

Location and boundaries

This Marine Character Area (MCA) comprises the coastal waters of the northern part of Cardigan Bay, stretching from Harlech in the north to Carlech Bay in the south. The Mawddach and Dyfi estuaries drain into this part of the bay.

- It includes the local Snowdonia Seascape Character Areas 35: Aberdyfi Bay, 27: Dyfi Estuary, 25: Tywyn and Sarn-y-bwch, 34: Barmouth Bay, 23: Mawddach Estuary, 22: Mochrasto Fairbourne and Sarn Badrig.
- The northern and north-western boundaries take in the rough, shallow waters (<10m) associated with Sarn Badrig, including areas of high energy rock and high energy sub-littoral sediment. This contrasts with the calmer gently shelving waters which characterise Tremadog Bay (MCA 14, adjacent to the north).

Key Characteristics

NB: This MCA has strong relationships with adjacent MCAs 16 and 17, which cover the southern coastal waters and outer bay respectively. Therefore cross-reference should be made to the profiles for these areas to form a complete picture of the character of Cardigan Bay as a whole.

Key Characteristics
Coastal and marine frontage to Snowdonia National Park , the mountains rising behind forming a dramatic backdrop to the MCA.
Swash-aligned landform with sweeping cobble and boulder beaches, extensive sand dunes, especially at Morfa Dyffryn, and expansive sand/mudflats fringing estuaries.
Varied coastal habitats of international and national importance , including the estuaries of the Mawddach and Dyfi and the Morfa Dyffryn sand dune system.
Internationally important and unique sarnau (glacial reefs), extending over 20km from the coast hosting a rich diversity of flora and fauna. Rare 'bubbling' calcium carbonate reefs are also present.
Openness to prevailing westerlies means the bay can be exposed and dangerous, with strong tidal streams around the sarnau and estuary mouths.
Exposures of intertidal peats and submerged forest deposits , providing proof of inundated landscapes dating back to the end of the last Ice Age.
Part falls within the Lleyn Peninsula and the Sarnau SAC , recognised for its varied maritime habitats and species including distinctive sarnau and seals and dolphins .
The rich marine environment also provides nursery grounds for demersal fish , habitats for invertebrate communities and feeding grounds for sea birds .
Registered historic landscapes representing extensive evidence of recurrent settlement and land use along the adjacent coast since the prehistoric period.
Wider area steeped in legend about the lost lands of Cantref y Gwaelod , the ancient kingdom believed to be hidden beneath the waters of the bay.
Historic ports of Aberdyfi and Barmouth , both expanding in the 18 th /19 th centuries to trade in primary materials from Snowdonia. These are now popular tourism destinations.
Wreck sites associated with the sarnau , including the Protected Wrecks of the <i>Diamond</i> and <i>Bronze Bell</i> .
Important for commercial and recreational fishing. Hand gathering of mussels and cockles is a feature of the estuaries.
Long associations with both onshore and offshore military use , including offshore military training areas and nationally important WWII defences at Fairbourne.
Destination for a range of coastal and marine activities including leisure sailing, chartered sightseeing, fishing and diving trips, beach angling, sea kayaking and walking along the Wales Coast Path.
Tourism infrastructure such as prominent camping/caravan sites, car parks and golf courses are found along the open coastline.
Perceptual qualities vary dramatically according to prevailing weather conditions. A calm and peaceful seascape can rapidly change when westerly weather rolls in.
Expansive views over the whole bay , with the conical hills of the Llŷn AONB appearing like islands on northern horizon. Silhouettes of the Preseli Mountains of Pembrokeshire Coast National Park feature in south-west views.
The ever-changing landscapes and seascapes provide a sense of inspiration to many – attracting visitors, artists and writers for centuries.

Natural Influences

This MCA covers the west-facing coastal waters of central and north Cardigan Bay, backed by a varied coastline stretching from Harlech, Gwynedd to Clarach Bay, Ceredigion. This includes sweeping sandy beaches dominated by cobbles and boulders, extensive sand dunes at Morfa Dyffryn, as well as expansive sand/mudflats and grazing marshes fringing the estuaries. The majority of the coastline falls within Snowdonia National Park, with the stretch from Borth to Clarach Bay defined as Heritage Coast.

The northern part of the coastline is dominated by the distinctive sand dunes of Morfa Dyffryn. An important site for coastal geomorphology studies, the landform originally developed as a spit, but today links the morainic hill of Mochras (Shell Island) to the mainland following diversion of the river in the early 19th century. The mobile sand dune system is of international importance (SAC, SSSI and NNR designated), surrounded by saltmarsh, swamp, vegetated shingle and dune slacks. The area is also internationally important for honeycomb worm *Sabellaria alveolata* biogenic reefs extending out from the shoreline – part of the Llyn Peninsula and The Sarnau SAC. Fronting the dunes and extending for a long distance southwards towards the Mawddach Estuary is a wide sandy beach dominated by cobbles and boulders.

Draining into Barmouth Bay, the Mawddach Estuary is designated as SAC and SSSI, with extensive intertidal habitats and grazing marshes supporting important breeding bird populations. Further down the coast is the similarly scaled Dyfi Estuary, also fringed by extensive sand banks, mudflats, dunes, saltmarsh and 19th century grazing marshes. Designated as SAC, Ramsar, NNR and SSSI, the estuary also falls within a wider UNESCO Biosphere Reserve. The site provides evidence for environmental changes through the Holocene epoch, and is of considerable value for wetland birds. The Dysynni Estuary and further minor watercourses drain into the bay from the mountains to the east, creeks and channels providing nursery grounds for bass and mullet. South of the Mawddach, the coastal belt consists of spectacular high cliffs composed of Aberystwyth Grits supplying sediment northwards to Borth beach. Tidal and long-shore drift processes greatly influence the swash-aligned coast of this MCA.



Llyn Peninsula from Aberystwyth (looking across MCA 15) © John Briggs

The marine area extends from between 12 and 22 kilometres offshore. It is strongly characterised by the presence of Sarn Badrig, Sarn-y-Bwch and Cynfelyn Patches; three

reefs referred to as 'the sarnau' (Welsh for 'causeway'). These unique features are glacial, composed entirely of boulders, cobbles, and pebbles mixed with various grades of sediment. Extending out into the sea for over 20 kilometres beneath shallow water of less than 10 metres, they are significant hazards to navigation. The sarnau are associated with strong tidal streams and wave action, with dense seaweed beds found across the reefs. Animal-dominated communities are found in the deeper parts, including crustaceans, cnidarians, sponges, hydroids and encrusting bryozoans. An extremely unusual reef structure known as 'Holden's Reef' was recently discovered near Barmouth, composed of calcium carbonate formed by methane gas leaking from the seabed. These reefs are the first known example of this habitat in UK inshore waters; comparable with the 'bubbling reefs' in the Danish Kagegat.

Present understanding of changing sea levels since the beginning of the Holocene confirm the premise of the legend of the *Cantref y Gwaelod* (English: Lowland Hundred), the drowned sunken kingdom. Sea levels have risen some 55 metres and the seabed would have been a large tract of fertile land before inundation beginning some 12,000 years ago. Legend has it that you could walk all the way to Ireland when the sarnau were exposed at low tide. Exposures of intertidal peat and submerged forest deposits at Clarach, Borth, Tywyn, Llanbedr and Morfa Dyffryn provide further proof of inundated landscapes dating back to the end of the last Ice Age. Petrified remains of trees are also found at Ynyslas and in the Dyfi Estuary, dating back 4,500 years; eerie symbols of an ancient lost landscape.

The waters support a rich fish and shellfish resource, attracting cetaceans including bottlenose dolphins, with grey seals also frequenting the reefs, sandbanks and using the shingle and rock 'beaches' at the back of some sea caves as haul-out and pupping areas. Covering much of the marine area and beyond, the Llyn Peninsula and the Sarnau SAC is of primary importance for its breeding population of bottlenose dolphins - shallow bays and sheltered headlands providing important feeding areas for adults and calves. Important populations of otters in the estuary systems also underpin the international designation. Basking sharks and leatherback turtles can be spotted in the waters – turtles migrating in the summer from the tropics to feast on barrel jellyfish in Tremadog Bay. The MCA also provides nursery grounds for commercially important demersal fish and feeding grounds for sea birds.

The open westerly aspect of the bay means that the waters are frequently exposed to high winds and prevailing weather conditions sweeping in from the Irish Sea. As a result, navigation into the estuarine harbours at Aberdyfi and Barmouth can present real dangers during heavy weather. Due to the constantly shifting sand banks and high tidal streams particularly in the ebb, heavy breaking seas can develop with strong currents. Entrance channels are heavily buoyed to guide safe pilotage, but nevertheless entry attempts are advised against during strong westerlies (Imray, 2009). The sarnau also create notorious submerged hazards; flashing buoys at their western extremities warn of their existence.

Cultural/social influences

This seascape is steeped in history, with rich evidence for man's evolving relationship between land and sea over millennia. The majority of the coastline is within the Arudwy and Mawddach Landscapes of Outstanding Historic Interest, with land in the south included within the Dysynni Landscape of Special Historic Interest. These represent extensive evidence of recurrent settlement and land use since the prehistoric period. Clusters of Neolithic burial chambers, Bronze Age ritual and funerary monuments are found on the slopes rising up from the coast, as well as relict field systems and settlements from the Iron Age and medieval periods. The mouth of the Dysynni is overlooked by two Iron Age hillforts occupying commanding positions on the elevated spur of Tal y Garreg.

Tywyn was the location of the first religious community administered by Saint Cadfan upon his arrival in Gwynedd, prior to his departure to establish the sixth century monastery on Bardsey Island. The wider area is steeped in legend about the lost lands of *Cantref y Gwaelod*, the ancient kingdom believed to be hidden beneath the waters of the bay (palaeo evidence now supports the legend). The 18th century folk song *The Bells of Aberdyfi* celebrates the story, describing the bells from the lost kingdom that legend says can still be heard ringing below the waves of Aberdyfi Beach.

The medieval period saw the development of the bay's potential for maritime trade in the rich marine and mineral resources of the wider area. Aberdyfi traded in herring, slate, oak bark and lead and Barmouth was famous for its ship-building and 19th century minerals export (including copper and gold from Snowdonia). Both ports developed around the mouths of the west-facing estuaries, benefiting from close links to the Irish Sea (and beyond), as well as their proximity to the Snowdonian valleys and hills with their rich mineral resources and farming economy. Further growth and economic prosperity was facilitated by the arrival of the railways in the 1860s – today, making the journey along the scenic Cambrian Coast railway is a popular tourist activity, affording expansive views across the bay with its spectacular mountain backdrop. The Grade II* listed Barmouth wooden trestle railway viaduct forms a distinctive local landmark on the Mawddach Estuary, including in views from the summer pedestrian ferry and miniature Fairbourne Railway.



Barmouth railway viaduct and wooden trestle bridge



Mawddach Estuary, with Barmouth and the wooden trestle railway bridge. © Rohan Holt

The increase in maritime traffic during the 18th and 19th centuries is linked to a large number of documented ship wrecks within Cardigan Bay, many of which foundered on the sarnau, ending with the vessel going ashore near Barmouth or on the reef itself. A lightship was used to warn mariners of the perils of entering the northern end of Cardigan Bay from 1870s onwards. Examples of losses include the nationally designated wreck sites of the *Diamond* (a 19th century American-built merchant vessel) and *Bronze Bell* (a 17th century French vessel). Notable remains on the seabed associated with the *Bronze Bell* include the precious Carrera marble blocks she was carrying from Italy, along with her iron cannons. The environs of Sarn Badrig are the subject of ongoing investigations by Cadw because of the density of reported losses.

The bay and estuaries' rich fish and shellfish resources have long been exploited, stimulating the initial development of the coastal settlements prior to their expansion into ports in the 18th and 19th century. Fishing continues to be an important commercial and recreational economic activity, with trawling, set netting and lobster/crab/prawn potting taking place in the coastal waters. Scallop fisheries are also found in the MCA, and the hand gathering of mussels and cockles takes place in the estuaries. Shrimp netting also features along the shores of the Dyfi, and crab lining from Aberdyfi pier is a popular recreational activity, particularly in the summer months. Beach angling and netting features along the coastline, and chartered fishing trips into the wider bay are popular.

The seascape has important associations with coastal defence, including the longest and best preserved stretch of WW2 anti-invasion defences at Fairbourne. These consist of at least 650 concrete anti-tank blocks on the beach immediately in front of the sea wall, arranged in a single and almost unbroken line just over two kilometres long. Further up the coast behind Morfa Dyffryn is the disused Llanbedr Airfield – its large scale hangars standing prominently in the open landscape. Large parts of the sea fall within the Military Practice Areas of Llanbedr and Aberporth, and some locations are also licenced for oil and gas exploration.

Today the mainstay of the local economy is coastal and marine tourism, building on the popularity of the area which blossomed following the arrival of the railways in the late 19th century. Prominent associated developments and infrastructure is scattered along the coast including golf courses, car parks, camping and caravan sites. A range of coastal and marine activities take place particularly during the summer months, including leisure

sailing, chartered sightseeing, fishing and diving trips, beach angling, sea kayaking and Celtic longboating (including the *Celtic Challenge* from Arklow, Ireland to Aberystwyth just to the south in MCA 16). The Three Peaks Yacht Race departs from Barmouth to Fort William, stopping en route for members to climb Snowdon, Scafell Pike and Ben Nevis. Aberystwyth is the main marina serving the area, though temporary quayside moorings and facilities provided by the two local yacht clubs are available at Barmouth and Aberdyfi.

The first Outward Bound Trust centre was established at Aberdyfi in the 1940s, its small sailing vessels and canoes, with young adventurers, often seen on the water inside the bar. Popular wildlife tourism sites include Morfa Dyfryn NNR and Rowen Nature Reserve at Fairbourne. The Wales Coast Path runs along the estuary shores and behind long lengths of the area's beaches, winding through the Snowdonian foothills in some locations, offering panoramic, elevated views across the MCA and beyond.

Aesthetic and perceptual qualities

This is an area of exceptional interest and nationally important scenic beauty; where the mountains meet the sea. The Moelwyn peaks, Cnicht, the Rhinogydd, Yr Eifl, Cader Idris range and even Snowdon stand out in views to form a particularly dramatic backdrop to the MCA. The conical mountains of the Llŷn AONB often appear as mysterious islands in northward views, while the silhouettes of the hills of Pembrokeshire Coast National Park often feature on south-westerly horizons. The estuaries open into broad and flat coastal havens as they approach the sea; the water meets the sky in striking abundance, with a seaward backdrop of beach and dune, and a landward backdrop of high, upland hills and valleys. At high tide, the large masses of water within the estuaries can appear lake-like.

The perceptual qualities associated with the area vary dramatically according to prevailing weather conditions. A calm and peaceful seascape can rapidly change when westerly weather rolls in from the Irish Sea – waves lash the shoreline and the estuary mouths feature breaking waves and swirling water with a very real sense of danger. The mountains behind the coast are often shrouded in mist and low cloud, creating an air of mystery to a seascape steeped in history. The seasons also bring variations in human activity. Sunny summer days bring visitors flocking to the popular seaside towns and long beaches; the waters dotted with boats and people partaking in a variety of watersports. On stormy winter days the area is wild and desolate; nature and the elements taking over.

A number of busy and sometimes very visible caravan parks, beach access points and associated car parks contrast with an otherwise peaceful and mainly rural coastline. Ironically, the largest camp site in Europe, on Shell Island, is very low density and out of season still resembles a rural landscape, whereas higher density sites of static units, notably north of Barmouth, are widely visible 'built' forms.

The ever-changing landscapes and seascapes provide a sense of inspiration to many and have attracted holiday-makers, artists and writers for centuries. The award-winning children's fantasy novel *A String in the Harp* by Nancy Bond (1976) is set in Borth and the surrounding area.



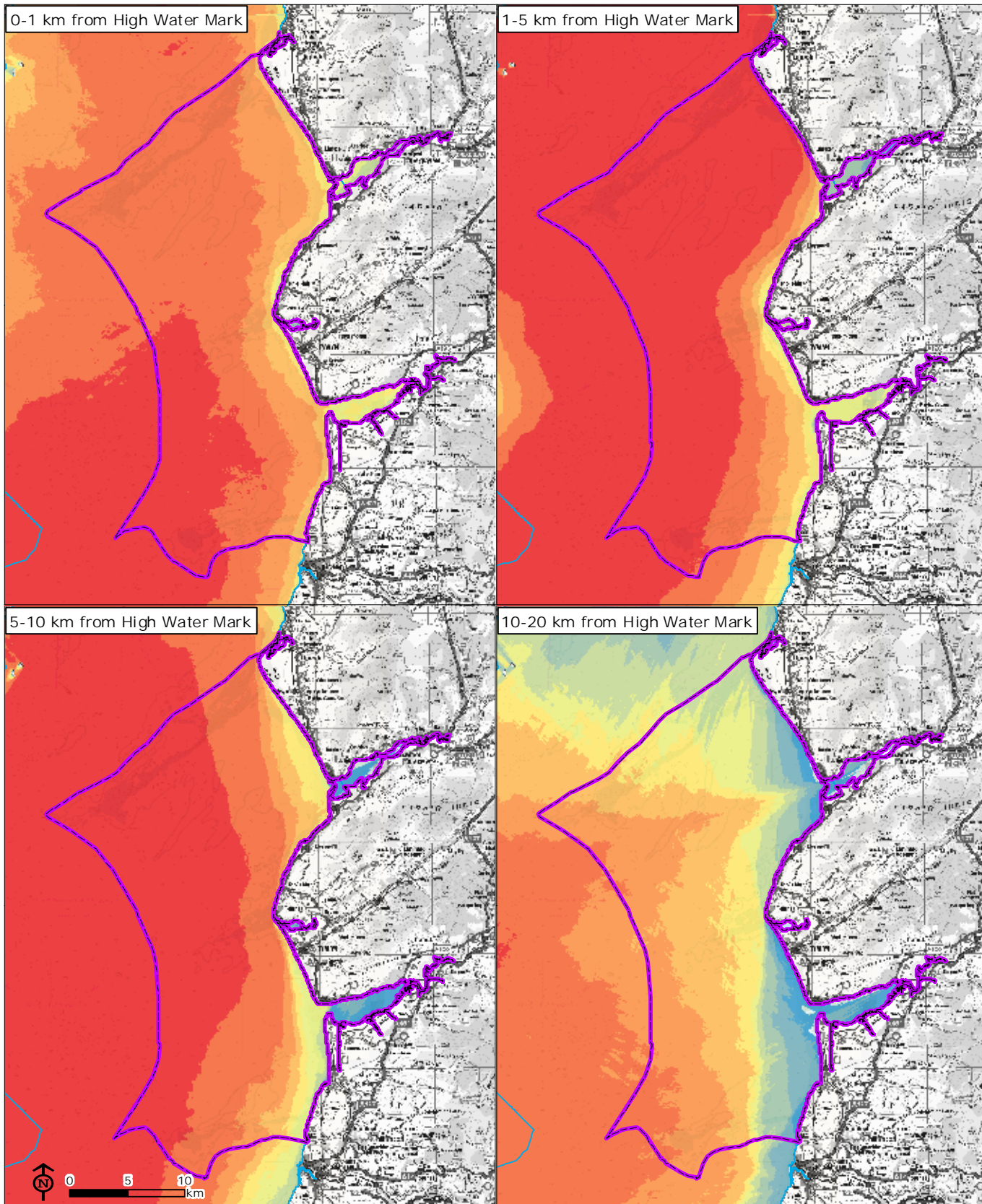
Barmouth Bridge over the Mawddach.

A steel engraving of Barmouth from c. 1860 (© Crown Estate, 2013)

The Visual Resource Maps (VRM) that follow provide a more detailed spatial representation of the visibility of this MCA from the surrounding land in Wales. Please refer to the technical report for an explanation of how these maps were generated and how they should be interpreted.

The first map shows land with views to this MCA, the darker shading indicating land where from which more of this MCA is visible.

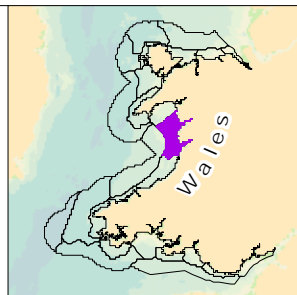
The second map shows sea visible from land, the warmer colours being areas of sea that are visible from more places on land. This comes from a national assessment of Wales so the results do not relate specifically to this MCA, whose boundary is overlaid for location only. The four individual versions show how the results vary depending on how far inland hypothetical viewers are located.



- 15: Cardigan Bay (north) and Estuaries
- Wales Inshore Marine Plan Area

Visibility of sea from land (percentile)

	<10 (Lowest)		51-60
	11-20		61-70
	21-30		71-80
	31-40		81-90
	41-50		91-100 (Highest)



Wales National Seascape Assessment

Relative Visibility of the Sea Surface from Viewers on Land
MCA 15: Cardigan Bay (north) and Estuaries



Map Scale @ A4: 1:480,000

CB: EB: Goosen_V LUC/LON 6262-00_022_VRM_Maps_DDP_Sea_Visibility_ 27/05/2015