine sites (EMS)

1. Indicative condition assessment workshop
2. Standardisation of indicative feature assessments across different sites
3. Standardised feature assessments sent out internally for comment
4. Issues with individual assessments resolved
5. Features assessments re-issued to internal staff for final comments.
6. Final draft indicative feature-level condition assessments produced
7. Internal sign-off * - draft indicative feature-level condition assessments
8. External quality assurance of draft indicative feature-level condition assessments
9. Changes made to assessments arising from quality assurance stage
10. Production of site-level reports containing indicative assessments and guidance for interpretation and use of indicative assessments
11. Final Internal sign-off ** - final site-level reports

* 1st internal sign-off by a dedicated task & finish group for the work

** Final internal sign-off by the task & finish group and then the Marine Programme Board

Figure A2: Summary definition of indicative site condition assessment.

Indicative condition assessments: Definition and use

The term 'indicative condition assessment' describes the use of readily available evidence and expert judgement in an intensive, collective workshop process to provide an indication of feature condition at the site level.

The confidence rating associated with the assessments is an **integral** part of the indicative assessment. Confidence levels for feature assessments should therefore **always** be quoted alongside the indicative condition result, together with NRW's definition of 'indicative condition assessment'.

A.1 Indicative condition assessment workshop

Existing readily available data and information was collated and an organisation-wide workshop held with NRW's specialists. By using the evidence available at the workshop and applying expert judgement, staff examined each feature for each site and drew indicative conclusions on condition. A total of 69 assessments were carried out; 66 within the workshop and a further three, for otter, following the workshop, to accommodate staff availability.

A.1.1 Assessment templates

Assessment templates were produced in advance of the workshop. These templates differed slightly depending on the feature type. In all cases the assessments were broken down into different components that were assessed separately. To assist with the workshop assessment process, staff populated the templates with relevant information before the workshop.

The templates included a notes section for providing more information on the component assessments, and an evidence section for listing the information used to inform the assessments – this was not, however, a full reference list.

A.1.2 Confidence levels

Guidance on the confidence levels to use for the assessments was produced before the workshop (Annex B).

A.1.3 Guidelines agreed at the workshop

At the beginning of the workshop the assessment approach was discussed and the following guidelines were agreed:

- 'Baseline' is considered to be the state at the time of designation – unless there is a recovery target in the conservation objectives. This means that significant modifications at the site before designation should not be taken into consideration unless there was a recovery target in the conservation objective for that feature at that site.
- The indicative condition is based on current knowledge and is based on the present i.e. the date of the assessment - but significant future concerns should be noted.
- If one attribute of the condition assessment is unfavourable, then the whole assessment is judged to be unfavourable ('one out, all out') unless there is a good reason to diverge from this. This is standard practice for NRW's Water Framework Directive (WFD) assessment processes as well as for terrestrial sites.
- Small-scale local known impacts should not necessarily result in a conclusion of unfavourable condition, but impacts should be noted.
- Assessments where there are 'unknowns' do not necessarily lead to a conclusion of unfavourable condition.
- There can be an overall 'unknown' conclusion where there is no information available to make the assessment.
- Nested features should be related to each other in the assessments. For example, an estuary feature in a site might encompass other named features. For example, in Pembrokeshire Marine SAC, the estuary feature also encompasses the mudflats and sandflats feature and the Atlantic saltmeadows feature.

- Where there is limited data an assessment should be made but the lack of data should be reflected in the confidence score.
- Any activities, developments or management measures that are having either positive or negative impacts should be noted in the assessments.
- Context on the indicative assessments and confidence ratings should always accompany the release of the conclusions on site level feature condition.

A.1.4 Post workshop processing of indicative assessments.

All 69 assessments were then taken through a process of developing them from the draft assessments agreed at the workshop to finalised indicative assessments contained within site level reports (Figure A1).

A.2 Use of best, readily available evidence

During the collation exercise and the workshop the best readily available evidence was used. Confidence ratings were applied to the evidence used for each component of the assessment (the guidance on these confidence levels can be found in Annex B). Three main sources of evidence were available before and during the workshop:

- Site-level monitoring data
- WFD Waterbody Assessments
- Activities information

In addition, expert judgement was a key part of the assessment process, drawing on the knowledge, expertise and experience that staff have amassed over many years collectively, from: training and research; visiting the sites; monitoring and survey work; and the provision of advice on development planning and activities regulation at the site level.

A.2.1 Site level monitoring data and reports

Monitoring is carried out on features or sub-features of our European marine sites following the UK common standards monitoring guidance. The amount of monitoring NRW carries out is, however, limited to the resources available, and hence the resultant prioritised monitoring programme does not provide monitoring data for all features.

Limitations:

Although the relevant specialists were present, the intensive workshop format did not always allow for full, detailed scrutiny of individual SAC monitoring reports for some features. Some monitoring information was therefore checked or added to after the workshop. A lack of resources to produce analysed reports on all existing monitoring data was highlighted as an issue during the workshop.

A.2.2 Water Framework Directive (WFD) Waterbody Assessments

The latest relevant WFD waterbody assessments (2015⁷) were used during the workshop. Both Transitional and Coastal Water bodies overlap with the SAC boundaries but, in most cases, the boundaries do not match with SAC boundaries. Maps showing the water bodies can be found at the Water Watch Wales web site⁸.

⁷ Environment Agency. 2015. Classification of Surface Water Bodies for the Water Framework Directive – Method Statement. Version 3.0 updated August 2014.

⁸ <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

Limitations:

Although good use was made of the summary data for the waterbody assessments, and tables had been created linking the relevant waterbodies to the relevant European marine sites, complete datasets were not available for the workshop. In addition, although some mapping data was available, the data points for each monitoring element and how they related to the feature being assessed were not available for all assessments. This was due to time constraints and the number of assessments being carried out. WFD specialists were, however, available to provide expert advice during and after the workshop.

There was some discussion among assessors on the use of some WFD elements and their relevance to individual features. The mercury and brominated diphenylether (BDPE) standard used in the 2015 WFD assessments are new more stringent standards which did not need to be implemented until 2018 but nonetheless were used in the knowledge that new standards will be coming in and to be consistent between England and Wales. These new standards have not been used in the Marine Strategy Framework Directive (MSFD) habitat assessments, which instead used the OSPAR⁹ (Oslo and Paris conventions) standards for these elements.

Since the WFD assessments had been used extensively in the NRW indicative condition assessments, the decision was made, for reasons of consistency, to use the new WFD standard. It should be noted that if NRW had used the OSPAR standard some of the component elements of the indicative condition assessments would have been favourable. As part of the next stage of further developing NRW's approach to MPA site level feature condition assessment, further work is planned to assess which standards are the most relevant to apply to the Welsh MPA network.

A.2.3 Activities information

The NRW LIFE Natura 2000 (N2K) Programme¹⁰ focussed on producing Prioritised Improvement Plans (PIPs) for each European site in Wales. These provided information on the pressure and threats for each feature of each site for assessors at the workshop. Staff were also available to discuss any ongoing casework¹¹ at the site level that may have impacted site condition.

Limitations:

The summary data provided was useful but, due to the number of features, information on the pressures and threats was only provided in a summary form so that detailed site level information for each issue against each feature could not be explored.

However, staff with expert local knowledge were also available to discuss pressures and threats at the site, and hence available activity information and knowledge was sufficient to support the indicative assessment process.

Two types of activity information were reported by assessors in the indicative condition assessments:

⁹ Oslo and Paris conventions managed by the OSPAR Commission: <https://www.ospar.org/>

¹⁰ <https://naturalresources.wales/about-us/our-projects/life-n2k-wales/?lang=en>

¹¹ Casework is a term used to encompass the assessments of plans and projects on protected sites

Relevant activities: These were activities agreed during the indicative assessment process as having an impact on the condition of the feature, underpinned by evidence. There was no confidence rating associated with these activities or their associated impacts.

Noted activities: These were activities agreed during the indicative assessment process as occurring in the site, but where there is no evidence that the activity is having a direct impact on condition of the feature at that site. Noted activities may be having, or have the potential to have, an impact on feature condition, and were listed to be kept under review.

Not all activities for a site from the LIFE N2K Programme were listed in the assessments as relevant or noted activities by the assessors. The activities listed are not meant to replace the pressures and threats in the Prioritised Improvement Plans.

Annex B: Confidence level guidance used in the site level indicative condition assessments.

B.1 Assigning confidence to component parts of the feature assessments

An indicative assessment was made for each component part of the assessment (e.g. structure and function, or typical species). These components varied depending on which feature was being assessed.

There were three potential outcomes for the assessment for each component of condition:

- favourable,
- unfavourable or
- unknown

Each outcome was assigned a confidence level.

Use of ‘Unknown’: The *unknown* category was only used for the condition assessment where the evidence base was extremely low or absent, and as a result it was not possible to reach any conclusion on condition. In this case the confidence level for the evidence part of that assessment was recorded as not applicable (N/A).

Even where a value was given for ‘level of agreement’, if the overall assessment of the component was unknown, the overall component confidence level was also recorded as not applicable (N/A).



Use of ‘Unfavourable’: Where any one component was unfavourable, the overall conclusion was unfavourable, (the ‘one out, all out’ rule), unless there was a good reason to deviate from this. See, for example, the otter assessments.

There were two types of confidence considered during the indicative condition assessment process.

1. The level of consensus between assessors and
2. The confidence in the evidence that the assessment was based on.

A matrix approach was used for this first stage of assigning confidence levels for each component of the indicative assessment.

Figure B1: Matrix used to assign the confidence level for each component of the indicative condition assessment.

Level of agreement 	High	Low	Medium	High
	Medium	Low	Medium	Medium
	Low	Low	Low	Low
		Low	Medium	High
	 Confidence in evidence			

B.1.1 Level of agreement between assessors

Assessors were required to draw conclusions based on the available evidence in the context of their knowledge of the relevant feature at that site. Where available evidence was contradictory or of only partial benefit in arriving at a condition assessment, this was resolved as far as possible, taking into account the amount, quality and relevance of the data. The resultant conclusion was given a confidence rating for the degree of consensus amongst the assessors, as follows:

- **High:** All assessors agreed with the assessment of the feature condition component;
- **Medium:** The majority of the assessors agreed with the assessment of the feature condition component;
- **Low:** There was no clear consensus on the assessment of the feature condition component.

B.1.2 Level of confidence in the evidence used to make the assessment

The degree of confidence in the assessments of each component was based on the quantity, quality, relevance or consistency of the evidence used. The categories are high, medium and low confidence as described below:

High confidence

- Clear evidence from complete monitoring surveys (high quality data collected to relevant standards with robust analysis of results and appropriate positional data) to support assessment relevant to condition components.

Medium confidence

- Partial survey or one of lower quality (i.e. lacking detail or appropriate positional data);
- Indirectly relevant to condition components but evidence may be from a complete survey, scientifically accurate study, peer-reviewed research or other surveys;
- Site-based, expert knowledge directly relevant to targets, supported by evidence (i.e. records, casework history, photos, positional data).

Low confidence

- Incomplete, old or lower quality survey;
- High quality data but from only a small portion of the component (e.g. data only available for one small area of a habitat on a site where that habitat is extensive and varied);
- Modelled information;
- Site-based, expert knowledge information either indirectly relevant to component condition or lacking sufficient supporting information.

B.2 Assigning confidence levels to the overall indicative condition assessment

The process for assigning the overall confidence level for the indicative assessment of the feature from the component confidence levels used the following rules:

- Where the overall indicative condition assessment was Unknown the confidence level was stated as not applicable.
- Where only one of the assessment components was unfavourable (leading to the overall assessment of unfavourable), the confidence level associated with the unfavourable component was used.
- Where two or more of the assessment components were unfavourable (leading to the overall assessment of unfavourable), the highest confidence level assigned to one of the unfavourable components was used for the overall confidence level.
- In all other circumstances the highest confidence level¹² attained for one of the individual components was used.

B.3 Use of confidence ratings

In all instances, whenever the indicative features and site condition assessments are reproduced or quoted this should be done together with the confidence rating and the definition of indicative assessment provided in this report.

¹² The use of the highest confidence level is one used in WFD assessments – reflecting that the assessment confidence is based on the best evidence available.



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