



**Cyfoeth  
Naturiol**  
Cymru  
**Natural  
Resources**  
Wales



## Blue Carbon Evidence - Where are we now?

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# Blue Carbon Evidence – where are we now?



What has happened in the last 10 years?

- UK level groups established [UK Blue Carbon Forum](#) and [UK Blue Carbon Evidence Partnership](#)
- Country-level fora set-up
- Increased number of academic projects and research programmes on blue carbon
- Marine carbon “stock take” completed for UK and Wales
- Increasing recognition of blue carbon as a significant resource and marine carbon sequestration as a valuable ecosystem service; inclusion in State of Natural Resources Reporting (SoNaRR 2025), marine Natural Capital Ecosystem Assessments and progress toward inclusion in UK GHGI
- Increasing body of evidence suggesting that marine carbon sequestration and stores are valuable and need to be protected and managed (e.g. included in Fisheries Management Plans and TCE Whole of Seabed Approach)
- Legislative drivers for protection remain linked (mostly) to biodiversity

# UK Blue Carbon Evidence Partnership



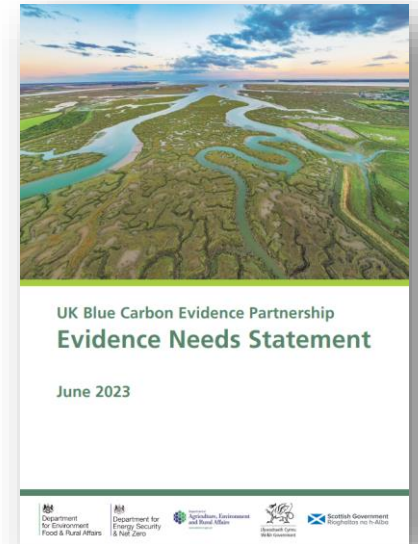
The UKBCEP was established in 2021 to:

- facilitate co-ordination and collaboration across UK administrations for blue carbon initiatives
- progress the evidence base on blue carbon habitats
- address key research questions related to the development of blue carbon policy
- enable the UK to have a joint and robust shared scientific understanding of blue carbon

Key deliverable - Evidence Needs Statement:






- Published in 2023 outlining the key evidence gaps required to support UK government and devolved administration policy and decision making
- Provides a roadmap for progressing research and information gathering, by administrations and with partners

[UKBCEP Evidence Needs Statement in English](#) [Datganiad Anghenion Tystiolaeth UKBCEP yn Gymraeg](#)








# Evidence Needs Statement

## Priorities

-  Working towards the potential inclusion of saltmarsh and seagrass in the UK Greenhouse Gas Inventory
-  Encouraging and enabling investment in blue carbon habitats
-  Reducing the impacts of human and environmental pressures, including climate change risks, on blue carbon habitats
-  Managing coastal and marine habitats on a seascape scale, with consideration of land and marine connectivity
-  Achieving climate change mitigation, adaptation and biodiversity benefits from blue carbon habitats as nature-based solutions

## Themes

-  1. Standardised Methods and Quality Control
-  2. Habitat Mapping
-  3. Carbon Stock, Accumulation, Burial and Emissions Data
-  4. Impacts of Human Activities and Climate Change
-  5. Socio-Economic Benefits and Costs

## Outputs so far:

- Draft technical guidance: Subtidal seabed sediment organic carbon technical guidance: stock and burial (2025). R. Parker, C. Mason, N. Hicks, H. Kennedy, Maija Marsh, F. Dal Molin, C. Smeaton.
- GHGI work [Defining saltmarsh for inclusion in the LULUCF inventory \(including roadmap\)](#) ; [Monitoring UK saltmarsh restoration using EO for national GHG accounting](#)
- Directory of relevant research and activities created under themes identified in the ENS

# Blue Carbon Project Directory

- The [Blue Carbon Project Directory](#) is a publicly accessible resource storing information on the various blue carbon activities carried out in the UK
- Developed to track activity and progress against Evidence Needs Themes
- Interactive dashboards can be used by researchers to view submitted projects by objectives, location, and habitat.
- Use the [online submission form](#) to add details of relevant activities and projects



## Standardised Methods

FIND OUT MORE



## Habitat Mapping

FIND OUT MORE



## Carbon Stock Data

FIND OUT MORE



## Impact of Human Activity

FIND OUT MORE



## Socioeconomic Benefit and Cost

FIND OUT MORE



## Search Projects

FIND OUT MORE

# Project Directory: Findings so far.....

Of all activities submitted:

- By country:
  - Scotland = 31, England = 23, Wales = 18, Northern Ireland = 16.
- By theme:
  - Habitat Mapping = 18 Projects
  - Carbon Stock Data = 16 Projects
  - Standardised Methods = 15 Projects
  - Socioeconomic Benefit and Cost = 12 Projects
  - **Impacts of Human Activity = 10 Projects**

Please add your activities to the directory: [UKBCEP - Blue Carbon Project Directory](#)

Saltmarsh



31

Seagrass



20

Intertidal & subtidal sediment



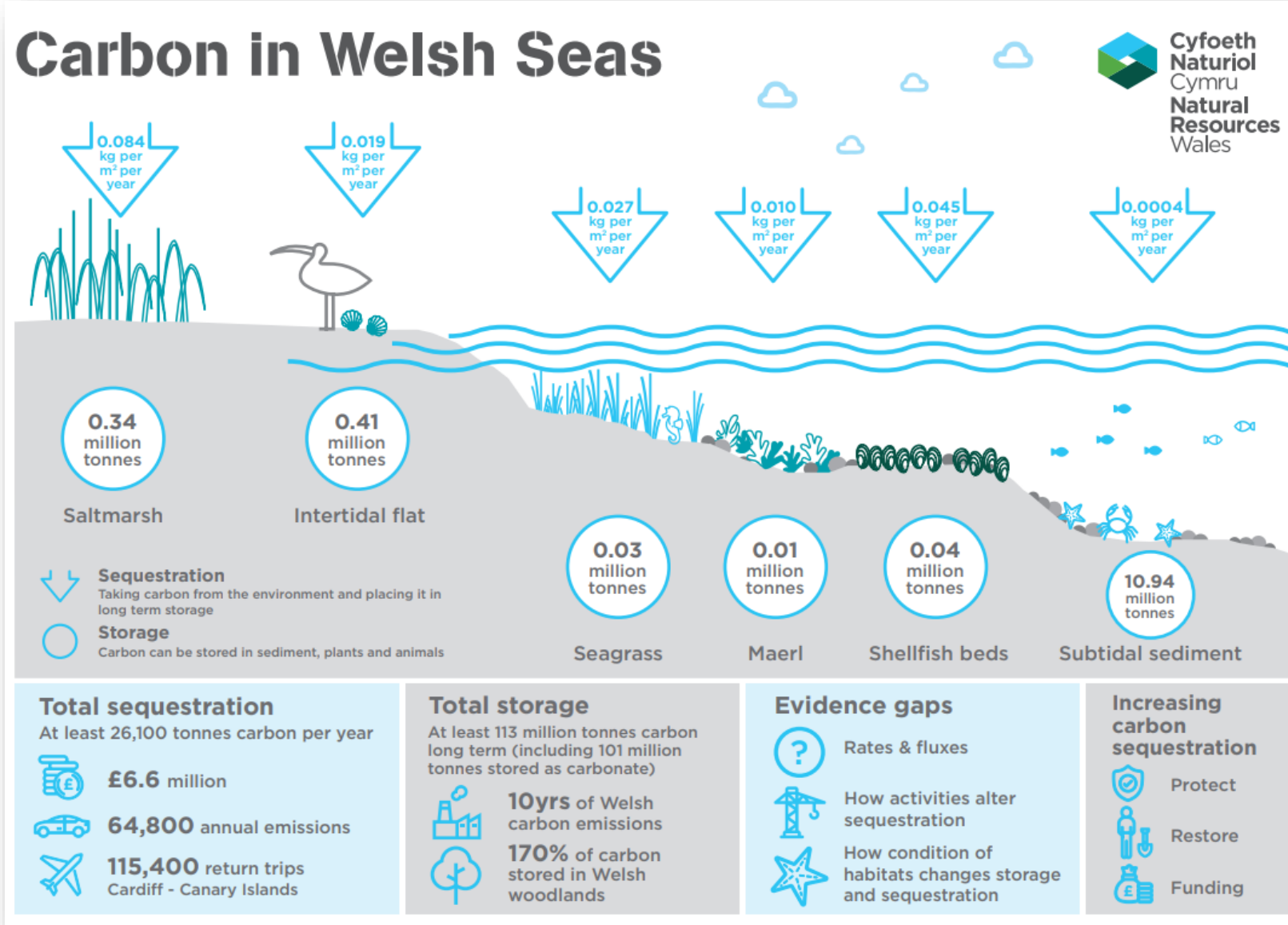
25

Kelp



18

# Carbon stock evaluation for Welsh Seas



How much carbon is stored and sequestered by the Welsh marine environment?

## Conclusions

- Estimated 113 Mt carbon stored
- Seabed sediments hold more carbon in total across their full extent than other habitats
- Saltmarshes sequester more carbon per unit area than other marine habitats

## Estimating the Carbon Sink Potential of the Welsh Marine Environment



Saltmarsh in the Dee Estuary SAC (© ABPmer)

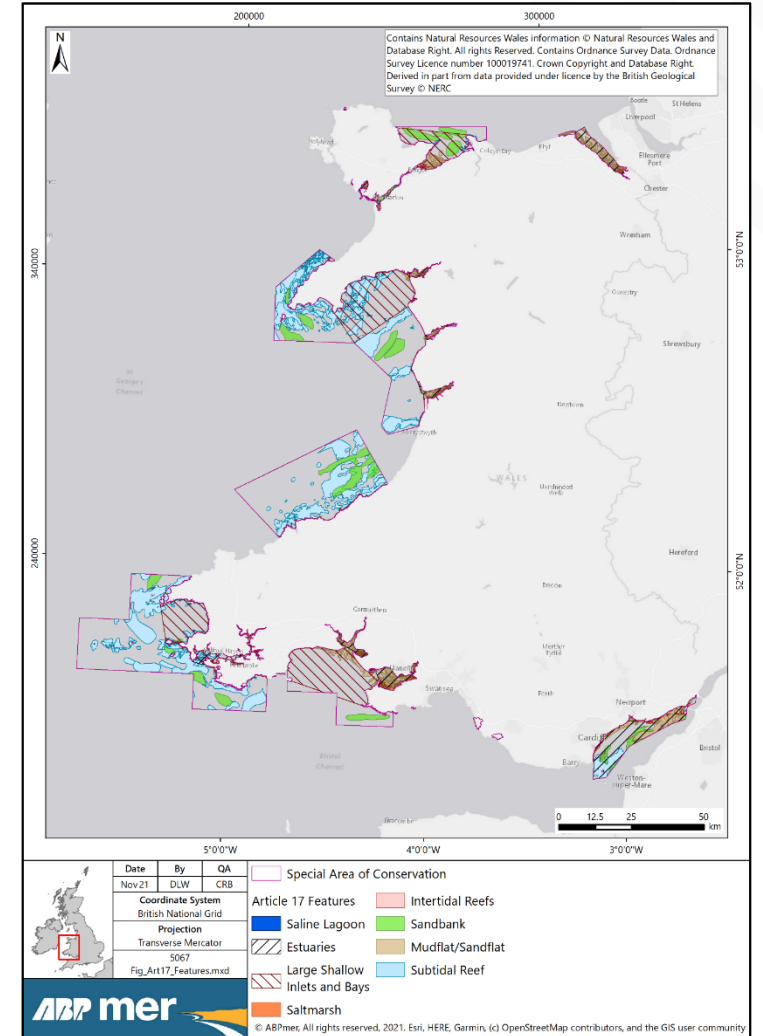
# Evaluation of Blue Carbon within MPA features

## Key objectives:

- Review the most recent literature on carbon storage and sequestration for different marine habitats and features present in Wales;
- Estimate carbon storage and sequestration potential of Annex I features in the SAC network
- Identify potential risks to blue carbon stored in Annex 1 features
- Review the policy and regulatory pathways to managing blue carbon and how stores can be protected using the existing legislative and policy framework that governs SACs

## Conclusions

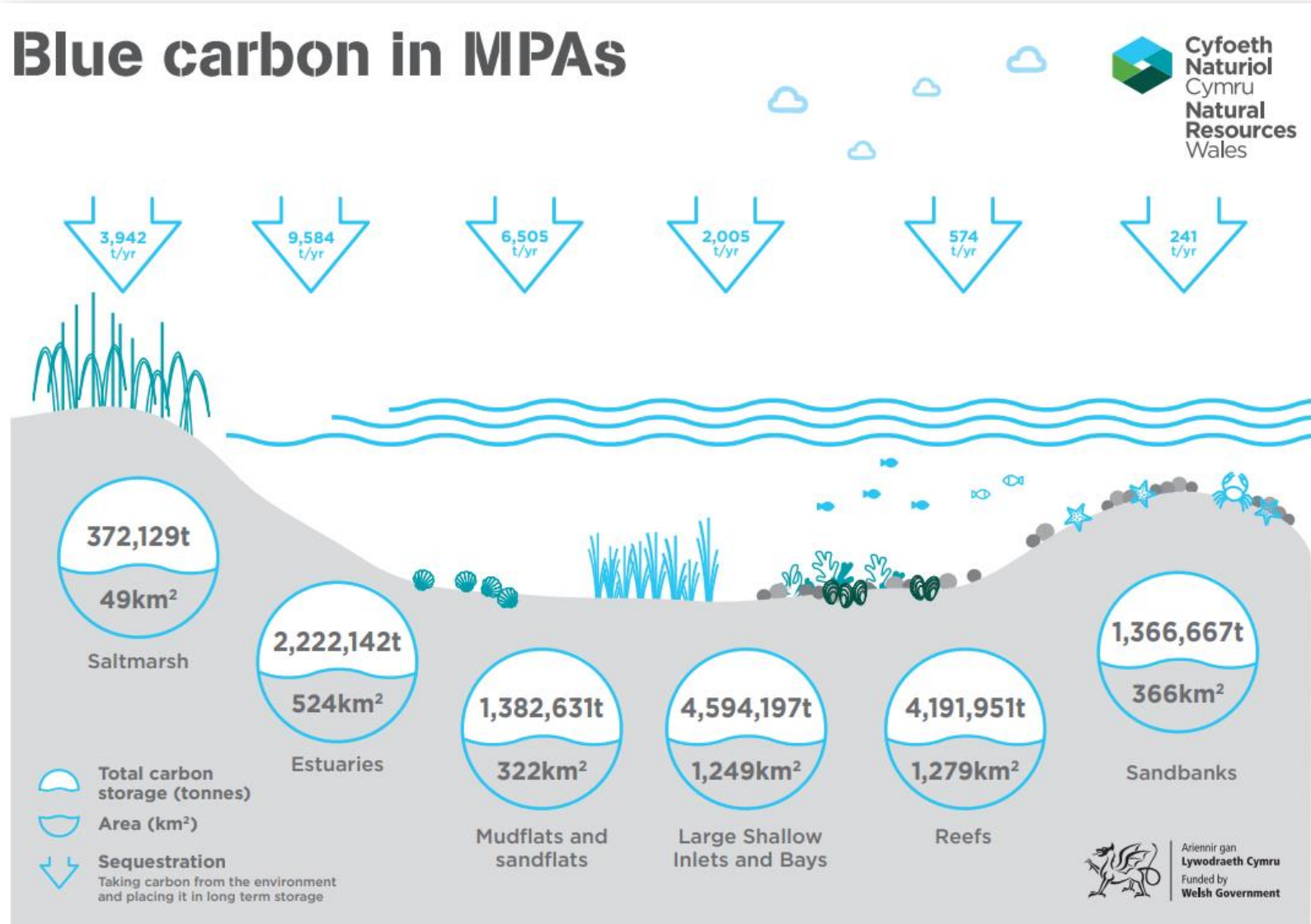
- Annex I features which covered large spatial extents such as estuaries and large shallow inlets and bays contributed the most towards carbon storage and sequestration across the MPA network
- Annex 1 features account for 47% of the total carbon sequestered within Welsh marine habitats per year, and 10% total carbon stored within the Welsh Marine Plan Area
- Designated saltmarsh features contributed the most towards blue carbon per unit area.



Marine Special Areas of Conservation (SACs) designated for habitat features in Wales.

# Carbon storage by MPA features in Wales

## Blue carbon in MPAs



NRW Evidence Reports available online:

- [Carbon in Welsh MPAs](#)
- [Understanding how management of the Welsh MPA network can contribute to the protection and enhancement of blue carbon](#)

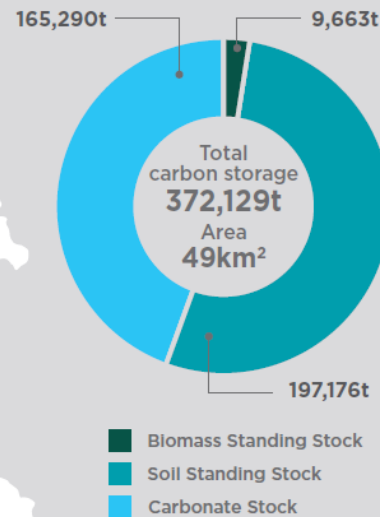
# Carbon storage by MPA features in Wales

## Blue carbon in MPAs Saltmarsh

Designated saltmarsh features contribute one of the largest amounts of carbon storage and sequestration per unit area within the SAC network. This is because they remove carbon dioxide from the atmosphere during photosynthesis, then store accumulated matter in the muddy substrates where they live, creating long term carbon sinks.

The saltmarsh feature within the Carmarthen Bay and Estuaries SAC accounts for 56% of the total volume of carbon in the 10cm of sediment in saltmarsh features across the SAC network. This SAC also has the largest total carbon stored in biomass and sequestration rate, likely due to the large spatial extent of the feature at this SAC.

SAC	Area (km <sup>2</sup> )	Biomass Standing Stock (t)	Soil Standing Stock (t (Top 10 cm))	Carbonate Stock (t (Top 10 cm))	Sequestration (t yr <sup>-1</sup> )
Carmarthen Bay and Estuaries	27.9	5,404	110,658	93,323	2212
Dee Estuary	5.5	1,148	23,052	18,633	461
Anglesey Coast: Saltmarsh	1.4	251	5,258	4,634	105
Kenfig	0.04	9	170	136	3
Pembrokeshire Marine	2.6	499	10,115	8,522	202
Lleyn Peninsula and the Samau	11.5	2,270	46,228	38,639	924
Severn Estuary	0.4	84	1,695	1,403	34



How is this information being use?

- Recognition of the carbon sequestration role of marine features in updated [Conservation Advice](#) documents for each SAC in Wales.
- Inclusion of blue carbon in Climate Mitigation recommendations in SoNaRR 2025

# NRW Evidence Priorities: Impacts on blue carbon habitat

## [Natural Resources Wales / Marine and coastal evidence priorities](#)

**Does habitat condition affect carbon sequestration potential in marine and coastal blue carbon habitats?**

NRW have identified an evidence gap around how habitat condition affects carbon sequestration in habitats such as saltmarshes and seagrass beds. This project would review available information on how different habitats components that contribute to condition - e.g. diversity and function - can impact carbon sequestration. This would include looking at the potential of restored habitats to sequester carbon.

**How do human activities affect carbon sequestration and storage in the marine environment?**

There is a growing focus on the ability of the marine environment to store and sequester carbon, and a requirement to both maintain and enhance blue carbon stores to help achieve net zero. Particular focus at present is on blue carbon habitats such as saltmarsh and seagrass, with a view to include them in the UK's Greenhouse Gas Inventory. Existing studies show that marine habitats play an important role in carbon storage and sequestration, but we have little current knowledge on how impacts on them may affect their ability to provide this ecosystem service.

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# Collaborative work



## Research work

- CASE PhD projects: NRW supporting 2 CASE PhDs linked to Blue Carbon evidence needs:
  1. Bangor University Seagrass project (blue carbon and microplastic capture, with a focus on how environmental variables may influence capture rates)
  2. Swansea University Macroalgae project (looking at carbon uptake and export in different seaweed species found in Wales and how climate change may affect this).
- CEFAS research work on carbon in sediments:
  - Development of an [evidence review](#) / technical brief on carbon storage in seabed sediments and potential impacts of bottom disturbance.
  - Collaborative work on understanding organic carbon accumulation, storage and loss in seabed sediments (understanding environmental drivers and potential vulnerabilities).
- Marine Impacts Evidence Group project (CEFAS)
  - Understanding how benthic macrofauna influence seabed carbon stocks and climate regulation
- SeaStore Project
  - How do fishing gears, trawling frequency and the sedimentary environment affect the potential for marine sediments to act as a net source of CO<sub>2</sub>?

# State of Natural Resources Report 2025

- Recognises the importance of the ecosystem services provided by marine habitats, including carbon sequestration and storage
- Climate Change Mitigation Recommendation: Enhance blue carbon through protecting and restoring marine and coastal ecosystems as a contributor to meeting climate mitigation goals. Noted progress to date includes:
  - 1) Seagrass restoration - While currently at a fairly low level, seagrass beds will sequester carbon which should increase over time
  - 2) Establishment of the Blue Carbon Forum for Wales to share information and knowledge, and to increase the expertise and experience around blue carbon in Wales



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