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Condition Assessments for the Designated Features of Ardal Cadwraeth Arbennig Bae Cemlyn / Cemlyn Bay Special Area of Conservation

Report No: 905

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Cemlyn lagoon and shingle ridge. © NRW.

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Crynodeb Gweithredol

Er mwyn rheoli ein hardaloedd morol gwarchodedig yn effeithiol ac yn gynaliadwy, mae'n hanfodol deall cyflwr eu cynefinoedd a'u rhywogaethau gwarchodedig. Mae gwybod cyflwr nodweddion dynodedig yn caniatáu i ni dargedu rheolaeth ac adnoddau lle mae eu hangen i wella ac adfer cyflwr.

Mae'r adroddiad tystiolaeth hwn, a gyflwynwyd fel rhan o brosiect gwella cyngor cadwraeth forol (IMCA) a ariannwyd gan Lywodraeth Cymru, yn cyflwyno canfyddiadau asesiadau cyflwr Cyfoeth Naturiol Cymru ar gyfer Ardal Cadwraeth Arbennig (ACA) Bae Cemlyn. Mae adran un yn rhoi trosolwg o'r broses asesu ac mae adran dau yn rhoi disgrifiad o'r ACA a'i nodweddion.

Mae'r asesiadau'n seiliedig ar y dystiolaeth orau a oedd ar gael ar y pryd (e.e. 2024). Adroddir canlyniadau asesiadau gyda hyder cysylltiedig yn y casgliad. Gellir dod o hyd i esboniadau manwl o'r rhesymeg y tu ôl i gasgliadau, ac unrhyw resymau dros fethu, yn yr asesiad cyflwr llawn yn Adran 3. Gellir dod o hyd i adroddiad ar y broses asesu a ddefnyddiwyd yn adroddiad terfynol IMCA.

Crynodeb o asesiadau cyflwr ar gyfer nodweddion dynodedig ACA Bae Cemlyn.

Nodweddion ACA	Asesiad cyflwr	Hyder yn yr asesiad
Morlynnoedd neu Lagynau	Anffafriol	Uchel
Llystyfiant lluosflwydd ar draethellau creigiog	Ffafriol	Canolig

Executive summary

To manage our marine protected areas effectively and sustainably it is vital to understand the condition of their protected habitats and species. Knowing the condition of designated features allows management and resources to be targeted where it is needed to improve and restore condition.

This evidence report, which was delivered as part of the Welsh Government funded improving marine conservation advice (IMCA) project, presents the findings of NRW's condition assessments for the designated features of the Cemlyn Bay special area of conservation (SAC). Section one gives an overview of the assessment process and Section two provides a description of the SAC and its features.

The assessments are based on the best evidence available at the time (e.g. 2024). Assessment outcomes are reported with an associated confidence in the conclusion. Detailed explanations of the rationale behind conclusions, and any reasons for failure, can be found in the full condition assessment in Section 3. A report on the assessment process used can be found in the IMCA final report.

Summary of condition assessments for the designated features of Cemlyn Bay SAC.

Feature	Condition assessment	Confidence in assessment
Coastal lagoons	Unfavourable	High
Perennial vegetation of stony banks	Favourable	Medium

1. Introduction

It is important for NRW to understand the condition of designated features in marine protected areas (MPAs) to allow NRW to prioritise management actions and advise on activity in the marine environment.

Having robust, evidence-based assessments of feature condition will ultimately lead to better protection through better management. The improvements in condition brought about by implementing targeted management will ultimately improve the resilience of Wales' marine ecosystems. As MPAs in Wales cover extensive areas of sea and coast, it can be challenging and resource intensive to monitor them. This can make thorough assessments of feature condition difficult. The process used for these condition assessments builds on work undertaken to produce indicative condition assessments published in 2018.

The 2018 indicative assessments used all available data and expert judgement to assess features using a workshop approach with internal NRW specialists. The new full assessment process, which has been delivered through the Welsh Government funded improving marine conservation advice (IMCA) project, has been improved by using carefully chosen performance indicators judged to be the most appropriate to assess condition (see section 3). The best available evidence has been used to conduct the assessments. Due to the differences in assessment methods between these full assessments and the indicative condition assessments, the results are not directly comparable.

1.1. Assessment process

Marine feature condition assessments in NRW consist of selecting performance indicators for the feature, gathering the best available evidence to assess those indicators and conducting the assessment.

Performance indicators have targets which have a primary, secondary or tertiary weighting. Failure of a primary target will mean the feature is classified as unfavourable, on a 'one out all out' basis. If all primary targets pass but two secondary targets fail, the feature would also be classified as unfavourable. Likewise, if all primary and secondary targets pass but three tertiary targets fail, the feature will also be unfavourable. Condition assessment outcomes are not strictly determined by target weightings and are also subject to expert judgement.

Each indicator result has an associated confidence which is determined by the quality and age of the evidence along with the confidence in the indicator itself and what it is telling us about condition of the feature. The confidence in the overall assessment is derived from the confidence in each target pass or failure, as well as expert judgment/ assessor consensus.

Each feature condition assessment will also identify reasons for indicator failure where known and any known threats to feature condition.

Table 1 summarises the steps taken in marine feature condition assessments. Details on the full condition assessment process, including indicator selection and target weighting can be found in the IMCA final report.

Table 1. The main steps of the marine feature condition assessment process.

Assessment Step	Process
Step 1: Preparation and evidence gathering.	Prepare site information. Source relevant evidence and any previous assessments. Evaluate quality of evidence according to suitability for use in assessments and carry out any analysis required.
Step 2: Indicator assessment.	A range of NRW specialists use all available evidence to assess the performance indicators and targets using a pass, fail or unknown. Record findings in the condition assessment form. Provide a confidence score for each target conclusion.
Step 3: Feature level assessments.	Combining the results from the assessment of feature indicators to provide an overall assessment of condition at the feature level.
Step 3.5. Complex features.	If the feature is a complex feature (i.e., estuaries or large shallow inlets and bays) consider the results of any nested feature assessments within the overall complex feature assessment.
Step 4: Condition pressures and threats.	Use the evidence gathered and information on management and activities to determine threats and pressures on feature condition.
Step 5: Finalise the assessments.	Ensure all required fields in the assessment have been completed and all assessed targets have an associated confidence. Circulate the reports to the relevant NRW specialists for review and comment. After issues have been resolved, the assessments will be signed off by the project task and finish group.
Step 6: Publish the assessments.	After signing off, the assessments will be published on the NRW website, and stakeholders and internal staff notified. Assessments are then ready to use by internal and external parties.

2. SAC description

Within Bae Cemlyn/ Cemlyn Bay SAC a shingle storm beach forms a bar between a tidal lagoon and the open shore. The shingle habitats, together with saltmarsh developing around the lagoon and brackish pools further inland are an unusual combination of habitats.

Annex I Coastal lagoons are areas of shallow, coastal salt water, wholly or partially separated from the sea by sandbanks, shingle or, less frequently, rocks. Lagoons show a wide range of geographical and ecological variation. The lagoon at Cemlyn is a modified natural feature. A sluice system was built in the 1930s across a narrow channel at the western end. Seawater exchange occurs mainly through the sluice and by percolation through the shingle bank, although in extreme storms coinciding with spring tides waves break over the top of the shingle bank.

The water in lagoons can vary in salinity from brackish (i.e. dilution of seawater by freshwater) to hypersaline (i.e. more salty than seawater as a result of evaporation). The biological communities of lagoons vary according to the physical characteristics and salinity regime of the lagoon, leading to significant differences between sites. Compared to other marine habitats, there is usually only a limited range of species present which are especially adapted to the varying salinity of lagoons, with some unique to lagoon habitats.

Coastal lagoons are a relatively uncommon habitat in the UK and are defined as a priority habitat within The Conservation of Habitats and Species Regulations 2017. Priority habitats are those that are particularly vulnerable and are mainly found within Europe.

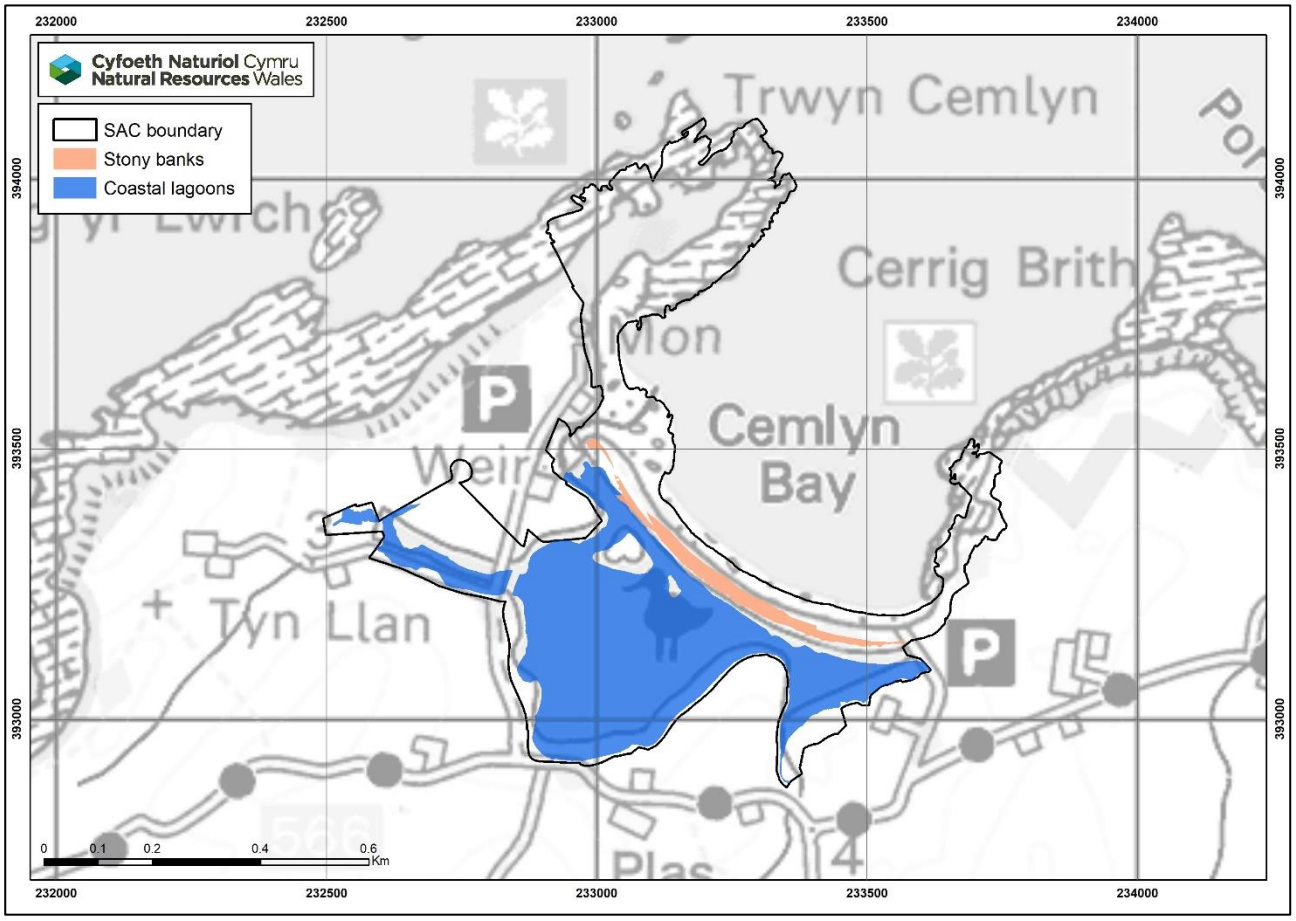
The Annex I perennial vegetation of stony banks feature consists of the community of plants on the shingle ridge at Cemlyn bay. Shingle structures develop when a sequence of foreshore beaches is deposited at the limit of high tide. More permanent ridges are formed as storm waves throw pebbles high up on the beach, from where the backwash cannot remove them. Stability of the shingle structure, together with climatic conditions and the amount of fine sediment that can accumulate will determine the extent of ecological variation. The ridges and lows formed also influence the vegetation patterns, resulting in characteristic zonation of vegetated and bare shingle. The *Rumex crispus – Glaucium flavum* pioneer shingle community is prevalent at Cemlyn and one of the best examples of the habitat in Wales.

The National Trust owns the land at Cemlyn, with large parts of the site managed as a wildlife reserve by the North Wales Wildlife Trust since 1971.

Figure 1 is a map of the location of the designated features within Cemlyn Bay SAC. The feature maps in this document are for illustrative purposes only. Detailed maps for the features in Wales can be found on Data Map Wales.

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

Figure 1. Map of the designated features of the Cemlyn Bay SAC.



3. Feature condition assessments for Cemlyn Bay SAC

This section contains assessments for the following designated features in Cardigan Bay SAC:

- Coastal lagoons
- Perennial vegetation of stony banks

Each feature has been assessed against their own performance indicators using all available evidence. The performance indicators were assessed using a combination of data from NRW Habitats Regulations monitoring, Water Framework Directive (WFD) Regulations 2017 (WFD Regulations) monitoring, commissioned evidence reports, scientific literature, plan and project assessments, external monitoring databases (e.g. National Biodiversity Network) and expert judgement. The outcome of the assessment and reasons for failure are discussed in more detail in the sections below.

In these condition assessments, the WFD 2024 cycle 3 interim classification was the default information used for water quality, however other earlier cycles were referenced, as follows:

- 2009 cycle 1 classification
- 2015 cycle 2 classification
- 2018 cycle 2 interim classification
- 2021 cycle 3 classification

In the WFD classification, results are rolled forward from previous assessments where there is no new monitoring data to provide a new classification. It is used to gap fill and provide a more complete classification. A decision was made to limit roll forward to six years which has been applied to the 2024 cycle 3 interim classification. It should be noted that the process taken for these water quality assessments may not account for some of the decisions taken in the WFD process, or that some waterbodies are not appropriate for classification of some WFD elements.

Additional information on water quality can be found in the IMCA final report.

3.1. Coastal lagoons condition assessment

The coastal lagoons feature in Cemlyn Bay SAC is comprised of a single lagoon located on the Island of Anglesey (Figure 2). The lagoon is separated from the sea with a shingle ridge and sluice built over the narrow channel at the western end. Monitoring data collected between 2006-2021, with both net sweep and grab sampling surveys, together with other relevant evidence has been used to assess the performance indicators.

Figure 2. Map of the coastal lagoons feature in the Cemlyn Bay SAC.

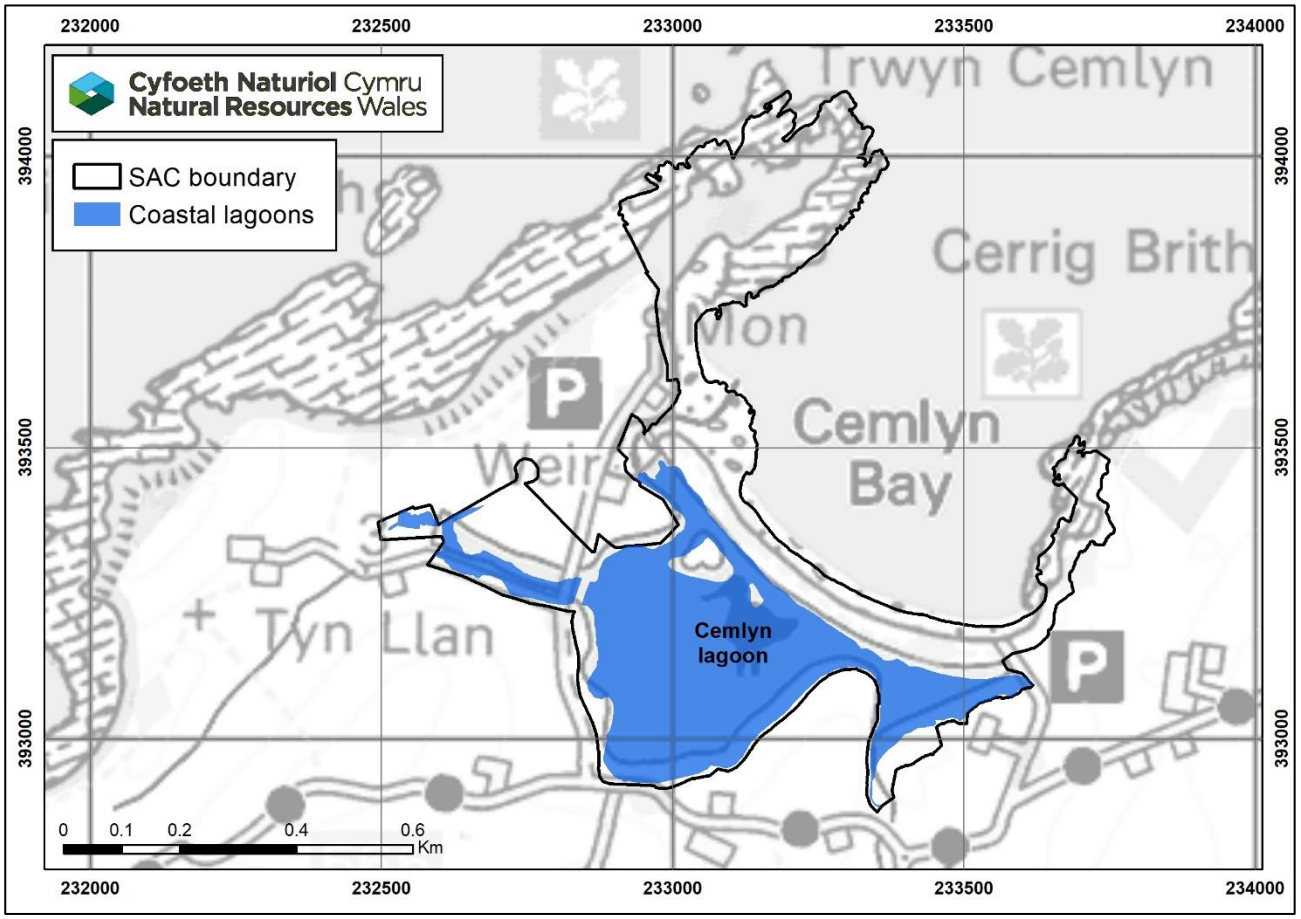


Table 2 has a summary of the assessment against the performance indicators. The overall feature condition, a detailed summary of the assessment and threats to condition can be found in the sections below.

Table 2. Condition assessment of Cemlyn Bay Lagoon. Each indicator target has a primary (P), secondary (S) or tertiary (T) weighting (see Section 1.1).

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Extent	No significant decrease in the extent of coastal lagoon within the SAC, allowing for natural change and variation. (P)	• Extent, determined from aerial imagery, indicates an apparent loss of 727 m^2 between 2000-2022. • The most notable loss of extent is at the northern end of the shingle barrier. It is estimated that 630 m^2 has been lost between 2000-2022 due to the barrier encroaching westward into the lagoon and makes up most of the extent lost. • This is not considered to be a significant loss to extent and within natural variation. • Confidence is high due to the availability of long term aerial imagery.	**Pass**	High
Shape of lagoon	Maintain the shape of coastal lagoon, subject to natural change and variation. (P)	• The shape of the lagoon has been determined from aerial imagery. • Very shallow wetting pools beyond the western lagoon extend into the neighbouring field. These areas are clearly drying parts of the lagoon and are subject to seasonal changes. The shingle barrier has also encroached westwards into the lagoon by 4-5 m. • These small changes are considered natural and the shape of the lagoon across the SAC remains broadly consistent. • Confidence is high due to the availability of long term aerial imagery.	**Pass**	High

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Isolating barrier integrity	No loss in integrity of any of the lagoon isolating barriers, allowing for natural change and variation (P)	• Waves over topping the barrier in stormy conditions over the last 20 years has caused a lowering of the shingle ridge along the western section. All Wales light detection and ranging (LiDAR) data shows the over topped areas are approximately 0.8 m lower than the natural mean height of the barrier. • The reduction in barrier height is not considered significant. The barrier currently has good integrity. • Confidence is high due to the availability of long term monitoring data.	**Pass**	High
Integrity of lagoon banks	No loss in integrity of any of the lagoon's banks, allowing for natural change and variation (S)	• Nearby livestock have been impacting bank integrity through grazing and trampling. • A vegetation survey by the National Trust in 2016 shows that several of the feeder streams to the lagoon are used by livestock, and are causing heavy poaching of the banks, reducing vegetation cover. • The integrity of the lagoon banks has been significantly compromised. • Confidence in the fail is high as damage to the banks was still evident in 2023.	**Fail**	High

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Angiosperms (*Ruppia*)	No loss of *Ruppia* extent from the lagoon, allowing for natural change and variation (P)	• A 2019 aquatic macrophyte survey of Tyn Llan pool to the West of Cemlyn's main lagoon showed that both Beaked Tasselweed *Ruppia maritima* and Spiral Tassleweed *Ruppia cirrhosa* (syn. *R. spiralis*) were present and formed a major component of the submerged macrophyte community. • There are historical records of *Ruppia* spp. in the main lagoon, though no recent surveys have confirmed if presence in the main pool has been maintained. This caused the confidence to be medium.	**Pass**	Medium
Species composition of communities	No modification of the expected composition of lagoon communities, allowing for natural change and variation. (P)	• Monitoring data has been collected between 2006-2021. Community analysis found a clear change in community composition in recent years (2016-2021). This relatively large change can be seen across all 3 sampling stations in the lagoon. • This shift has been driven by a decline in the gastropod *Ecrobia ventrosa*, a lagoon specialist, and increases in more opportunistic species. • Confidence is high due to the significant shifts toward opportunistic species seen in recent years which are strongly indicative of environmental disturbance.	**Fail**	High

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Abundance of lagoon specialists	Maintain the abundance of lagoon specialist species, allowing for natural change and variation. (P) List of species for the SAC: *Cerastoderma glaucum, Chaetomorpha linum, Conopeum seurati, Ecrobia ventrosa, Gammarus chevreuxi, Gammarus insensibilis, Idotea chelipes, Monocorophium insidiosum, Ruppia maritima.*	• There were no concerns for the following lagoon specialists. ○ *Monocorophium insidiosum* abundance has varied greatly throughout the monitoring period. ○ *Idotea chelipes* was recorded in low numbers by grab samples but high numbers by sweep net surveys in 2015. • Declines in the following species are a cause for concern, based on medium confidence data collected between 2006-2021. ○ *Ecrobia ventrosa* has seen significant declines in abundance since 2016. The decline has been consistent across all sampling stations. ○ *Gammarus chevreuxi* and *G. insensibilis* have not been recorded in sweep net surveys since 2013. ○ *Cerastoderma glaucum* was recorded previously in low numbers. There have been no recent records, despite additional effort to specifically search for it. • Other species have not been sampled in recent years but are hard to detect with standard survey methods. ○ *Conopeum seurati* was recorded previously in 1998 and 2000, and in the sweep net survey in 2014. It has not been recorded since 2017. ○ *Chaetomorpha linum* has not been recorded since 2013. • Confidence is medium due to inadequate sampling method and the boom-and-bust nature of some populations making drawing any conclusion difficult.	**Fail**	Medium

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Species richness and diversity	Maintain the expected richness and diversity of lagoon species, allowing for natural change and variation. (P)	• Analysis of monitoring data collected between 2006-2021 showed changes in species diversity which were within the expected range of natural variation. • However, there was a decline in species richness in recent years (2016-2021) across all three sampling stations. There has also been a significant decline in the abundance of species at each sampling station. • The decline is potentially linked to water quality, but more investigation is needed. • Confidence is medium as it is not clear what has caused the decline in species richness.	**Fail**	Medium
Taxonomic spread of species	Maintain the expected taxonomic spread of lagoon species, allowing for natural change and variation. (P)	• Analysis of monitoring data showed a high mix of taxonomic diversity across the dataset. • However, there was a low number of taxa in 2021. This, together with declining species richness (see above), suggests there could be a decline in taxonomic spread of species in years to come. • This caused the confidence in the pass to be low.	**Pass**	Low
Invasive non-native species (INNS)	Spread and impact of INNS caused by human activities should not adversely affect the condition of the feature. (P)	• There is no evidence to suggest that INNS are spreading into the lagoon or impacting its condition. • Confidence is medium as the impacts of INNS present within the feature are not well understood.	**Pass**	Medium

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Non-native species (NNS)	No increase in the number of introduced non-native species (NNS) by human activities. (T)	• There has been no increase in NNS species introduced to the lagoon within the last six years. • Confidence is high due to the availability of long term monitoring data.	**Pass**	High
Sediment composition and distribution	Maintain the composition and distribution of sediment granulometry across the lagoon, allowing for natural change and variation. (P)	• Principal component analysis (PCA) showed a shift in sediment composition, with coarse sediment shifting to finer sediments over the years (2006-2021). This can be a natural shift for a lagoon. • However, the rate of recent change (silt increase) is a concern. This caused the confidence to be low. No significant relationship was detected between sediment composition and abundance of macrofaunal community.	**Pass**	Low
Water depth	Maintain the expected depth of water within the lagoon, allowing for natural change and variation. (P)	• Water depth in the lagoon is managed via sluice gates. Stop logs reduce the peak flow of seawater into the lagoon in summer to protect the nesting tern colony. • Water depth has been measured sporadically since 2010 and seems to be stable (possible declines in recent years). • Confidence is medium due to a lack of consistent data and natural water depth variability creating uncertainty.	**Pass**	Medium

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Presence of materials and debris of anthropogenic origin	Anthropogenic material should not be having a detrimental impact on coastal lagoon. (S)	• Anthropogenic materials and debris have not been surveyed in a targeted way but have been counted or weighed as part of the infaunal surveys since 2017, though not consistently. • Microplastic counts took place in 2016 and 2019-2021. • Confidence is low as it is difficult to determine trends due to the short term and sporadic dataset. Large amounts of debris or microplastics have not been seen in available monitoring data.	**Pass**	Low
Water quality: nutrients (Dissolved Inorganic Nitrogen -DIN only)	The WFD classification achieved for winter DIN should be Good or High status in WFD waterbodies that overlap with the feature, and there should be no deterioration between status classes. (P)	• The Cemlyn Lagoon waterbody was classified with a Bad status for the DIN WFD element in the 2024 cycle 3 interim classification. • The adjacent WFD waterbody, the Skerries, has not been classified for the DIN WFD element in any cycles. • Confidence is high due to the recent monitoring within the lagoon.	**Fail**	High

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Water quality: opportunistic macroalgae	The WFD classification achieved for opportunistic macroalgae should be Good or High status in WFD waterbodies that overlap with the feature, and there should be no deterioration between status classes. (S)	• Neither of the WFD waterbodies that input water into the Cemlyn lagoon have been classified for the opportunistic macroalgae WFD element in the 2024 cycle 3 interim classification. • There have been direct observations of nuisance algae growth in the lagoon every year since 2020. • Confidence is high due to the observed extent of the macroalgae cover in the lagoon in recent years.	**Fail**	High
Water quality: contaminants	Water column contaminants not to exceed the environmental quality standards (EQS). (S)	• Both of the relevant WFD waterbodies were not classified as the chemicals have not been assessed within the last six years (Cemlyn Lagoon and Skerries). • There is no monitoring of chemicals within the lagoon itself. This indicator was therefore assessed as unknown.	**Unknown**	N/A
Water quality: turbidity	Maintain expected levels of turbidity, allowing for natural change and variation. (S)	• There are limited data on turbidity for the coastal lagoons feature in Cemlyn Bay SAC, therefore this target was assessed as unknown.	**Unknown**	N/A

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Water quality: physicochemical properties	Maintain expected physicochemical properties of the water, allowing for natural change and variation. (P)	• Temperature and salinity loggers within the lagoon showed no concerning changes. • Confidence is medium as there are large gaps in the data series as the loggers have not been recording continuously due to technical issues. In addition, only temperature and salinity have been considered. Other physicochemical parameters such as pH should be considered in future.	**Pass**	Medium

Assessment conclusions

The coastal lagoons feature in Cemlyn Bay SAC (Cemlyn) has been assessed as being in **unfavourable** condition (high confidence). There were a number of failing indicators (Table 3). Further investigation is needed to better understand all of the failures to be able to identify management options that can bring the feature back into favourable condition.

A summary of the assessment can be seen in Table 3 with more detail on each performance indicator, and any reasons for failure, provided in the sections below.

Table 3. Summary of the condition assessment for the coastal lagoons feature in Cemlyn Bay SAC. Each indicator target has a primary (P), secondary (S) or tertiary (T) weighting.

Feature	Overall Condition Assessment	Indicator failures	Reason for indictor failures	Threats to condition
Coastal lagoons	**Unfavourable (high confidence)**	Species composition of communities (P) Abundance of lagoon specialist species (P) Species richness and diversity (P) Water quality: nutrients (DIN only) (P) Water quality: opportunistic macroalgae (S) Integrity of lagoon banks (S)	• Decline in the lagoon specialist *E. ventrosa* and increases in opportunistic species. • High nutrient levels in the Cemlyn Lagoon waterbody. • Growth of opportunistic macroalgae within the lagoon. • Livestock damaging bank integrity.	• Marine litter • Increased siltation • Water quality: contaminants • Climate change

Detailed assessment information

Extent and shape

The extent and shape of the lagoon has remained relatively stable over the monitoring period. Initial extent analysis showed a decrease of 727 m^2 between 2000-2022, equating to a 0.45% loss. Storm waves breaking over the top of the shingle barrier have washed down shingle into the lagoon. This is most pronounced at the northern end of the barrier and has changed the perimeter line in this area inwards by 4-5 m. This inward encroachment equates to a 630 m^2 loss of lagoon extent, accounting for most of the overall loss seen. These losses are relatively small and have been attributed to natural change. The shape of the lagoon across the SAC also remains broadly consistent. The extent and shape of lagoon indicators were therefore assessed as meeting their targets with a high confidence.

Lagoon barrier and banks

Cemlyn lagoon is isolated from the sea by the shingle ridge. Storm waves have over topped this ridge, but it still has good integrity and is currently functioning as a barrier. The isolating barrier integrity indicator target was therefore met with a high confidence. Although the barrier has good integrity, there is a lack of data and concerns over its long-term security. Surveying the ridge itself for change would improve assessment of this indicator. There is an expectation that as climate change brings about increased storminess and sea level rise, over topping events will occur more frequently. This will eventually result in a catastrophic breach of the barrier unless it is managed. The area of low-lying coast cliff retaining the sea from the field above Tyn Llan is also eroding and is thought to be a potential breach area in the future.

The banks of the lagoon on the landward side have been judged to lack integrity, causing the integrity of lagoon banks indicator to fail its target with a high confidence. Several areas of the banks of the lagoon have been identified as being affected by livestock from neighbouring fields. Several of the retaining field boundaries around the lagoon are compromised. A vegetation survey by the National Trust in 2016 showed livestock using feeder streams to the lagoon are heavily poaching the banks, reducing vegetation cover (A. Lewis (NRW), pers. comm.), particularly by the stream to the south and the shallow pools to the west. Lack of vegetation can increase runoff and livestock can cause the banks to erode. An NRW and National Trust project was carried out in 2022. The aim was to re-establish fences around field boundaries, completely excluding the cattle from the lagoon. Feeding stations and water troughs were moved to the centre of the field to limit cattle proximity to the lagoon and reduce trampling of the banks. The field near the western end of the lagoon that often gets wet has been fenced off to stop grazing. The National Trust have excluded stock from the majority of the feeder streams on their land (A. Lewis (NRW), pers. comm.), and also plan on planting more apple trees and hedges to create a more permanent buffer. While it is felt appropriate management has been carried out, it will take time to see if these measures are effective in allowing the banks to recover and regain integrity.

Species and communities

The angiosperms (*Ruppia*) within the Cemlyn lagoon were assessed as part of a 2019 aquatic macrophyte survey of Tyn Llan pool in the west of the main lagoon. This survey found that both Beaked Tasselweed (*Ruppia maritima*) and Spiral Tassleweed (*Ruppia cirrhosa* (syn. *R. spiralis*) were present and formed a major component of the submerged macrophyte community. The angiosperms indicator therefore met its target but confidence was reduced to medium as there are no routine surveys of *Ruppia*. There is a threat that the opportunistic macroalgae present in the lagoon (see below) could restrict light availability to the *Ruppia* species.

Cemlyn lagoon failed to meet indicator targets for species composition of community, species richness and diversity and abundance of lagoon specialists. Failure of these indicators suggests there has been a decline in lagoon condition that is impacting the species present.

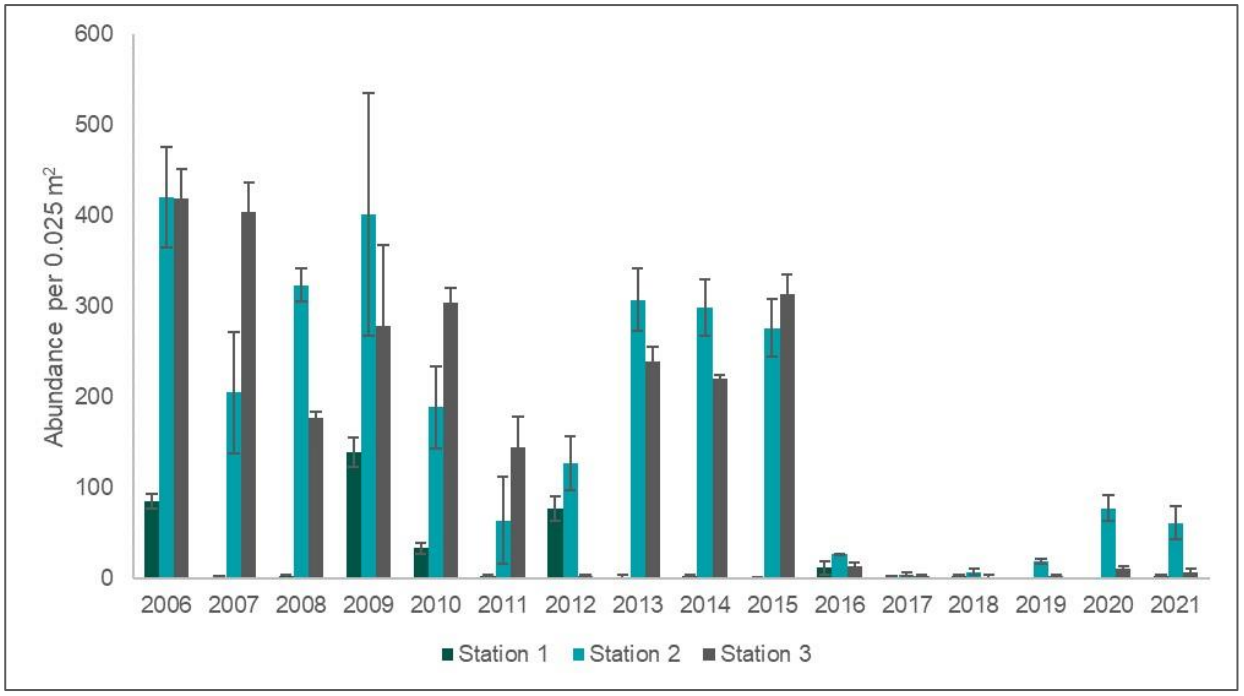
Community composition, species richness and taxonomic spread

Analysis showed a relatively large shift in community composition since 2016. This shift has been driven by a decline in the Spire snail *Ecrobia ventrosa*, a lagoon specialist, and increases in more opportunistic species (i.e. smaller body sizes and shorter life spans). *E. ventrosa* was the most abundant lagoon specialist at Cemlyn with high densities in the past, before starting to decline in 2016 as seen in Figure 3. Confidence in the fail is high due to the significant shifts toward opportunistic species seen in recent years, which are strongly indicative of environmental disturbance.

Analysis of species richness and diversity also revealed a decline over time at all three sampling stations. Species abundance was significantly lower in 2016-2021 compared to 2006-2015. The decline in species richness caused the species richness and diversity indicator to fail its target. Confidence was reduced to medium as it is not certain what has caused the decline, however it may be related to water quality. Observations of algal mats in recent years has prompted a water quality investigation. Nutrient levels were found to be very high (see below). It is possible that algal blooms resulting from high nutrients have negatively impacted the species richness and abundance. The sinking and subsequent decay of dying algal blooms can result in anoxic conditions on the surface of sediments which can lead to benthic biota death.

While the taxonomic spread indicator was deemed to meet its target, the data suggested there has been a decline in recent years. This caused the confidence in the taxonomic spread of species indicator to be reduced to low. The potential decline in taxonomic spread may be related to the decline in species richness, and may be further evidence of disturbance and loss of biodiversity within the lagoon.

Figure 3. Declines of the Spire snail *Ecrobia ventrosa* at Cemlyn lagoon. Mean (± Standard Error) abundance of *E. ventrosa* per 0.025 m^2 from grab surveys between 2006 and 2021 (5 grabs per station).



Lagoonal specialists

Other lagoon specialists besides *E. ventrosa* have also declined in abundance over the monitoring period. The amphipods *Gammarus chevreuxi* and *G. insensibilis* have not been recorded in sweep net surveys since 2013. The lagoon cockle *Cerastoderma glaucum* was recorded previously, up to 2007, in low numbers, but has not been recorded recently. This is despite additional targeted surveys to specifically search for the species.

Two lagoon specialists, the spaghetti algae *Chaetomorpha linum* and bryozoan *Conopeum seurati* have also not been observed in recent years. *C. linum* has not been recorded since 2013 (further surveys in 2014, 2015 and 2019). *C. seurati* has not been recorded since 2017. Both species are hard to sample with grab and sweep net methods. *C. seurati,* for example, is an encrusting bryozoan commonly inhabiting pebbles on the lagoon floor making them unlikely to be sampled. This means *C. seurati* and *C. linum* may be present and not being picked up by monitoring. While it is a concern that these species have not been recorded in recent years, it is not certain that they have been lost from the lagoon. The abundance of other lagoon specialists, such as the amphipod *Monocorophium insidiosum* and the isopod *Idotea chelipes*, varied greatly depending on the sampling methods and throughout the monitoring period, making it difficult to draw conclusions. These caused the confidence of the abundance of lagoon specialists indicator to be medium.

Invasive non-native species

Monitoring between 2006-2021 found some non-native species (NNS) present in Cemlyn lagoon. However, numbers recorded have been very low. The sand gaper *Mya arenaria*, a NNS originating from America, was first recorded in the Cemlyn lagoon in 1998 and consistently in grab surveys since 2013. The overall mean abundance of this species from

sweep net surveys over the monitoring period was low, with a high abundance in 2014, but just one record in 2015, and no records in 2019.

Two further NNS have been recorded over the monitoring period of 2006-2021. The Ponto-Caspian freshwater hydroid *Cordylophora caspia* is a non-native freshwater hydroid that originates from the Black Sea. Presence of *C. caspia* has been recorded in the 2017 pre-term raft survey but not in the grab or sweep net surveys. The Jenkins' spire snail *Potamopyrgus antipodarum* is a freshwater mud snail that originates from New Zealand. It was only recorded in small numbers in 1998, with no records of the species since.

No new NNS were recorded in the coastal lagoons feature within the last six years, resulting in the NNS indicator to meet its tertiary target. Confidence in the pass was high due to the availability of long term monitoring data within the lagoon.

It is not fully understood how some of these species may spread and impact the condition of the coastal lagoons feature, and effects on the species diversity and composition have not yet been observed.

As there is no current impact from the invasive non-native species (INNS) present the primary target of the INNS indicator passed. Confidence is medium as the impacts of the NNS present within the feature are not well understood.

Sediments, depth and anthropogenic litter

While both the sediment composition and distribution, and water depth indicators met their targets, analysis showed some concerns. Sediments have been shifting from coarser sediments to finer silts over the period of 2006-2021. This can be a natural progression for a lagoon, however the rate of siltation at Cemlyn in recent years has been rapid. As there is no obvious anthropogenic impact the target passed but the confidence was reduced to low due to concerns over the increased rate of siltation seen. A similar scenario was seen with water depth. From the data available, the water depth appears to be stable, though there is evidence of slight declines in recent years. The lack of continuity in water depth data, combined with natural variability in water depth makes it difficult to determine if the recent decline is an issue. Therefore, the indicator has passed but with medium confidence.

The presence of materials and debris of anthropogenic origin indicator met its target. As there has not been a large amount of debris or microplastics found in available monitoring data, anthropogenic material was considered as not having a detrimental impact on the condition of the lagoon. However, there have not been targeted surveys of anthropogenic materials within the lagoon, and instead ad-hoc data has been obtained as part of the infaunal surveys. This reduced the confidence to low. A longer dataset and appropriate sampling design is required for temporal analysis as well as dedicated analysis of plastics.

Water quality

There is one WFD waterbody that overlaps with the lagoon feature. This is the Cemlyn Lagoon waterbody, which overlaps with 97% of the lagoon by area. This is likely to be good reflection of the overall effect of water quality on the feature. Cemlyn is isolated from the sea by the shingle ridge, but receives some water from the adjacent WFD waterbody,

the Skerries, which was used as part of the water quality: contaminants indicator assessment.

Nutrients (Dissolved Inorganic Nitrogen - DIN only), phytoplankton and opportunistic macroalgae

In the 2024 cycle 3 interim classification, the Cemlyn Lagoon waterbody was classified with a Bad status for the DIN element. This caused the nutrients (DIN only) indicator to fail with a high confidence as the monitoring has been done within the lagoon itself. The adjacent WFD waterbody, the Skerries, has not been classified for the DIN element in any cycles.

Nutrient levels may be linked to the tern that have been recorded nesting at Cemlyn for over 40 years. Excrement from the tern colony nesting on islands in the lagoon may have elevated nutrient levels in the lagoon for a long time, but there has been no evidence collected to support this.

The opportunistic macroalgae indicator was assessed as failing to meet its target with high confidence due to observations of opportunistic macroalgae since 2020 (Figure 4). There were no reports of nuisance algae prior to 2020. This suggests new additional inputs have been increasing levels of nutrients to a point that produces a biological response.

Neither of the relevant WFD waterbodies have been classified for the phytoplankton element in the 2024 cycle 3 interim classification. Therefore, this indicator could not be assessed. Classification of some WFD waterbodies are not suitable or possible for this element due to WFD classification methodology, or due to the nature of the waterbodies (e.g. turbidity levels).

Figure 4. Algal mats at Cemlyn lagoon in 2020.

Contaminants

The contaminants indicator has been assessed as unknown as the two relevant WFD waterbodies were not classified as the chemicals have not been assessed within the last six years.

Turbidity and physicochemical properties

The turbidity indicator was assessed as unknown due to insufficient data.

Temperature and salinity loggers in the lagoon did not indicate any concerning changes over the sample period therefore the physicochemical properties indicator met its target. Medium confidence has been attributed to the pass as the loggers in the lagoon have not been recording continuously due to technical issues, and as there are some gaps in the data series. In addition, only temperature and salinity have been considered. Other physicochemical parameters such as pH should be considered in future. The salinity, temperature, and water level in Cemlyn are closely linked to tidal and meteorological parameters, the degree of runoff into the lagoon, and the presence of the weir at the seaward entrance of the lagoon. Any changes in the runoff entering the lagoon, e.g. through artificial diversion or blocking of drainage ditches and streams, could tip the delicate balance of seawater and freshwater inputs to result in either a mainly fresh or mainly saltwater lagoon.

Reasons for target failure

The assessment of the coastal lagoons feature in Cemlyn Bay SAC failed four primary targets and two secondary targets. This resulted in the coastal lagoons feature to be assessed as being in **unfavourable** condition. The failing indicators and reasons for failure, if known, are stated below.

Species composition of communities

This indicator failed to meet its primary target due to a significant shift in community composition in recent years (2016-2021). The shift has been driven by declines in the once abundant lagoon specialist *E. ventrosa* and increases in short lived, opportunistic species. The shifts in community composition are indicative of disturbance in the lagoon ecosystem, although it is not clear what is causing this disturbance. The declines may be related to the high level of nutrients and opportunistic macroalgae growth within the lagoon. However, further investigation will be needed to understand the reason for this failure and allow management measures to be implemented.

Abundance of lagoon specialist species

This indicator failed to meet its primary target due to significant declines in some of the specialist lagoon species. Of the nine specialist lagoon species seven have seen declines. Some of these such as *G. chevreuxi*, *G. insensibilis, C. linum* and *C. seurati* may be due to not being easy to detect with current sampling methods and locations, or the boom-and-bust nature of some populations. More targeted investigations to find these species should be carried out. In the case of *E. ventrosa* and *C. glaucum*, it is certain that these species have seen real and significant declines. *E. ventrosa*, a once abundant gastropod in the

lagoon has declined significantly since 2016. The lagoon cockle *C. glaucum* seems to have disappeared from Cemlyn lagoon, with an absence of records of the species during targeted surveys in recent years. From the evidence it is not yet clear what is driving the declines of these lagoon specialists. Declines may be due to water quality issues, as high levels of nutrients and algae have been recorded. However, further investigation will be needed to understand the reason for this failure and to allow management measures to be implemented.

Species richness and diversity

This indicator failed to meet its primary target due to a significant decline in species richness and abundance in the years 2016-2021 compared to years 2006-2015. Declines in species richness can indicate a change in environmental conditions. While taxonomic spread was deemed to meet its target, the data suggested there has been a decline in recent years. If this trend continues it would be further evidence for disturbance and loss of biodiversity within the lagoon. As with previous indicators these declines may be linked to the water quality issues in the lagoon, but it is not yet clear what is driving the declines of species richness and abundance and further investigation is needed.

Water quality: nutrients (DIN only)

This indicator failed to meet its primary target as the WFD waterbody that overlaps with the Cemlyn lagoon was classified with a Bad status for the DIN element in the 2024 cycle 3 interim classification (Cemlyn Lagoon waterbody).

The nutrient levels in the lagoon could possibly have been elevated for a long time due to excrement from the breeding tern colony nesting on islands in the lagoon. Terns have been recorded nesting at Cemlyn for over 40 years but there has been no evidence collected to support this. However, the reports of nuisance macroalgae have only been reported since 2020, suggesting new inputs of nutrients are increasing levels to a point that produces a biological response. Other sources of nutrients are most likely coming from agricultural land use in the surrounding area. Cattle are grazed in the fields surrounding the lagoon. Though management is now in place to prevent them getting close to the lagoon itself, runoff will still be an issue. There are also concerns of the impact of waste spreading on land adjacent to the lagoon. It is likely some point source pollution from leaking sewage is occurring, as large quantities of kiwi and tomato seeds have been found in grab samples (C. Lindenbaum, pers. comm.).

Water quality: opportunistic macroalgae

This indicator failed to meet its secondary target as a large accumulation of green algae has been observed in the lagoon since 2020. The large algae mats present are a result of high levels of nutrients in the lagoon and are now considered to be abundant enough to have a detrimental impact (see above).

Integrity of lagoon banks

This indicator failed to meet its secondary target due to bank integrity being significantly impacted by cattle from neighbouring farmland. Trampling and poaching of vegetation have led to bank erosion and instability in many areas. Management measures have been put in place to deal with this issue. Fencing has been erected to prevent cattle from

accessing the banks; feed stations have been moved to keep cattle away; and trees are being planted to create natural long lasting buffer zones around the lagoon. It is hoped that with this management in place the integrity of the lagoon banks can start to recover. The level of recovery will not be clear until the next condition assessment.

Threats to condition

Part of the condition assessment is to identify threats to the condition of the lagoon. A threat is defined as an activity that is currently not impacting condition but has the potential to do so over the next reporting cycle, if activity levels increase or are unmanaged. It is important to identify these threats to be able to put pre-emptive management in place to prevent declines in condition.

Activities that go through licencing and permission processes whereby the impact of the activity on the feature would be assessed have not been included. The threats to the coastal lagoons feature condition in the Cemlyn Bay SAC are stated below.

Marine litter

Marine litter (e.g. microplastics) are increasing and could threaten condition.

Increased siltation

Increasing levels of silt in the lagoon can lead to decreases in water depth, increased turbidity (limiting light and clogging feeding apparatus) and change substrata, which can negatively impact those species that require less silty environments.

Water quality: contaminants

There is the potential for unregulated contaminants (such as per- and polyfluoroalkyl substances (PFAS)) to increase. This could affect some of the biota of the coastal lagoons feature as PFAS has been shown to bioaccumulate in marine species, increasing up the trophic levels (Khan et al., 2023). However, the biological impact of PFAS on marine species is not well understood.

Some persistent chemicals are not measured in every WFD waterbody, and some of the relevant WFD waterbodies have not been classified for any chemicals.

Climate change

It is not yet clear what pressures we will see from climate change at the SAC level or how different pressures will counter act each other. However, threats from climate change may include (Gihwala et al., 2024):

- Increased storminess which will put pressure on the barrier through over topping events and storm wave damage.
- Coastal squeeze from sea level rise will increase flooding events on high tides changing the hydrodynamic and physical conditions of the lagoon.

Evidence gaps

There are gaps in the current evidence that NRW feel are needed to be filled to fully understand condition in this feature.

Listed below are current indicators for the coastal lagoons feature that were either assessed as unknown, not assessed, or with a lower confidence. This was due to either limited data availability, outdated data, or a lack of information. Some indicators are not currently monitored but should be ideally considered in future condition assessments. See Table 4 for details.

Table 4. Evidence gaps for the coastal lagoons feature in Cemlyn Bay SAC. Each indicator target has a primary (P), secondary (S) or tertiary (T) weighting (see Section 1.1).

Indicator	Assessed status	Comments
Distribution and extent of habitats and communities (P)	Not assessed	• Biotopes are not well established for lagoons. Current monitoring is not set up to look at this in depth; additional fieldwork would be required.
Sediment quality: organic carbon content (P)	Not assessed	• This is not monitored but could be incorporated into PSA analysis in lagoons in future.
Sediment quality: contaminants (P)	Not assessed	• This is not monitored but could be incorporated into PSA analysis in lagoons in future.
Bathymetry of the feature (S)	Not assessed	• More targeted data would need to be collected to be able to assess changes in bathymetry. There is potential to create continual depth layer for lagoons using LiDAR data.
Hydrodynamic and sediment transport processes (S)	Not assessed	• Lagoon hydrodynamic regimes are not currently monitored.
Presence of materials and debris of anthropogenic origin (S)	Low confidence (limited data)	• Longer datasets and appropriate sampling designs are required for temporal analysis and detecting concerns for the future. • A dedicated analysis for plastic should be carried out in a similar fashion to hydrocarbon for sediment. Standardised surveys for large debris are also needed.
Water quality: phytoplankton (S)	Low confidence (proxy data used)	• This element is not currently monitored in Cemlyn lagoon.

Indicator	Assessed status	Comments
Water quality: opportunistic macroalgae (S)	Low confidence (proxy data used)	• This element is not currently monitored in some of the lagoons.
Water quality: dissolved oxygen (S)	Not assessed	• Dissolved oxygen is not currently monitored within Cemlyn lagoon. • Once a baseline is established monitoring would take place only when intelligence suggests an impact is occurring from an activity.
Water quality: contaminants (S)	Low confidence (proxy data used)	• Contaminants are mostly measured in Wales as part of WFD monitoring, but there is currently no WFD monitoring of contaminants within Cemlyn lagoon itself.
Water quality: turbidity (S).	Unknown	• Turbidity is measured in WFD sampling, but this is limited to only a few samples per year. • Therefore, this cannot be used to adequately assess the turbidity in any of the SACs. Investigation of the use of remote sensing data to assess turbidity could be carried out in the future. External data from other organisations could also be used.

3.2. Perennial vegetation of stony banks condition assessment

The perennial vegetation of stony banks (stony banks) feature in Cemlyn Bay SAC covers the vegetation communities that grow on and around the shingle ridge of the lagoon (Figure 5). The perennial vegetation of stony banks has been monitored sporadically between 1993 and 2022. Vegetation surveys, site visits, air quality monitoring and casework have been used to assess the feature against the performance indicators.

Figure 5. Map of the stony banks feature in the Cemlyn Bay SAC.

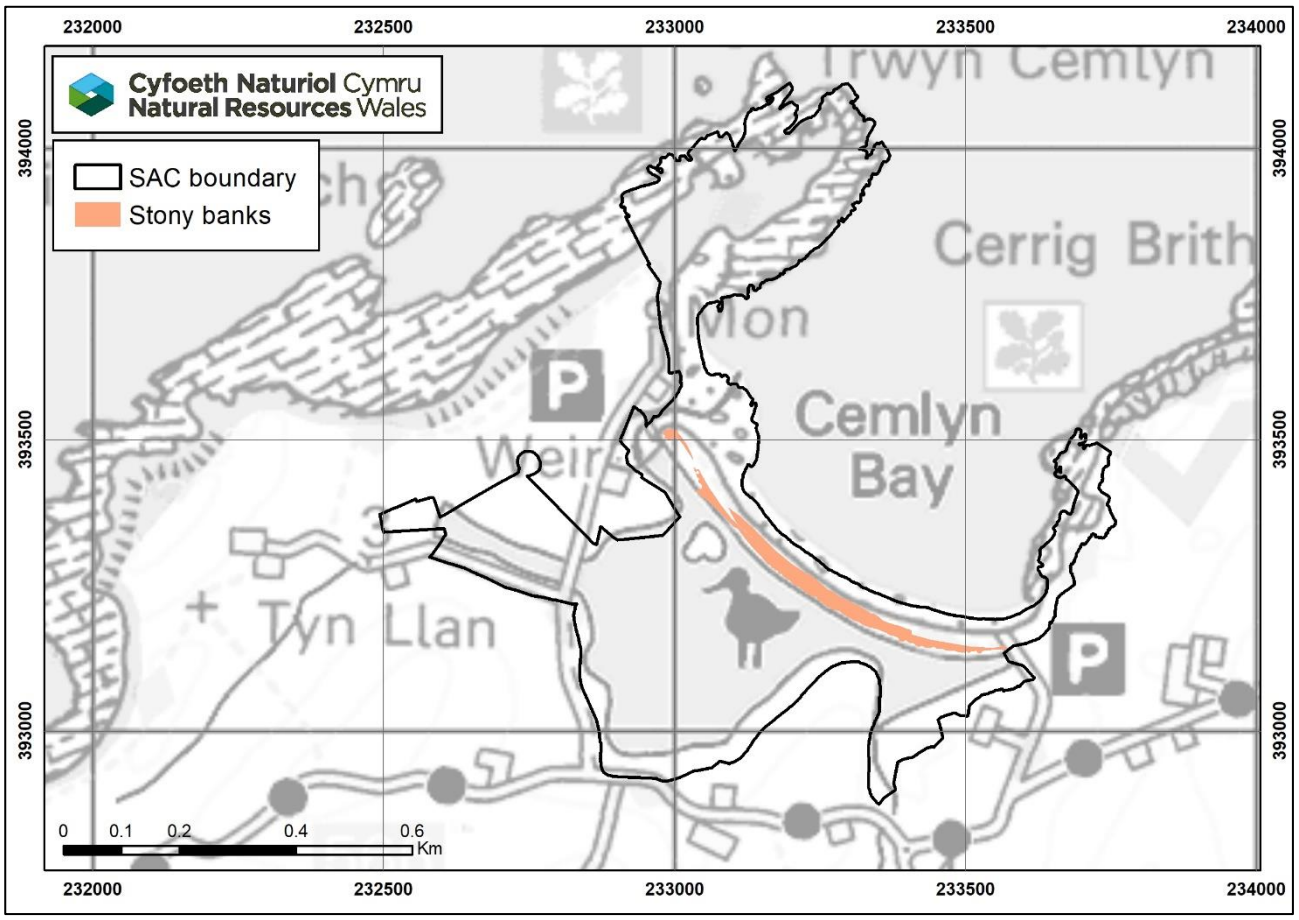


Table 5 has a summary of the assessment against the performance indicators. The overall feature condition, a detailed summary of the assessment and threats to condition can be found in the sections below.

Table 5. Summary of the condition assessment of perennial vegetation of stony banks in Cemlyn Bay SAC. Each indicator target has a primary (P), secondary (S) or tertiary (T) weighting (see section 1.1).

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Feature extent	Maintain the extent of perennial vegetation of stony banks habitat. (P)	• There were no concerns highlighted in the 2022 NVC survey and vegetation covers the extent of the shingle ridge. • The total area of communities surveyed was the same as that in the 1993 baseline survey. • Confidence is medium as survey methods and habitat classifications have differed between surveys.	**Pass**	Medium
Habitat quality: *Crambe maritima*	Good quality habitat will show no signs of anthropogenic damage to *Crambe maritima.* (P)	• No issues with the *Crambe maritima* community (SD1) were noted in the 2022 survey. • It was highlighted as being one of the biggest populations of *Crambe maritima* in Wales. • Confidence in the pass is medium as this survey was not specifically looking for damage to *Crambe maritima*.	**Pass**	Medium
Habitat quality: shingle ridge	Open areas of shingle ridge are unimpeded by grass (P)	• From the photos taken for the 2022 NVC survey there appeared to be sufficient areas of open shingle, unimpeded by grass. • Grass species were not found in the pioneer communities according to quadrat data. • As the survey was not targeted to look for grass encroachment the indicator passes with medium confidence.	**Pass**	Medium

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Habitat quality: nitrogen deposition	Ensure the level of nitrogen deposition less than the Critical load of 8-10 kg N ha-1 year-1. (S)	• The average nitrogen (N) deposition in the area directly surrounding the lagoon is 6.8-6.9 kg N ha^{-1} $year^{-1}$. This is the average for data collected across all habitats. • There is no specific deposition load for shingle. The critical load is from a closely related habitat. • The average data does not exceed the critical load of 8-10 kg N ha^{-1} $year^{-1}$ set for the feature. • The fact that the deposition values in the area are not specific to the overarching habitat type and understanding around N deposition on the feature is lacking, the indicator passes with low confidence.	**Pass**	Low
Physical structure: functionality and sediment supply	There are no constraints to shingle mobility. (P)	• There are no known impacts to shingle mobility from site knowledge or development in the area. • The pass is medium as expert judgment has been used. There is no empirical monitoring of shingle movement.	**Pass**	Medium
Vegetation communities	Maintain/restore the abundance, distribution and diversity of communities present. (P) No restriction to reproductive success of the plant species of the NVC communities, allowing for natural change. (P)	• The 2022 NVC survey found good abundance, diversity and distribution of communities expected for the feature. • Photos of the ridge taken for the survey provide evidence of seedlings. This together with healthy abundant communities is indicative of reproductive success. • The indicator passes with high confidence due to recent high quality survey data.	**Pass**	High

Indicator	Target	Assessment rationale	Target assessment	Target confidence
Negative indicator species	Species not typically associated with the feature are not having a detrimental impact on structure and function of the feature. (P)	• The 2022 NVC survey found no negative indicator species within the communities on the shingle ridge. • As the whole area was surveyed the indicator passes with high confidence.	**Pass**	High
Named species	Restore the abundance, distribution and diversity of named species and habitats (P)	Named species for this feature are, *Atriplex* sp., *Beta vulgaris, Crambe maritima, Glaucium flavum* and *Rumex crispus.* • All the listed named species were recorded at the site in the 2022 NVC survey. • As the whole area was surveyed the indicator passes with high confidence.	**Pass**	High

Assessment conclusions

The perennial vegetation of stony banks feature in Cemlyn Bay SAC has been assessed as being in **favourable** condition (medium confidence). All performance indicators met their targets (Table 6). There was a spread in confidence across target assessments from low to high, so the overall confidence in the condition is medium.

Table 6. Condition assessment conclusion for the stony banks feature in Cemlyn Bay SAC.

Feature	Overall Condition Assessment	Indicator failures	Reason for indictor failures	Threats to condition
Perennial vegetation of stony banks	**Favourable (medium confidence)**	None	None	• Outdoor sports and recreational activities • Human induced changes in hydraulic conditions

Detailed Assessment Information

Extent

The vegetation of the stony banks at Cemlyn was first surveyed in 1993 as part of a UK wide mapping of coastal vegetated shingle structures (Sneddon and Randell, 1993). In this survey, vegetation was grouped into specific shingle communities, based on the principles of the National Vegetation Survey (NVC) (Rodwell,1991), whilst also matching them to existing NVC communities. In 2022 NRW commissioned an NVC survey of coastal shingle sites in Wales (Heathcote et al., 2022). This resurvey attempted to match the shingle communities found with those identified in 1993 and with NVC communities. Some areas were classified into different NVC communities to the original survey and not all communities fit into the original ones identified in the 1993 survey. While the communities differed at Cemlyn between the two surveys, the area of communities mapped was the same (2.5 ha). The assessment concluded that there had been no loss of extent therefore the indicator passed. The confidence is medium as survey methods and habitat classifications have differed between surveys.

Habitat quality and physical structure

Crambe maritima

An NRW site visit in February 2018 concluded that the *Crambe maritima* was in favourable condition due to the number of sampling points with *C. maritima* present and the presence of seeds. The 2018 site visit could not assess trampling as there were no leaves on the plants due to the time of year. The quality of the *C. maritima* habitat was not directly surveyed in the 2022 report. However, there were no concerns raised or activities with the potential to damage the *C. maritima* noted. The survey did record that the *C. maritima* community (SD1) at Cemlyn was one of the largest in Wales (Heathcote et al., 2022). The habitat quality: *Crambe maritima* indicator therefore passed. Confidence in the assessment was lowered to medium as the 2022 survey was not specifically looking for signs of damage to the *C. maritima* plants and the 2018 assessment is now quite old.

To support the important communities of the feature, the shingle must be open and not dominated and stabilised with grass. There have been no NRW site visits to look at the level of open shingle since 2018. However, many photos were taken of the ridge as part of the 2022 NVC survey (Heathcote et al., 2022). These photos show the ridge has plenty of open areas with plant species you would expect to find in shingle vegetation communities (see Figure 6).

There were also no reports of grass species in the pioneer communities on the ridge when the communities were classified in 2022. Based on this information the habitat quality: shingle ridge indicator passed, but with medium confidence, as the survey did not specifically map the open shingle so no comparison to previous data could be made.

Figure 6. Shingle ridge at Cemlyn. The ridge in 2022 was considered to have sufficient open areas.

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Air quality

Air pollution can impact vegetation in the form of nitrogen (N) deposition. Increasing amounts of N in a system can threaten the competitive balance between the species and communities of a habitat. This usually results in an increase in weedy species and can result in the loss of species that define the habitat. The air pollution information system (APIS) states that there is little known about the impacts of N deposition on shingle habitats. They are assumed to behave in a similar way to acidic dune grasslands, and so the critical load for acidic dune grassland of 8-10kg N ha^{-1} $year^{-1}$ has been used in this condition assessment. APIS provides the N deposition in areas at a 1 - 5 km resolution for each habitat type where available. For areas surrounding Cemlyn there is no N deposition recorded for the dune, shingle or Machair habitat. There are N deposition values available that average N deposition from all available data, but only from those grid squares that border the site not from the grid squares over the shingle ridge itself. The three grid squares that border the ridge have an average N deposition between 6.8 - 6.9 kg N ha^{-1} $year^{-1}$. These averages do not exceed the critical load, so the habitat quality: nitrogen deposition indicator passes. The lack of specific habitat deposition data and the lack of understanding around how N deposition impacts shingle habitats meant the indicator passed with low confidence.

Sediment supply

The ability of shingle to move and be supplied with new sediment is important to maintain the pioneer communities. If there were barriers to shingle movement and supply the ridge could stabilise, reduce in height or lack new material. Without replenishment the habitat would likely go into decline. From site knowledge and casework there are no known impacts to shingle mobility in the area therefore the physical structure: functionality and

sediment supply indicator passed. The confidence in the pass pass is medium as expert judgment has been used as there is no empirical monitoring of shingle movement.

Species and communities

The 2022 NVC survey found good diversity, distribution and abundance of the vegetation communities on and surrounding the shingle ridge at Cemlyn. It is what would be expected of a healthy habitat and in line with what has been recorded in the baseline surveys and previous condition assessments. The presence and abundance of the communities is indicative of successful reproduction. Photos taken as part of the NVC survey in 2022 also showed the presence of seedlings, further evidence of reproductive success. The 2022 survey did not record the presence of any negative indicator species and recorded all named species and communities that would be expected. The assessment found no concerns with the species and communities of the feature. The negative indicator species and named species indicators therefore passed their targets with high confidence.

Reasons for target failure

The stony banks feature in the Cemlyn Bay SAC has been assessed as being in **favourable** condition as none of the targets failed.

Threats to condition

Part of the condition assessment is to identify threats to the condition of the stony banks. A threat is defined as an activity that is currently not impacting condition but has the potential to do so over the next reporting cycle, if activity levels increase or are unmanaged. It is important to identify these threats to be able to put pre-emptive management in place to prevent declines in condition.

Activities that go through licencing and permission process e.g. offshore wind and marine cabling, whereby the impact of the activity on the feature would be assessed have not been included. The threats to the condition of the stony banks feature in the Cemlyn Bay SAC are stated below.

Climate change

It is not yet clear what pressures will be seen from climate change at the site level or how different pressures will counter act each other. However, threats from climate change may include,

- Increased storminess will put pressure on the single ridge and vegetation through over topping events and storm wave damage. It may remove significant proportions of shingle vegetation.
- Sea level rise will increase flooding events on high tides is likely to result in loss of the shingle habitat.

Sports, tourism and leisure activities

Cemlyn is managed as a nature reserve and is a popular area for people to visit. Walking over the ridge has the potential to damage the vegetation, particularly *Crambe maritima*.

Evidence gaps

There are gaps in the current evidence that NRW feel are needed to be filled to fully understand condition in this feature.

Listed below are current indicators for the stony banks feature that were either assessed as unknown, not assessed, or with a lower confidence. This was due to either limited data availability, outdated data, or a lack of information. Some indicators are not currently monitored but should be ideally considered in future condition assessments. See Table 4 for details.

Table 7. Evidence gaps for the stony banks feature in Cemlyn Bay SAC. Each indicator target has a primary (P), secondary (S) or tertiary (T) weighting (see Section 1.1).

Indicator	Assessed status	Comments
Habitat quality: *Crambe maritima* (P)	Medium confidence (limited data)	• There are no specific *Crambe Maritima* monitoring surveys.
Habitat quality: Shingle ridge (P)	Medium confidence (proxy data)	• There is no quantitative monitoring of grass on the shingle ridge making it hard to know if it is encroaching.
Physical structure: functionality and sediment supply. (S)	Medium confidence (expert judgement)	• There is no monitoring of shingle movement or supply.
Habitat quality: nitrogen deposition (P)	Medium confidence (proxy data)	• There are no nitrogen deposition values for the specific feature habitat and no monitoring directly in the SAC.

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