Cyfoeth Naturiol Cymru
Natural Resources Wales

Pen Llŷn a`r Sarnau / Lleyn Peninsula and the Sarnau Special Area of Conservation

Indicative site level feature condition assessments 2018

NRW Evidence Report No: 234

About Natural Resources Wales

Natural Resources Wales' purpose is to pursue sustainable management of natural resources. This means looking after air, land, water, wildlife, plants and soil to improve Wales' well-being, and provide a better future for everyone.

Evidence at Natural Resources Wales

Natural Resources Wales is an evidence based organisation. We seek to ensure that our strategy, decisions, operations and advice to Welsh Government and others are underpinned by sound and quality-assured evidence. We recognise that it is critically important to have a good understanding of our changing environment.

We will realise this vision by:

- Maintaining and developing the technical specialist skills of our staff;
- Securing our data and information;
- Having a well resourced proactive programme of evidence work;
- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
- Communicating our evidence in an open and transparent way.

This Evidence Report series serves as a record of work carried out or commissioned by Natural Resources Wales. It also helps us to share and promote use of our evidence by others and develop future collaborations. However, the views and recommendations presented in this report are not necessarily those of NRW and should, therefore, not be attributed to NRW.

Report series:	NRW Evidence Report
Report number:	234
Publication date:	January 2018
Title:	Pen Llŷn a`r Sarnau / Lleyn Peninsula and the Sarnau Special Area of Conservation: Indicative site level feature condition assessments 2018
Author(s):	NRW
Restrictions:	None

Distribution List (core)

NRW Library, Bangor	2
National Library of Wales	1
British Library	1
Welsh Government Library	1
Scottish Natural Heritage Library	1
Natural England Library (Electronic Only)	1

Recommended citation for this volume:

NRW, 2018. Pen Llŷn a`r Sarnau / Lleyn Peninsula and the Sarnau Special Area of Conservation: Indicative site level feature condition assessments 2018. NRW Evidence Report Series, Report No: 234, 58pp, NRW, Bangor.

Contents

Summary

This document presents NRW's indicative assessment of the condition of marine features in Pen Llŷn a`r Sarnau / Lleyn Peninsula and the Sarnau 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 Lleyn Peninsula and the Sarnau SAC,

Section 3: NRW's indicative condition assessments for the features of Lleyn Peninsula and the Sarnau 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 Lleyn Peninsula and the Sarnau SAC.

Designated Features	Indicative condition assessment	Confidence in assessment
• Reefs	Unfavourable	Low
• Large shallow inlets and bays	Favourable	Low
• Sandbanks which are slightly covered by sea water all the time	Unfavourable	Low
• Estuaries	Unfavourable	Medium
• Coastal lagoons	Unfavourable	High
• Mudflats and sandflats not covered by seawater at low tide	Unfavourable	Low
• Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Unfavourable	High
• Salicornia and other annuals colonizing mud and sand	Unfavourable	High
• Submerged or partially submerged sea caves	Unknown	Not applicable
• Bottlenose dolphin *Tursiops truncatus*	Favourable	Medium
• Otter *Lutra lutra*	Favourable	Medium
• Grey seal *Halichoerus grypus*	Favourable	Medium

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 Pen Llŷn a`r Sarnau (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 Pen Llŷn a`r Sarnau,

Adran 3: Asesiadau cyflwr dangosol CNC ar gyfer nodweddion AGA Pen Llŷn a`r Sarnau, 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 Pen Llŷn a`r Sarnau.

Nodweddion Dynodedig	Asesiad dangosol o gyflwr y nodwedd	Hyder yn yr asesiad
• Riffiau	Anffafriol	Isel
• Cilfachau a baeau mawr bas	Ffafriol	Isel
• Banciau tywod sydd wedi'u gorchuddio ag ychydig o ddŵr y môr drwy'r amser	Anffafriol	Isel
• Aberoedd	Anffafriol	Canolig
• Morlynnoedd neu lagynau	Anffafriol	Uchel
• Gwastadeddau llaid neu dywod nas gorchuddir gan y môr ar lanw isel	Anffafriol	Isel
• Dolydd ar forfeydd arfordir y gorllewin (*Glauco-Puccinellietalia maritimae*)	Anffafriol	Uchel
• *Salicornia* a phlanhigion unflwydd eraill sy'n cytrefu llaid a thywod	Anffafriol	Uchel
• Ogofâu môr sy'n danforol neu'n lleddanforol	Anhysbys	Ddim yn berthnasol
• Dolffin trwyn potel (*Tursiops truncatus)*	Ffafriol	Canolig
• Dyfrgi (*Lutra lutra)*	Ffafriol	Canolig
• Morlo llwyd (*Halichoerus grypus*)	Ffafriol	Canolig

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 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’.

2. Site Description

The Pen Llŷn a'r Sarnau SAC 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. The site is situated in northwest Wales. The SAC boundary extends from Nefyn on the north coast of Llŷn and includes parts of the seashore and the waters and seabed around the Llŷn Peninsula, in north Cardigan Bay and along the Meirionnydd coast to Clarach in Ceredigion south of the Dyfi estuary, including the Glaslyn/Dwyryd, Artro, Mawddach and Dyfi estuaries.

The boundary of the SAC encompasses nine marine habitat features three species features for which it was selected as an SAC.

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

- Reefs
- Large shallow inlets and bays
- Sandbanks which are slightly covered by seawater all the time
- Estuaries
- Coastal lagoons

and to support a significant presence of:

- Mudflats and sandflats not covered by seawater at low tide
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- *Salicornia* and other annuals colonising mud and sand
- Submerged or partially submerged sea caves
- Bottlenose dolphin *Tursiops truncatus*
- Otter *Lutra lutra*
- Grey seal *Halichoerus grypus*

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 map[1] 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 website[2].

[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 Reefs indicative condition assessment

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

Date	May 2017
Site name	Pen Llŷn a`r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Reefs

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)	Unfavourable	Monitoring data (limited) and expert judgement	High	Low	Low
Structure & function	Unfavourable	Monitoring data (limited), WFD data and expert judgement	High	Low	Low
Typical species	Unfavourable	Monitoring data (limited) and expert judgement	High	Low	Low
Relevant activities (*activities directly impacting condition of the feature on this site*)	• Historic fishing damage, previous illegal activity has caused long term damage that has not yet recovered (see notes section). • Water quality issues				

Overall Indicative Assessment	**Overall Confidence Level**
Unfavourable	Low

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

Distribution & extent:

Intertidal: In 2014 the areas of honeycomb worm (*Sabellaria alveolata*) reef at both survey locations, Llandanwg and West of Afon Dwyfor can be seen to have decreased dramatically, having apparently been affected by the winter storms of 2013/2014. The impact at West Afon Dwyfor was the most marked with a decrease in reef area of 67%. The pattern within the associated species was also one of decreasing abundance (Mercer, 2016b). This was not the case in 2012 or 2013 (Mercer, 2013 & 2016a).
This component has been assessed as **unfavourable**.

Structure & function: Subtidal reef: Historic damage to horse mussel (*Modiolus modiolus*) reef, is affecting the structure and function of the reef feature. It is appreciated by the assessors that the damaged area is only one part of the site's reef feature but as this is the only *Modiolus* reef within a Welsh European marine site (EMS) they felt that damage to this significant sub-feature should lead to unfavourable condition of the feature as a whole. For more information see the monitoring data section below.

WFD data was used from the relevant waterbodies (Caernarfon Bay South, Cardigan Bay North, Mawddach, Glaslyn, Dyfi & Leri and Tremadog Bay) two of these waterbodies have a good overall status and good chemical status (Glaslyn & Tremadog Bay), one (Caernarfon Bay South) has a moderate overall status and good chemical status, the moderate status is driven by dissolved inorganic nitrogen (DIN) only. Three waterbodies have a moderate overall status, with a good ecological status but with a fail for chemical status. Cardigan Bay North had a chemical failure for tributyltin (TBT) and its compounds, although this waterbody fails for TBT, the imposex[3] assessment was good for this waterbody and good for the adjacent waterbody (Tremadog Bay). The Mawddach and Dyfi & Leri waterbodies fail for brominated diphenylether (BDPE) only.
This component has been assessed as **unfavourable**.

Typical species:

Holden's reef: Fish populations (2007 – 2015, time series data with 7 or 8 repeats) no significant impacts detected, nothing to suggest unfavourable condition. Habitat quadrat (annual survey): major changes in composition but thought to be due to natural change.
Horse mussel (*Modiolus modiolus*) reef – there has been a decline of live *Modiolus* in one area. No new impacts to reef in last 5 years based on NRW sidescan data, original trawl marks are still present now (2017) five years after impact. Data needs to be processed. Evidence from other areas suggests recovery will take at least 25 years (MarLIN website). Would still need to check *in situ* condition of damage. Algal density – decline (minor), infaunal composition increasing.
Bardsey: Photo monitoring carried out but not analysed. Expert judgement from dive visits indicate that reef is fine but low confidence.

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

Carreg y trai: two data points, changes noted but not significant.
This component has been assessed, based on the damage to the *Modiolus* reef, as **unfavourable**.

Relevant activities (more information):
Impacts from scallop dredging through *Modiolus* reef in 2006 is still affecting condition in 2017. Management measures have improved, there was a new Welsh Scallop Order in 2010 which restricts scallop fishing within the site. Since 2012 all vessels dredging for scallops in Wales are required to install inshore vessel monitoring systems to track location of vessels, there are no known incursions or prosecutions within the site since 2006.

Noted activities:
None highlighted for this feature.

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

- Mercer, T.S. (2013). *Intertidal SAC monitoring, Pen Llyn a'r Sarnau SAC July 2012*. CCW Marine Monitoring Report No: 102, pp 68 + x, Aquatic Survey & Monitoring Ltd. Bollihope, Co. Durham.
- Mercer, T.S. (2016a). *Intertidal monitoring, Pen Llyn a'r Sarnau SAC August 2013*. NRW Evidence Report No. 58, pp 67 + x, Natural Resources Wales, Bangor.
- Mercer, T. S. (2016b). *Across-Wales intertidal SAC monitoring, Pen Llyn a'r Sarnau SAC August 2014*. NRW Evidence Report No: 75, pp 95 + vii, Aquatic Survey & Monitoring Ltd. Harehope Quarry, Co. Durham.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: http://waterwatchwales.naturalresourceswales.gov.uk/en/

3.2 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	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Large shallow inlets & bays

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	Monitoring data and expert judgement	High	Low	Low
Structure & function	Favourable	Monitoring data and expert judgement	High	Low	Low
Typical species	Favourable	Monitoring data and expert judgement	High	Low	Low
Relevant activities (*activities directly impacting condition of the feature on this site*)	No activities identified as having a direct impact on site condition				

Overall Indicative Assessment	**Overall Confidence Level**
Favourable	Low

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

Part of the reef feature for this site can be found within the Large Shallow Inlet and Bay (LSIB) feature and is considered a sub-feature, the indicative condition assessment for the reef feature should be read in conjunction with the indicative condition assessment for this feature. However please note that reasons for failure of the reef feature could relate to reef outside this feature.

Pen Llyn a'r Sarnau Indicative Reefs feature assessment 2017: Unfavourable

Distribution & extent: Large shallow inlets and bays are still largely of the same extent and distribution since designation. Losses due to coastal defence works, post designation – no cumulative assessment carried out. No plans in place to implement Shoreline Management Plan policies which will have future implications.
This component has been assessed as **favourable**.

Structure & function:
Particle size analysis (PSA) data from grab sampling showing no anthropogenic change. 2009 illegal scallop dredging episode in muddy gravel habitat "tramline" in seabed affected the structure of habitat. Unknown whether this has recovered. The most relevant waterbodies (Tremadog Bay and Glaslyn) have a good overall status with good ecological status.
This component has been assessed as **favourable**.

Typical species: Seagrass beds (component of LSIB) have been found in new areas (Abersoch) (Unpublished data). Existing locations continue to slowly increase in extent. See mudflat and sandflat condition assessment for more information.
Infaunal data collected for LSIB sandflats show no change in the amphipod *Pectenogammarus (*now *Echinogammarus incertae sedis planicrurus)* population, although sediment recharge at Pwllheli still threatens *Pectenogammarus*.

In 2014 the areas of Honeycomb reef (*Sabellaria alveolata)* at both survey locations, (Llandanwg and West of Afon Dwyfor) can be seen to have decreased dramatically. The impact at West Afon Dwyfor was the most marked with a decrease in reef area of 67%. The pattern within the associated species was also one of decreasing abundance (Mercer, 2016). The reasons for the decline are currently unknown.

Recent records of the spoon worm (*Maxmuelleria lankesteri*) in Tremadog Bay indicate the presence of a biotope that forms part of the OSPAR[4] Seapens and burrowing megafauna threatened and declining habitat. However, this may have been previously under recorded due to the difficulty of sampling. Records have come from grabs and Seasearch records (Seasearch 2014, SOS, 2012 EA survey).

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

Infaunal sampling data – 2012/13 analysis of data from 2004 – 2012. All results look good. There are significant changes in individual sampling sites but the broad picture is favourable, stable. WFD infaunal quality index (IQI) for Tremadog Bay waterbody was assessed as high. No evidence of anthropogenic impacts.
This component has been assessed as **favourable**.

Noted activities:

- Coastal defence and beach feeding at Pwllheli.
- Commercial fisheries: No clear evidence of stock levels of commercially exploited typical species.
- Coastal squeeze may be having an impact on structure and function, expert judgement.
- Intertidal non-native seaweed Japanese wire weed (*Sargassum muticum*) is an issue impacting condition but not enough to conclude unfavourable.

Note favourable condition has been assessed with low confidence for some components due to:

- No evidence of recoverability from scallop dredging
- Longer term concerns about coastal squeeze
- Declines in honeycomb worm *Sabellaria alveolata* reef

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

- Mercer, T. S. (2016). *Across-Wales intertidal SAC monitoring, Pen Llyn a'r Sarnau SAC August 2014*. NRW Evidence Report No: 75, pp 95 + vii, Aquatic Survey & Monitoring Ltd. Harehope Quarry, Co. Durham
- 2014 Seasearch Survey of the South Llyn and Tremadog Bay, North Wales.
- SOS Prince Madog Cruise 32/05 Muddy Hollow, Tremadog Bay
- 2012 EA Tremadog Bay WFD Grab Survey
- WFD waterbody classifications (2015). 2009-2015 Classification Data: http://waterwatchwales.naturalresourceswales.gov.uk/en/

3.3 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	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Sandbanks which are slightly covered by seawater all the time

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	NRW monitoring data, expert judgement	High	Low	Low
Structure & function	Favourable	NRW monitoring data, WFD data & expert judgement	High	Low	Low
Typical species	Unfavourable	NRW monitoring data, expert judgement	High	Low	Low
Relevant activities (*activities directly impacting condition of the feature on this site*)	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: This component for the feature has been assessed as **favourable** due to consensus among the assessors that the feature is dynamic and there is no evidence of changes beyond those expected through natural processes.

Structure & function: Pen Llŷn a'r Sarnau SAC overlaps with a number of WFD waterbodies however the sandbank feature is partially outside the WFD assessment area (most of two sandbanks – Devils Ridge and Bastram shoals) and partially within two waterbodies – Caernarfon Bay South and Cardigan Bay North (The Tripods sandbank and 4 fathom bank). Cardigan Bay North waterbody has an overall moderate status and a fail for chemical status. The chemical status fail is driven by Tributyltin (TBT) and its compounds; however, the waterbody has a good ecological status and the invertebrate imposex[5] sub-element was good. Caernarfon Bay South waterbody has a moderate overall status and a good chemical status.

The DIN (dissolved inorganic nitrogen), macroalgae and invertebrate (Infaunal quality Index (IQI) & imposex) elements were all assessed as good for the Cardigan Bay North waterbody while the phytoplankton element was high. Caernarfon Bay South had an assessment of moderate for DIN, but phytoplankton, IQI and macroalgae elements were not assessed for this waterbody making it difficult to look at the impact of the DIN failure. As phytoplankton, IQI and macroalgae elements were all good for the adjacent waterbody (Cardigan Bay North) assessors were not overly concerned with this failure.

Although there was a chemical failure for tributyltin (TBT) the fact that the imposex element for the same waterbody was good and for the adjacent waterbody was high (Caernarfon Bay South) meant that assessors were not, without more evidence, very concerned about the ecological impact.

As some of the feature is outside the waterbody and there was a general lack of information, at the time of assessment, on the location of the sample point data and their relevance to the assessment of condition of the sandbank feature this component of the assessment was assessed as **favourable**.

Typical species: NRW monitoring data from 1998 to 2013 show a decline in infaunal species. Data was used from Devil's Ridge, Bastram Shoals and Tripods within the Pen Llŷn a'r Sarnau site, but there was low confidence in evidence due to the age of some of the data. The reason(s) for the decline needs to be investigated. The WFD infaunal quality index (IQI) for the only relevant waterbody where it was assessed Cardigan Bay North, was good.
This component is **unfavourable** due to evidence of decline in infaunal species from specific monitoring on the sandbank feature.

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

Evidence used: *The evidence used to support the assessment conclusion.*
• NRW monitoring data • WFD waterbody classifications (2015). 2009-2015 Classification Data: http://waterwatchwales.naturalresourceswales.gov.uk/en/

3.4 Estuary indicative condition assessment

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

Date	May 2017
Site name	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Estuaries

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)	Unfavourable	Some monitoring data, expert judgement	High	Medium	Medium
Structure & function	Unfavourable	Some monitoring data, WFD waterbody assessments, expert judgement	High	Low	Low
Typical species	Favourable	Some monitoring data, WFD data, expert judgement	High	Medium	Medium
Relevant activities (*activities directly impacting condition of the feature on this site*)	• Historic pollutants • Works on Pont Briwet and Dwyryd Pylon				

Overall Indicative Assessment	**Overall Confidence Level**
Unfavourable	Medium

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

Restoration Objective within conservation objective for the Estuary feature: Part of the conservation objective for this feature is 'should be restored', this means that at the time the conservation objectives were set the estuary feature was likely to be in unfavourable condition.

The mudflats and sandflats feature and the Atlantic saltmarsh feature are very important nested features within 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.

Pen Llyn a'r Sarnau Indicative Mudflats and sandflats feature assessment 2017: Unfavourable
Pen Llyn a'r Sarnau Indicative Atlantic Saltmarsh feature assessment 2017: Unfavourable
Pen Llyn a'r Sarnau Indicative *Salicornia* feature assessment 2017: Unfavourable

Distribution & Extent: No major change to date in **extent or distribution**, although there have been small losses due to development, each has been subject to a Habitats Regulation Assessment (HRA) but there has been no cumulative assessment carried out since site designation. The West of Wales Shoreline Management Plan (SMP) HRA predicted a 7.6 ha loss of intertidal mudflat and sandflat due to coastal squeeze for the first epoch (2005 - 2025) for Pen Llŷn a`r Sarnau (PLAS). 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, but to date no schemes have been delivered to offset the small predicted losses for PLAS (*nb* Morfa Friog habitat creation was mitigation for works at Fairbourne, not compensation).

Works carried out to Pont Briwet and Dwyryd Pylon are causing loss of saltmarsh in Dwyryd estuary – loss calculated <1ha to be compensated by Gwynedd Local Authority. Structure and function are in question due to scour protection being left in at Bridge works causing an impediment to lateral variation of channel and weir effect which permanently changes the hydrology.
Therefore, this component has been assessed as **unfavourable**.

Structure & Function: Pen Llŷn a`r Sarnau SAC overlaps with a number of WFD waterbodies, however three of these (Mawddach, Glaslyn and Dyfi & Leri waterbodies) overlap with the majority of the estuary feature. The Glaslyn has a good overall status with a good chemical status, the Mawddach and Dyfi & Leri waterbodies have a moderate status and a fail for chemical status (both for Brominated diphenylether (BDPE)). The ecological status for all three waterbodies was good with two of the three waterbodies assessed as high for DIN (dissolved inorganic nitrogen) while one was good. There have been no known changes in nutrient levels in the estuaries since designation.
This component has been assessed as **unfavourable** but low confidence as the effects of BDPE on this feature are unknown.

Typical species: Based on information for mudflats and sandflats (favourable for typical species) and Atlantic saltmarsh (unfavourable for typical species). The WFD infaunal quality index for the Dyfi and Leri was high and good for the Mawddach. The ecological status for all three relevant waterbodies was good with two of the three waterbodies assessed as high for DIN (dissolved inorganic nitrogen) while one was good. All three waterbodies were high for macroalgae.

Seagrass (*Zostera*) beds to the south of the Llyn are fragmented and unstable. Seagrass beds at Porth Dinllaen have been reported as under stress and at their limit of existence due to low light levels (Unsworth *et al*., 2015). This is likely to be of natural cause, however, dragging of boats across the intertidal bed moorings in the intertidal and subtidal continue to cause damage to the bed, reducing the resilience. The bed appears to be sustainable under these conditions and has shown a slight expansion in extent. This component has been assessed as **favourable**.

Noted activities:

- Bait collection
- Invasive non-native species – mainly terrestrial

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

- Mercer, T.S. 2013. *Intertidal SAC monitoring, Pen Llyn a'r Sarnau SAC July 2012*. CCW Marine Monitoring Report No: 102, pp 68 + x, Aquatic Survey & Monitoring Ltd. Bollihope, Co. Durham.
- Mercer, T.S. 2016. *Intertidal monitoring, Pen Llyn a'r Sarnau SAC August 2013*. NRW Evidence Report No. 58, pp 67 + x, Natural Resources Wales, Bangor.
- Mercer, T. S. 2016. *Across-Wales intertidal SAC monitoring, Pen Llyn a'r Sarnau SAC August 2014*. NRW Evidence Report No: 75, pp 95 + vii, Aquatic Survey & Monitoring Ltd. Harehope Quarry, Co. Durham.
- Unsworth, R.K.F., Collier, C.J., Waycott, M., McKenzie, L.J., Cullen-Unsworth, L.C. (2015). *A framework for the resilience of seagrass ecosystems*. Marine Pollution Bulletin 100 (1), 34–46.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: http://waterwatchwales.naturalresourceswales.gov.uk/en/

3.5 Coastal lagoons indicative condition assessment

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

Date	May 2017
Site name	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Coastal lagoons – Morfa Gwyllt Lagoon

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	NRW monitoring data and reports to 2013, expert judgement.	High	High	High
Structure & function	Favourable	NRW monitoring data and reports to 2013, expert judgement.	High	Medium	Medium
Typical species	Unfavourable	NRW monitoring data and reports to 2013.	High	High	High
Relevant activities (*activities directly impacting condition of the feature on this site*)	No activities identified as having a direct impact on site condition.				

Overall Indicative Assessment	**Overall Confidence Level**
Unfavourable	High

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

Distribution & 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 & function: Morfa Gwyllt is a small saline percolation lagoon that sits in the middle of a spit between the sea and river mouth. As such, it has no direct inputs such as seawater sluice or stream inputs. The water depth however does vary depending on tidal cycles and river height. With the lagoon being so shallow (average depth in the deepest part is approx. 60cm) and with gently sloping sides, the extent of the lagoon does vary greatly with the water depth (large intertidal). The salinity and temperature also vary greatly. Whilst it is natural for lagoons to suffer such extremes, Morfa Gwyllt is particularly vulnerable because it is so small. Temperature varies from 0 – 30 degrees Celsius and salinity can also vary from 0 – 30 ppt.

Variation in sediment composition appears random and no trend was detected. There is evidence of seasonal drying but it is not known if this is changing with dredging and climate change patterns, there is no evidence of deterioration in this component.
This component was assessed as **favourable**.

Typical species: Typical species component is unfavourable due to the absence of lagoon specialist *Conopeum seurati* (an encrusting bryozoan), last observed in 1998, despite targeted monitoring in 2013 (Green & Camplin, in prep). *Conopeum seurati* was present at the site when the SAC was proposed, but there are no records in more recent data from 2013 and so the site is assessed as unfavourable. Due to the isolated nature of this lagoon, if the taxon is absent the population is unlikely to repopulate. More data were collected in 2014-16 but not yet analysed.

The sudden community change seen in 2013 was not linked with any obvious sign of deterioration of in-benthic community health. The condition of the site probably relies on the importance attributed to the absence of *Conopeum seurati*. This species is 'distinctly more characteristic of lagoons and lagoon-like habitats than of other habitats' (JNCC, 2004). The low richness of the lagoon specialists and other taxa adds weight to the importance of this probable loss.
This component has been assessed as **unfavourable**.

Noted activities:
- Managed water levels and channels affecting salinity and water height.
- Litter: Morfa Gwyllt is prone to "collecting" rubbish. The steep cobble ridge that barriers the lagoon form the sea has a westerly aspect and it seems that when floating rubbish at sea comes ashore here it is blown up and over the ridge and gets trapped in

the slack, collecting in the vicinity of the lagoon. A survey by NRW in 2014 found 36 pieces of significant rubbish on the shore of the lagoon.

- The area around Morfa Gwyllt is a popular area for dog walking and subsequently the lagoon quite often has dog faeces around it. Whilst this is not particularly pleasant, it is not thought to be leading to eutrophication problems.
- In the past, the lagoon has had problems with people off-roading around and through it. This was thought to be a significant problem but management of the lagoon, access restrictions and discussions with the land owner seems to have solved this problem as no evidence of activity has been noted in recent years.

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

- Green, M., Camplin, M. (in prep). Lagoons (Across-Wales). NRW Evidence Report
- JNCC (2004). Common standards monitoring guidance for lagoon. ISSN 1743-8160 (online). http://jncc.defra.gov.uk/PDF/CSM_marine_lagoons.pdf

3.6 Mudflats and sandflats 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	Pen Llŷn a`r Sarnau / Lleyn Peninsula and the Sarnau 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)	Unfavourable	Some monitoring data, expert judgement	High	Low	Low
Structure & function	Unfavourable	Expert judgement, WFD assessments	Low	Low	Low
Typical species	Favourable	Monitoring data, expert judgement & WFD assessments	High	Medium	Medium
Relevant activities (*activities directly impacting condition of the feature on this site*)	• Development issues • Water quality issues				

Overall Indicative Assessment	**Overall Confidence level**
Unfavourable	Low

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

Restoration Objective within conservation objective for the Estuary feature: Part of the conservation objective is 'should be restored' for the estuary feature, this means that at the time the conservation objectives was set the estuary feature was likely to be in unfavourable condition. This affects the mudflats and sandflats feature as it is within the estuary feature and is therefore included within the objective.

Distribution & Extent: No major change to date in extent or distribution since designation, although there have been small losses due to development, each has been subject to a Habitats Regulation Assessment (HRA) but there has been no cumulative assessment carried out since site designation. The West of Wales Shoreline Management Plan (SMP) HRA predicted a 7.6 ha loss of intertidal mudflat and sandflat due to coastal squeeze for the first epoch (2005 - 2025) for Pen Llŷn a`r Sarnau (PLAS) (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, but to date no schemes have been delivered to offset the small predicted losses for PLAS (*nb* Morfa Friog habitat creation was mitigation for works at Fairbourne, not compensation).

Unfavourable assessment due to bridge at Harlech over the Dwyryd causing unexpected erosion of saltmarsh and the permanent placement of scour proofing under the bridge which permanently changes the hydrology.
This component has been assessed as **unfavourable**.

Structure & Function: Pen Llŷn a`r Sarnau SAC overlaps with several WFD waterbodies, however only three of these (Mawddach, Glaslyn and Dyfi & Leri waterbodies) overlap with the mudflats and sandflats feature. The Glaslyn has a good overall status with a good chemical status, the Mawddach and Dyfi & Leri waterbodies have a moderate status and a fail for chemical status (both for Brominated diphenylether (BDPE)). The ecological status for all three waterbodies was good with two of the three waterbodies assessed as high for DIN (dissolved inorganic nitrogen) while one was good. All three waterbodies were high for macroalgae.
This component has been assessed as **unfavourable** but low confidence as the effects of BDPE on this feature are unknown.

Typical species: The NRW infaunal samples collected for open coast and estuaries since 2007, was sufficient for IQI (infaunal quality index) and temporal trend analysis, but no published analysis to date. A rapid scan of data shows no changes in infaunal composition. Mussel and cockle beds have shown temporal variability in the estuaries. The Glaslyn/Dwyryd infaunal cores again revealed a low diversity infaunal invertebrate community, with the greatest number of taxa and individuals in the mid-estuary and mouth of the Glaslyn. This community was unsurprisingly still dominated by bivalves, amphipods and spionid worms.

No dramatic changes were identified in the univariate data calculated for the infaunal communities at the mid and upper estuary monitoring stations. Some characteristics fluctuated at the mouth where the sediment is regularly mobilised and regular changes in the community structure are to be expected.

Both the *in-situ* assessment and the quantitative coring in the Dyfi estuary reveal a low diversity system, due in part to the high sand content. No rare or endangered species were encountered, but the univariate measures calculated for the infaunal cores provide a baseline from which monitoring can take place in the future.

The monitoring transects on the Mawddach show that the muds and muddy sands tend to be dominated by sparse ragworm, spionid polychaetes, oligochaetes, *Peringia ulvae* and *Scrobicularia plana*, whilst the mobile sands of the lower shore stations are relatively barren, being exposed to constantly fluctuating salinity and strong water movements on a daily basis. There appear to be no significant differences in the infaunal univariate statistics noted between the sampling occasions of 2012 and 2014.

Consideration of the changes in biotopes over time, based on analysis of the infauna, suggest that there is a shift, in general, to biotopes characterised by mud preferring species. In 2012, there was a greater density of *Corophium* (an amphipod) which influenced the biotopes assigned. Some stations clearly go through dramatic changes, where river channels or sand bars shift.

The WFD infaunal quality index (IQI) for the Dyfi and Leri was high and good for the Mawddach. The ecological status for all three waterbodies was good with two of the three waterbodies assessed as high for DIN (dissolved inorganic nitrogen) while one was good. All three waterbodies were high for macroalgae.

Seagrass (*Zostera*) beds to the south of the Llyn are fragmented and unstable. Seagrass beds at Porth Dinllaen have been reported as under stress and at their limit of existence due to low light levels (Unsworth *et al*., 2015). This is likely to be from natural causes, however, dragging of boats across the intertidal bed moorings in the intertidal and subtidal continue to cause damage to the bed, reducing the resilience. The bed appears to be sustainable under these conditions and has shown a slight expansion in extent. This component has been assessed as **Favourable**.

Noted activities:

- Historic pollutants
- Bait collection
- Winkle collection
- Moorings (damage to sea grass bed)
- Marine invasive non-native species (Japanese wireweed (*Sargassum muticum*) effects on sea grass bed).

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

- Davies, J. (in draft). *Intertidal SAC monitoring Zostera marina at Porth Dinllaen, PLAS, 2016*. NRW evidence report xx.
- Mercer, T.S. (2013). *Intertidal SAC monitoring, Pen Llyn a'r Sarnau SAC July 2012*. CCW Marine Monitoring Report No: 102, pp 68 + x, Aquatic Survey & Monitoring Ltd. Bollihope, Co. Durham.
- Mercer, T.S. (2016). *Intertidal monitoring, Pen Llyn a'r Sarnau SAC August 2013*. NRW Evidence Report No. 58, pp 67 + x, Natural Resources Wales, Bangor.
- Mercer, T. S. (2016). *Across-Wales intertidal SAC monitoring, Pen Llyn a'r Sarnau SAC*. August 2014. NRW Evidence Report No: 75, pp 95 + vii, Aquatic Survey & Monitoring Ltd. Harehope Quarry, Co. Durham.
- Royal Haskoning (2010). West of Wales Shoreline Management Plan 2: Appendix I: Habitats Regulations Assessment. Report to Pembrokeshire County Council, October 2010.
- Unsworth, R.K.F., Collier, C.J., Waycott, M., McKenzie, L.J., Cullen-Unsworth, L.C. (2015). *A framework for the resilience of seagrass ecosystems*. Marine Pollution Bulletin 100 (1), 34–46.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: http://waterwatchwales.naturalresourceswales.gov.uk/en/

3.7 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	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

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)	Unfavourable	Expert judgement (knowledge of historical modification to the estuaries), reports, expert judgement based on casework.	High	High	High
Structure & function	Unfavourable	Expert judgement (knowledge of historical modification to the estuaries), WFD assessments, Expert judgement based on casework.	High	High	High
Typical species	Unfavourable	Monitoring report Expert judgement	High	Medium	Medium
Relevant activities (*activities directly impacting condition of the feature on this site*)	• Grazing • Infrastructure development: Pont Briwet and Dwyryd Pylon • Coastal defence and erosion control				

Overall Indicative Assessment	**Overall Confidence Level**
Unfavourable	High

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

Restoration Objective within conservation objective for the Estuary feature: Part of the conservation objective is 'should be restored' for the estuary feature, this means that at the time the conservation objectives were set the estuary feature was likely to be in unfavourable condition. This affects the Atlantic saltmeadows (ASM) as it is within the estuary feature and is therefore included within the objective.

Distribution & extent:
Sarnau estuaries: Work by the RESILCOAST research programme shows all three estuaries are increasing in extent of saltmarsh by approximately 61% total since late 19th century. However, slight decline in extent from 1990 to 2013 in Dyfi data shown (505 Ha to 487 Ha). Mawddach data shows increase from 183 ha to 207 ha and Dwyryd shows an increase from 300 ha to 305 ha between 1990 and 2013. Shi (1993), show accretion rate at 12mm +/- 4mm/yr (1977 – 1989) with sea level 4.97+/- 0.10 mm/yr (1991 – 2013) for the Sarnau estuaries.

Increases in Atlantic Salt meadows are a response of the estuary modification of the estuary in the 19th century particularly the cob along with flood embankments within the component estuaries. However, the distribution is constrained because of the modifications. There are small predicted losses for the 1st epoch (2005 – 2025) within SMP2 and these losses will continue into the future with the existing constraints in the estuary.

The West of Wales Shoreline Management Plan HRA predicted a 4.4 ha loss of saltmarsh due to coastal squeeze for the first epoch (2005 - 2025) for Pen Llŷn a'r Sarnau (Royal Haskoning, 2012). 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, but to date no schemes have been delivered to offset the small predicted losses for PLAS (n.b. Morfa Friog habitat creation was mitigation for works at Fairbourne, not compensation). Predicted losses are relatively small and the variation in extent of saltmarsh between estuaries is illustrated by the RESILCOAST work mentioned above. Predicted coastal squeeze wouldn't lead to a conclusion of unfavourable at this stage. In Artro there has been a loss of saltmarsh due to flood defence works following 2013/14 storms.

Works carried out to Pont Briwet and Dwyryd Pylon are causing loss of saltmarsh in Dwyryd estuary – loss calculated <1ha to be compensated by Gwynedd Local Authority. Structure and function in question due to scour protection being left in at Bridge works causing an impediment to lateral variation of channel and weir effect which permanently changes the hydrology.
This component has been assessed as **unfavourable**.

Structure and function: The Pen Llŷn a`r Sarnau SAC overlaps with several WFD waterbodies, however four of these (Artro, Mawddach, Glaslyn and Dyfi & Leri waterbodies) overlap with the majority of the ASM feature. The Glaslyn had a good overall status with a good chemical status, the Artro had a moderate overall status with a good chemical status. The Mawddach and Dyfi & Leri

waterbodies have a moderate status and a fail for chemical status (both for Brominated diphenylether (BDPE)). The ecological status for three of the four waterbodies was good with two of these waterbodies assessed as high for DIN (dissolved inorganic nitrogen) while one was good. The Artro was an exception with a moderate assessment for DIN. There have been no known changes in nutrient levels in the estuaries since designation.

Works carried out to Pont Briwet and Dwyryd Pylon are causing loss of saltmarsh in Drywyd estuary – loss calculated <1ha to be compensated by Gwynedd Local Authority. Structure and function in question due to scour protection being left in at Bridge works causing an impediment to lateral variation of channel and weir effect which permanently changes the hydrology.
This component has been assessed as **unfavourable**.

Typical Species: In the 2011 SAC Monitoring Report for this feature and site ASM was reported to be in unfavourable condition. The report highlighted areas of poaching and over grazing however, although a significant proportion of the site is in good condition the overall result was unfavourable. Both over grazing and under grazing is an issue on some parts of the site, particularly on some parts of the Dwyryd. Only one of the WFD waterbodies was assessed for saltmarsh, the Artro waterbody, it was assessed as good. However, based on the SAC monitoring data, as the WFD data is limited to one area, this component has been assessed as **unfavourable**.

Noted activities:

- Access onto saltmarsh with vehicles.

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

- Lewis, H. (2011). *CCW SAC Monitoring Report, UK0013117 Pen Llŷn a'r Sarnau SAC Monitoring Report 2011: H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae), H1310 Salicornia and other annuals colonising mud and sand.*
- Royal Haskoning, (2012). *West of Wales Shoreline Management Plan 2. Cardigan Bay and Ynys Enlli to the Great Orme Coastal Groups*. June 2012.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: http://waterwatchwales.naturalresourceswales.gov.uk/en/

3.8 *Salicornia* and other annuals colonising mud and sand indicative condition assessment

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

Date	May 2017
Site name	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	*Salicornia* and other annuals colonizing mud and sand

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)	Unfavourable	Expert judgement (knowledge of historical modification to the estuaries), reports, expert judgement based on casework.	High	High	High
Structure & function	Unfavourable	Expert judgement (knowledge of historical modification to the estuaries), WFD assessments, Expert judgement based on casework.	High	High	High
Typical species	Favourable	Monitoring report Expert judgement	High	Medium	Medium
Relevant activities (*activities directly impacting condition of the feature on this site*)	• Coastal defence and erosion control • Development (Pont Briwet and Dwyryd Pylon)				

Overall Indicative Assessment	**Overall Confidence level**
Unfavourable	High

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

Restoration Objective within conservation objective for the Estuary feature: Part of the conservation objective is 'should be restored' for the estuary feature, this means that at the time the conservation objectives was set the estuary feature was likely to be in unfavourable condition. This affects the *Salicornia* as it is within the estuary feature and is therefore included within the objective.

Distribution & extent:
Sarnau estuaries: Work by RESILCOAST shows all three estuaries are increasing in extent of saltmarsh by approx. 61% total since late 19th century. However, slight decline in extent from 1990 to 2013 in Dyfi data shown (505 ha to 487 ha). Mawddach data shows increase from 183 ha to 207 ha and Dwyryd shows an increase from 300 Ha to 305 Ha between 1990 and 2013. Shi (1993), show accretion rate at 12mm +/- 4mm/yr (1977 – 1989) with sea level 4.97+/- 0.10 mm/yr (1991 – 2013) for the Sarnau estuaries.

Increases in *Salicornia* are a response of the estuary modification of the estuary in the 19th century particularly the cob along with flood embankments within the component estuaries. **However, the distribution is constrained because of the modifications.** There are small predicted losses for the 1st epoch (2005 – 2025) within SMP2 and these losses will continue into the future with the existing constraints in the estuary.

The West of Wales Shoreline Management Plan HRA predicted a 4.4 Ha loss of saltmarsh due to coastal squeeze for the first epoch (2005 - 2025) for PLAS (Royal Haskoning, 2012). 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, but to date no schemes have been delivered to offset the small predicted losses for PLAS (n.b. Morfa Friog habitat creation was mitigation for works at Fairbourne, not compensation).

Predicted losses are relatively small and the variation in extent of saltmarsh between estuaries is illustrated by the RESILCOAST work mentioned above. Predicted coastal squeeze wouldn't lead to a conclusion of unfavourable at this stage.

Works carried out to Pont Briwet and Dwyryd Pylon are causing loss of saltmarsh in Drywyd estuary – loss calculated <1ha to be compensated by Gwynedd Local Authority (Not recorded how much of this was *Salicornia*). Structure and function in question due to scour protection being left in at Bridge works causing an impediment to lateral variation of channel and weir effect which permanently changes the hydrology. Loss of saltmarsh due to fold defence works following 2013/14 storms.
This component has been assessed as **unfavourable**.

Structure and function: The Pen Llŷn a`r Sarnau SAC overlaps with several WFD waterbodies, however four of these (Artro, Mawddach, Glaslyn and Dyfi & Leri waterbodies) overlap with the majority of the ASM feature. The Glaslyn had a good overall status with a good chemical status, the Artro had a moderate overall status with a good chemical status. The Mawddach and Dyfi & Leri

waterbodies have a moderate status and a fail for chemical status (both for Brominated diphenylether (BDPE)). The ecological status for three of the four waterbodies was good with two of these waterbodies assessed as high for DIN (dissolved inorganic nitrogen) while one was good. The Artro was an exception with a moderate assessment for DIN, this feature is thought to be relatively tolerate to nitrates. There have been no known changes in nutrient levels in the estuaries since designation.

Works carried out to Pont Briwet and Dwyryd Pylon are causing loss of saltmarsh in Drywyd estuary – loss calculated <1ha to be compensated by Gwynedd Local Authority. Structure and function in question due to scour protection being left in at Bridge works causing an impediment to lateral variation of channel and weir effect which permanently changes the hydrology.
This component has been assessed as **unfavourable**.

Typical species: In the 2011 SAC monitoring report for this feature and site *Salicornia* was reported to be in favourable condition (this covers condition of the vegetation only) (Lewis, 2011). Only one of the four relevant WFD waterbodies was assessed for saltmarsh, the Artro waterbody, it was assessed as good.
This component has been assessed as **favourable**,

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

- Lewis, H. (2011), *UK0013117 Pen Llŷn a'r Sarnau SAC Monitoring Report 2011: H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae), H1310 Salicornia and other annuals colonising mud and sand.*
- Royal Haskoning (2012). *West of Wales Shoreline Management Plan 2. Cardigan Bay and Ynys Enlli to the Great Orme Coastal Groups*. June 2012.
- WFD waterbody classifications (2015). 2009-2015 Classification Data: http://waterwatchwales.naturalresourceswales.gov.uk/en/

3.9 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	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Submerged or partially submerged sea caves

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	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 (*activities directly impacting condition of the feature on this site*)	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.
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.
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: The following activities are of concern for the feature and were identified in the LIFE N2K Project, there is a lack of evidence on what affects they may be having on the feature.

- Coasteering – some caves are accessible in the inter-tidal zone
- Coastal defence – along the railway line
- Enrichment from agricultural runoff

Note: Network rail casework since site designation has aimed to avoid further infilling of caves along the Tonfannau stretch of coast. Small re-inventory with photographs and waypoints carried out at Friog-Tonfannau in 2013. The data is yet to be worked up and compared to the 2007/8 inventory.

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.

3.10 Bottlenose dolphin *Tursiops truncates* indicative condition assessment

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

Date	May 2017
Site name	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Bottlenose dolphin (*Tursiops truncatus*)

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	Monitoring data, report	Medium	Medium	Medium
Range (within site)	Favourable	Monitoring data, report	Medium	Medium	Medium
Supporting habitats					
Distribution & extent	Unknown	Expert judgement	Medium	Not applicable	Not applicable
Structure & function	Unknown	Expert judgement	Medium	Not applicable	Not applicable
Prey availability and quality	Unknown.	Expert judgement	Medium	Not applicable	Not applicable
Relevant activities (*activities directly impacting condition of the feature on this site*)	No activities identified as having a direct impact on feature condition.				

Overall Indicative Assessment	**Overall Confidence Level**
Favourable	Medium

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

The 'population' associated with Pen Llŷn a'r Sarnau SAC is part of a larger coastal population that is largely associated with Cardigan Bay SAC, where longer term monitoring has been carried out. There is a high degree of connectivity in dolphins in both SACs and other locations further afield and these two SACs together are typically considered as a 'super-site' that does not have separate populations. As such, the Cardigan Bay SAC monitoring data are used as a proxy for PLAS SAC population metrics and its condition assessment. Therefore the component results below are taken from those of Cardigan Bay SAC as a proxy for Pen Llŷn a'r Sarnau feature.

Population:
Abundance Estimate
Cardigan Bay SAC - 2016: 147 individuals (127 – 194, 95% Confidence Interval (CI)). This abundance estimate is derived using photographic identification methods.

An initial trend analysis on these data indicates no significant trend in the SAC between 2001 and 2016 but a decline in the last 10 years (Lohrengel *et al*., in prep). Further work is underway to better analyse trends in the data set.

Birth rate – last three years (4.3% (2014), 5.8 % (2015) and 4.0% (2016) below 11-year average (6.5%)
Interbirth Intervals – 3.4 years' average (range 2 – 7 years)
Juvenile survival rate – Cardigan Bay SAC - remained similar over study period (2001 – 2016)

The level of PCBs (polychlorinated biphenyls) is high in bottlenose dolphin and at a level which fails part of the 'Population' conservation objective whereby contaminant burdens derived from human activity should be below levels that may cause physiological damage, or immune or reproductive suppression. Analysis of bottlenose dolphin (BND) blubber samples by the UK Cetacean Strandings Investigation programme (CSIP) have found the level of PCB contamination to be very high and at a level likely to be leading to population declines and suppress population recovery. This is a UK wide issue. However, there is no evidence that high PCB levels are causing a reduction in reproductive capacity (birth rates etc.) in Cardigan Bay. It may be that we are observing a suppressed population.

Body condition – the population is generally considered to be in good body condition. Occasional underweight mothers are observed, associated with lactation.

Injured individuals – a small number (<20 (estimate)) of known surviving injured individuals. The cause of injuries in some cases may be propeller/boat strikes.

The Indicative assessment is determined by comparing the current SAC 'population' estimate to that at the point of initial designation (2002). The population has not declined below those levels and as such is deemed favourable.

The population component has been assessed as: **Favourable**,
The Medium confidence score is due to:

- High PCB loads
- Unknown condition of prey / habitat

Trend: Population only - Declining (population number) in the short term (10 years), stable in the medium term (since 2001).
Confidence in trend: Medium

Range: Residency patterns for Cardigan Bay SAC and wider Cardigan Bay - there are no significant trends in the probability of emigration or of staying out of the area.
Home ranges – Cardigan Bay SAC. Bottlenose dolphins can be found throughout Welsh waters, with individuals regularly recorded from Pembrokeshire to the waters north of Wales occasionally recorded from as far north as the Isle of Man. It is therefore considered to be a wide-ranging population and is treated as one management unit.
This component has been assessed as **favourable**.

Supporting habitats:

Habitat distribution & extent: Beyond general terms (i.e. the water column), there is no specifically defined 'dolphin habitat'. The presence of dolphins at a location implies that the habitat is suitable but presence is largely driven by prey availability.
This component has been assessed as **unknown**.

Habitat structure & function:
Water quality: The relationship between any failures in WFD assessments and bottlenose dolphin condition is unknown. WFD data was used from the relevant waterbodies (Caernarfon Bay South, Cardigan Bay North, Mawddach, Glaslyn, Dyfi & Leri and Tremadog Bay) two of these waterbodies have a good overall status and good chemical status (Glaslyn & Tremadog Bay), one (Caernarfon Bay South) has a moderate overall status and good chemical status, the moderate status is driven by dissolved inorganic nitrogen (DIN) only. Three waterbodies have a moderate overall status, with a good ecological status but with a fail for chemical status. Cardigan Bay North had a chemical failure for tributyltin (TBT) and its compounds, although this waterbody fails for TBT, the

imposex[6] assessment was good for this waterbody and good for the adjacent waterbody (Tremadog Bay). The Mawddach and Dyfi & Leri waterbodies fail for brominated diphenylether (BDPE) only.

Seabed habitat: the relationship between seabed habitat, prey species and bottlenose dolphins are largely unknown. Weather events, e.g. winter storms, have been shown to affect seabed structure.
This component has been assessed as **unknown**.

Prey availability and quality: Body condition generally good, bottlenose dolphin have a varied diet and it is unlikely that a declining or low population size of a particular food source would make it unfavourable. Note that some fish stocks are below Maximum Sustainable Yield (International Council for the Exploration of the Sea (ICES data)) in the region containing Wales. However, we do not have enough information about bottlenose dolphin prey species and the status of fish stocks to produce a meaningful assessment for this component.

Prey items could have PCB loads which are at levels which could be harmful to the prey's physiological health (as PCBs have been at high concentrations in stranded bottlenose dolphin) but further evidence on PCB levels in prey species and potential harm is needed before a meaningful assessment can be made
This component has been assessed as **unknown**.

Noted Activities:
Increased recreational usage is a pressure. It is an unregulated activity. There is anecdotal evidence that around the Tidwals / Abersoch bottlenose dolphins are not seen in summer months. There are some observations that motor boats and sail boats move towards dolphins.

Positives:
- SAC Officer is raising awareness of local issues regarding bottlenose dolphins.
- Codes of Conduct for bottlenose dolphins produced by Gwynedd Council.
- There is a Local Accreditation scheme for boat owners to encourage boat owners to act in accordance with code. Dolphin Watch monitoring is an initiative which looks at compliance with the Code of Practice.

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

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

- Deaville, R. and Jepson, P.D. (compilers) (2014) *UK Cetacean Strandings Investigation Programme*. Final Report to Defra for the period 1st January – 31st December 2014. (Contract numbers CR0346 and CR0364). Institute of Zoology, London. 75pp.
- Feingold, D. and Evans, P.G.H. (2014a) *Bottlenose Dolphin and Harbour Porpoise Monitoring in Cardigan Bay and Pen Llŷn a'r Sarnau Special Areas of Conservation 2011-2013*. Natural Resources Wales Evidence Report Series No. 4. 124pp.
- Feingold, D. and Evans, P.G.H. (2014b) *Connectivity of Bottlenose Dolphins in Welsh Waters*: North Wales Photo-Monitoring Report. Natural Resources Wales Research Report. 15pp.
- Jepson *et. al*., (2016). *PCB pollution continues to impact populations of orcas and other dolphins in European waters*. Nature Scientific Reports 6, Article Number 18573. https://www.nature.com/articles/srep18573
- Lohrengel, K., Evans, P.G.H., Lindenbaum, C.P., Morris, C.W., Stringell, T.B. (in prep) *Bottlenose dolphin monitoring in Cardigan Bay 2014-2016.* NRW Evidence Report No: 191, 163pp, Natural Resources Wales, Bangor.
- Pesante G, Evans PGH, Baines ME, McMath M (2008b). *Abundance and Life History Parameters of Bottlenose Dolphin in Cardigan Bay: Monitoring 2005-2007*. CCW Marine Monitoring Report No. 61. Countryside Council for Wales, Bangor
- Penrose, R.S. (2016) *Marine Mammal & Marine Turtle Strandings (Welsh Coast). Annual Report 2015.* Marine Environmental Monitoring, Llechryd, Cardigan. 20pp.
- Pesante, G., Evans, P.G.H., Anderwald, P., Powell, D. and McMath, M. (2008a) *Connectivity of bottlenose dolphins in Wales: North Wales photo-monitoring*. CCW Marine Monitoring Report No. 62, 1-42.
- Pesante, G., Evans, P.G.H., Baines, M.E. and McMath, M. (2008b*) Abundance and Life History Parameters of Bottlenose Dolphin in Cardigan Bay: Monitoring 2005-2007*. CCW Marine Monitoring Report No. 61: 1-75.

3.11 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	Pen Llŷn a`r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Otter (*Lutra lutra*)

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	Monitoring data, reports & expert judgement.	High	Medium	Medium
Range (within site)	Unknown	Expert judgement	High	Not applicable	Not applicable
Supporting habitats					
Distribution & extent	Favourable	Expert judgement	High	Low	Low
Structure & function	Unknown	Expert judgement	High	Not applicable	Not applicable
Prey availability and quality	Favourable	Expert judgement	High	Low	Low
Relevant activities (*activities directly impacting condition of the feature on this site*)	No activities identified as having a direct impact on site condition.				

Overall Indicative Assessment	**Overall Confidence Level**
Favourable	Medium

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 elements with supporting habitats, 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 areas of the 2009/10 otter survey relevant to this site are the Glaslyn and Dyfi areas and the component river populations (Dyfi & Glaslyn) have increased in population (Strachan, 2015). The Mawddach, Dysynni and Dyfi all showed substantial improvements in positive results for otters in the 2009-10 survey compared to 2002. However, a total of 23 sites were found to be negative. The survey of the area took place after a period of heavy rain and high river levels. In these conditions signs may have been washed away from some sites, so the results may represent an underestimate of the real situation (Strachan, 2015). The Glaslyn hydrometric area showed an overall increase in positive sites[7] from 48% in 2002 to 92% in 2009-10, the results are thought to represent a real expansion in range across this area. 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. This is based on current evidence from the 2009 National Otter Survey of Wales. The next survey is currently taking place (2017) and should there be positive results on population for this site, then the Confidence in Trend may become high.

Range: Although there is evidence that otters occur across those catchments as surveyed during the Otter Survey, we cannot say for certain that they also occur throughout the entirety of the SAC, however the Glaslyn area is thought to be showing a real expansion across the site and expansion along the Lleyn peninsula and coastal Snowdonia has been made possible due to the sheltered bays and estuaries that have been exploited by otters for foraging and breeding (Strachan, 2015). This component has been assessed as **unknown**.

Supporting habitats:

Distribution and extent: Based on the judgement of experts, their knowledge of the area and records of breeding otter from the local records centre (but with no other supporting documentation).
This component has been assessed as **favourable**

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

Structure & function: There is no information on structure and function for this feature on this site.
This component has been assessed as **unknown**.

Prey availability and quality: Based on the judgement of experts, their knowledge of the area and records of breeding otter from the local records centre (but with no other supporting documentation), this component was assessed as favourable. Fish species in the diet of otter from the Glaslyn hydrometric area show an abundance of marine fish in otter diet in this area (Strachan *et al*., 2006). A large number of spraints[8] in the Glaslyn coastal sites showed the otters were eating crab (Strachan 2015).
This component has been assessed as favourable.

Noted Activities:
Mitigation for otters in developments is not always sufficient and could be a factor in why otters are not doing quite as well in this site when compared to other European marine sites in Wales with otter as a feature.

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

- Evidence of breeding otter at this site from Local Records Centre records
- Kean E.F., Lyons, G., & Chadwick, E.A. (2013). Persistent organic pollutants and indicators of otter health. A CHEM Trust report.
- 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

[8] Otter faecal matter

3.12 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	Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC
Site feature assessed	Grey seal (*Halichoerus grypus*)

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	Medium	Medium*	Medium
Range (within site)	Favourable	Reports & expert judgement	Medium	Medium*	Medium
Supporting habitats					
Distribution & extent	Unknown	Expert judgement / Casework	Medium	Not applicable	Not applicable
Structure & function	Unknown	Expert judgement / Casework	Medium	Not applicable	Not applicable
Prey availability and quality	Unknown	Expert judgement / Casework	Medium	Not applicable	Not applicable
Relevant activities (*activities directly impacting condition of the feature on this site*)	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 regularly monitored sites (Bardsey Island) pup production and haul out numbers have been maintained or increased over the observation period (since 2009) (RSPB/NRW, unpublished data). Previous census results indicated that pup production remained stable at observed pupping sites in North Wales (Stringell *et al*., 2014; Westcott & Stringell, 2003, 2004); we do not have more recent pup production estimates (outside of Bardsey Island) but based on results from Pembrokeshire (see Pembrokeshire indicative condition assessment 2017) and elsewhere in UK (e.g. see SCOS 2016) we assume that grey seal populations are doing well.
This component has been assessed as **favourable**.

Trend (population only): Recovering (at monitored sites)
Confidence in trend: Medium

Range: Known pupping site use has not contracted between censuses of 2002, 2003 and 2004 (Stringell, *et al*., 2014; Westcott & Stringell 2003, 2004) and several new sites have been observed to have pupping in recent years (e.g Angel Bay, North Wales); it is likely that pupping site distribution is stable or increasing (no loss in range). Haul out site use appears to be stable (i.e. no new sites have been documented). However, no systematic monitoring has been carried out since 2004, so the evidence supporting no loss in range is limited and driven by expert judgement based on *ad hoc* surveys and observations.
This component has been assessed as **favourable**.

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 photoID (Pomeroy, *et al*., 2015).

Supporting habitats (all): The growth or stability of pup production over at least the last decade (in Pembrokeshire (see Pembrokeshire indicative condition assessment 2017) and in UK (SCOS 2016)) suggests that the supporting habitat is functioning well and likely to be of sufficient quality to maintain the population or enable population growth. However, 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 sites monitored) is stable or 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 SW approaches) is high. Despite this, the population is increasing.

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

- Baines, M.E., Evans, P.G.H. (2012). *Atlas of the Marine Mammals of Wales*. 2nd Edition. Marine Monitoring Report No. 68. Countryside Council for 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 ME (2000). *Grey seals: Status and monitoring in the Irish and Celtic Seas*. Maritime Ireland/Wales INTERREG Report No. 3.
- 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.
- Stringell, T.B., Millar, C.P., Sanderson, W.G., Westcott, S.M., McMath, M.J. (2014). *When aerial surveys will not do: grey seal pup production in cryptic habitats of Wales*. Journal of the Marine Biological Association of the United Kingdom. 94 (6): 1155-1159.
- 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.
- Westcott, S.M., Stringell, T.B. (2003). *Grey Seal Pup Production for North Wales, 2002*. CCW Marine Monitoring Report No: 5a. Countryside Council for Wales, Bangor.
- Westcott, S.M., Stringell, T.B. (2004). *Grey seal distribution and abundance for North Wales, 2002-2003*. CCW Marine Monitoring Report No: 13. Countryside Council for Wales, Bangor.

3.13 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
Reefs	Favourable	Unfavourable
Large shallow inlets and bays	Unfavourable	Favourable
Sandbanks which are slightly covered by seawater all the time	Favourable	Unfavourable
Estuaries	Unfavourable	Unfavourable
Coastal lagoons	Unfavourable	Unfavourable
Mudflats and sandflats not covered by seawater at low tide	Unfavourable	Unfavourable
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Unfavourable	Unfavourable
Salicornia and other annuals colonising mud and sand	Favourable (2011)	Unfavourable
Submerged or partially submerged sea caves	Favourable	Unknown
Bottlenose dolphin (*Tursiops truncatus*)	Favourable	Favourable
Otter (*Lutra lutra*)	Unfavourable	Favourable
Grey seal (*Halichoerus grypus*)	Favourable	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 (2015[9]) 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 site[10].

[9] Environment Agency. 2015. Classification of Surface Water Bodies for the Water Framework Directive – Method Statement. Version 3.0 updated August 2014.
[10] 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 OSPAR[11] (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) Programme[12] 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 casework[13] 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:

[11] Oslo and Paris conventions managed by the OSPAR Commission: https://www.ospar.org/
[12] https://naturalresources.wales/about-us/our-projects/life-n2k-wales/?lang=en
[13] 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 level[14] 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.

[14] 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.

Published by:
Natural Resources Wales
Cambria House
29 Newport Road
Cardiff
CF24 0TP

0300 065 3000 (Mon-Fri, 8am - 6pm)

enquiries@naturalresourceswales.gov.uk
www.naturalresourceswales.gov.uk

Further copies of this report are available from:

Email: library@cyfoethnaturiolcymru.gov.uk