Copyright

Data sources are referenced in Appendix C. This also refers to the Marine Natural Capital Search tool, a repository which holds over 220 separate sources of data on marine Natural Capital. The search tool is available at: https://nc.avsdev.uk/f6b175654a709483a43a2a25c3a7b467/nc-search/

Data sources are cited throughout where these reflect published reports and datasets but, in some places, additional expert knowledge obtained through communication is used. It was not possible to list the sources for this information.

Marine Natural Capital Case Study 1: Cornwall and the Isles of Scilly

1. Introduction

This report sets out a summary of the findings of a preliminary natural capital assessment of the coastal waters around Cornwall and the Isles of Scilly. The objective of the report is to summarise the following key aspects of a natural capital assessment:

- The context of an area (including existing conservation areas, key industries and landowners);
- The habitats that exist within the coastal waters;
- Mapping from the habitats, species, geology and heritage to ecosystem services;
- Valuation of selected ecosystem services;
- An overview of the pressures facing natural capital in the area.

This document is provided as an example to validate the accompanying marine Natural Capital Guidance. The guidance sets out a staircase approach to generating natural capital assessments encompassing Introductory, Intermediate and Advanced options (otherwise known as 'Basic', 'Better' and 'Best'). This document aims to demonstrate what is possible in a 'Basic' assessment.

2. Site context

2.1 Jurisdictions

Jurisdiction and responsibilities across the marine domain are complex. The following defines the major stakeholders involved in the jurisdiction processed.

The Local Authority for the landmass of Cornwall is Cornwall Council and for the Isles of Scilly this is the Council of the Isles of Scilly.

The respective Inshore Fisheries and Conservation Authorities provide local regulation of commercial and recreational fishing activity, balancing the social and economic benefits from fisheries with the need to protect and restore the marine environment. They are responsible for the development, monitoring and enforcement of fishing regulations by their use of local byelaws.

- Cornwall Inshore Fisheries Conservation Authority governs the balance between fishing activity between the Cornish coast and the 6nm fisheries limit.
- Isle of Scilly Inshore Fisheries Conservation Authority governs the balance between fishing activity between the Scilly Isles and the 6nm fisheries limit.

The Cornwall Council Maritime Service is responsible for the operation of all municipal ports and harbours in Cornwall, which includes Bude, Newquay, Portreath, St Ives, Penzance, Prince of Wales Pier (Falmouth), Penryn, Truro, Portscatho and Portwrinkle.

Harbour Authorities are established for the major harbours in the area including Falmouth and Hayle.

The Marine Management Organisation (MMO) is responsible for the licencing and regulation of activities within the marine region, including commercial fishing construction activities beyond the low tide mark including harbours, and coastal protection.

The South West Inshore Marine Plan sets out the vision, objectives and processes for review and monitoring of activities which impact upon the marine environment.

2.2 Key coastal landowners

The Crown Estate is responsible for the leasing of seabed activities within UK territorial waters. This includes resources for Oil & Gas, Wind Farms, Tidal Energy (where appropriate) as well as aggregate and mineral extraction and seabed dredging for navigation.

The Ministry of Defence has a major presence in the coastal region. This includes 3 airfields and several bases placed close to the shoreline.

The National Trust maintains over 1,659 hectares of coastal area (i.e. within 500m of the shoreline) including parts of the nationally important South West Coast Path [1], part of the King Charles III England Coast Path (KCIIIECP), which is estimated to draw 9 million visitors each year along its entire length [2].

Additionally, the National Trust maintains over 100 acres of limited access land in the coastal region comprising many important historic and cultural assets that contribute to the region's tourism industry.

Cornwall Council owns several ports throughout the County, including Newquay Harbour, Truro, St. Ives, Penzance, Bude, Penryn, Porttreath, Prince of Wales Pier (Falmouth), Portscatho, Portwrinkle with additional maritime infrastructure located within Saltash and Downderry.

The Duchy of Cornwall owns significant areas of the coastal land within Cornwall. Along each bank of an estuary and along the coastal foreshore, Duchy ownership extends to the Mean High Water mark. Along the coast, the Low Water limit is the line of Lowest Astronomical Tide, beyond which is Crown seabed.

2.3 Conservation areas, wrecks and their designations

Designated marine protected areas around the coastline are shown in Figure 1. These include the following long list of protected areas designated for a variety of features [3]:

Designation type	Locations
Marine Conservation Zones (MCZs) (note not offshore but some straddle the 12nm-EEZ boundary For feature information see JNCC.	Hartland Point to Tintagel; South West Approaches to Bristol Channel; Padstow Bay and Surrounds; Newquay and the Gannel; Cape Bank; Isles of Scilly Sites - Bristows to the Stones; Isles of Scilly Sites - Men a Vaur to White Island; Isles of Scilly Sites – Tean, Isles of Scilly Sites - Hanjague to Deep Ledge; Isles of Scilly Sites - Higher Town; Isles of Scilly Sites - Lower Ridge to Innisvouls; Isles of Scilly Sites - Peninnis to Dry Ledge; Isles of Scilly Sites - Plympton to Spanish Ledge; Isles of Scilly Sites - Smith Sound Tide Swept Channel; Isles of Scilly Sites - Bishop to Crim; Isles of Scilly Sites - Gilstone to Gorregan; South of the Isles of Scilly, Runnel Stone (Land's End); Mount's Bay; The Manacles; Helford Estuary;

Designation type	Locations
	Upper Fowey and Pont Pill; Whitsand and Looe Bay; Tamar Estuary Sites; Fal and Helford
Special Protection Areas (SPAs). For feature information see JNCC.	Isles of Scilly, Falmouth Bay to St Austell Bay, Tamar Estuaries Complex
Special Areas of Conservation (SACs). For feature information see JNCC.	Bristol Channel Approaches / Dynesfeydd Môr Hafren; Land's End and Cape Bank; Isles of Scilly Complex; Lizard Point; Fal and Helford, Start Point to Plymouth Sound & Eddystone
Voluntary Marine Conservation Areas (VMCA)	Polzeath, St Agnes, Helford, Fowey, Looe
Protected Wrecks	Isles of Scilly: HMSS Colossus, Bartholomew Ledges, Tearing Ledge, Association, Wheel Wreck; Cornwall: Loe Bar Wreck, St Anthony, Schiedam, Hanover, Rill Cover, Royal Anne, Coronation Offshore, Coronation Inshore
Military Protected wrecks	UB65, Warwick, A7

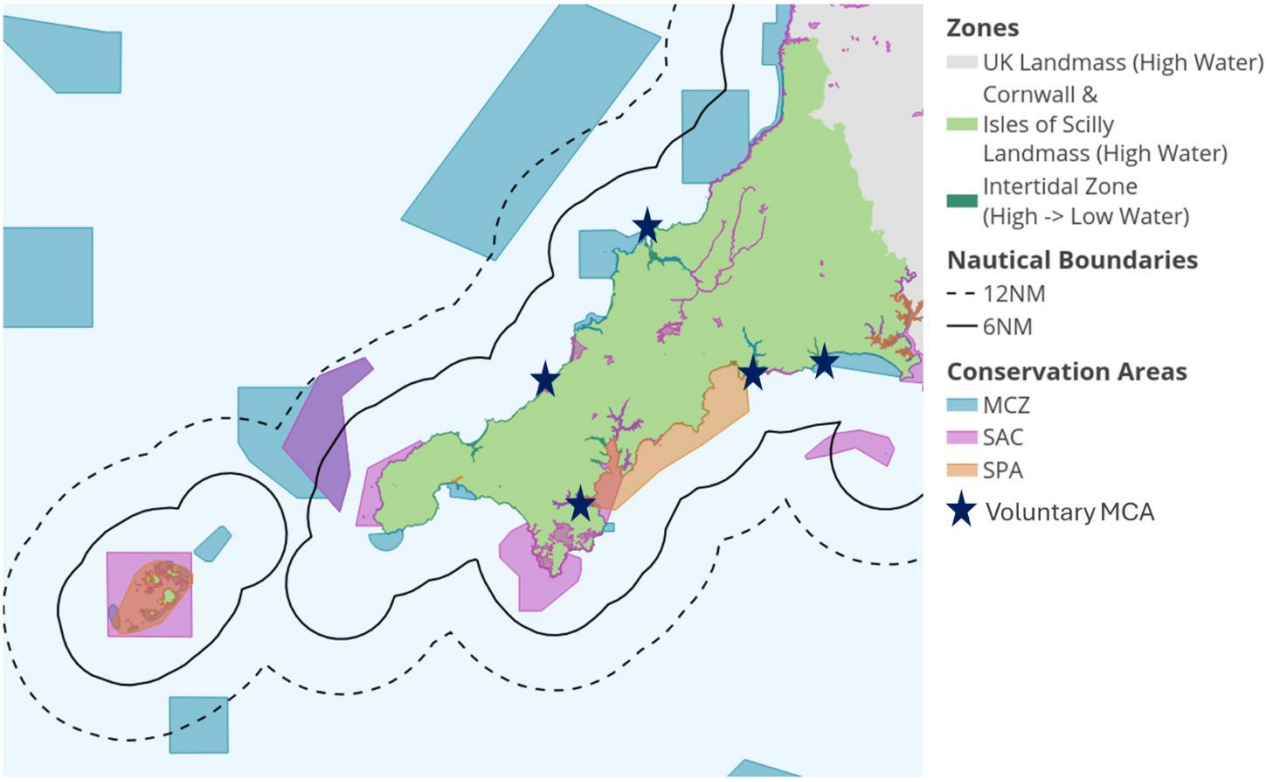

Figure 1. Spatial distribution of the conservation areas of Cornwall and the Isles of Scilly

2.4 Important maritime sectors

2.4.1 Fishing Metiers, Ports & Processing Industries

Cornwall and the Isles of Scilly have a large and diverse sea fishing industry comprising both inshore and offshore vessels. Inshore vessels, generally considered under 10m in length, use pots, nets, dredges, mid water and bottom trawls and fish predominantly within 6nm of the coastline. The table below characterises the fishing and aquaculture sector.

Characteristic	Description

Major fishing ports (by value of fish landed)[4]	Newlyn, Mevagissey, Padstow, Penzance, Looe, Newquay
Smaller coves and ports recognised for their fishing heritage (some still active)	Including, Cawsand, Polperro, Coverack, Charlestown, St Mawes, Porthoustock, Porthleven, Mullion, Mousehole, Penberth, Sennen Cove, St Ives, Portreath, Newquay, Rock, Port Isaac, Boscastle.
Aquaculture	Aquaculture in Cornwall is undeveloped yet growing. The only operational sites are found along the south coast, harvesting mussels and Pacific oysters.
Employment in fishing and aquaculture (Census 2021)[5]	Cornwall: 635 people (0.2% of all usual residents over 16 years and in employment the week before the census)

2.4.2 Recreational and Cultural Assets

Key recreational and cultural heritage assets and designations are described below and summarised spatially in Figure 2:

Characteristic	Description
Bathing water sites	There are 89 designated bathing water sites in Cornwall, all but 2 classified as excellent or good by the Environment Agency bathing waters quality assessment scheme [6].
Outdoor Activity Centres	There are 37 outdoor recreation centres in Cornwall. These offer a range of seaborne activity including coasteering, kayaking, surf training as well as Community groups for educating children and young adults [7].
Walking trails	460.3km (286 miles) of the South West Coast Path runs along the entire Cornish coastline [2].
Heritage coast	268.3km (166 miles) of the Cornish coast and all of the Isles of Scilly coast (1640 ha) have been defined as heritage coast [8].
UNESCO World Heritage Sites	The Cornwall and West Devon Mining Landscape designation includes a number of coastal sites (e.g. St Just Mining District, St Agnes Mining District, the Port of Hayle, Charlestown) [9].

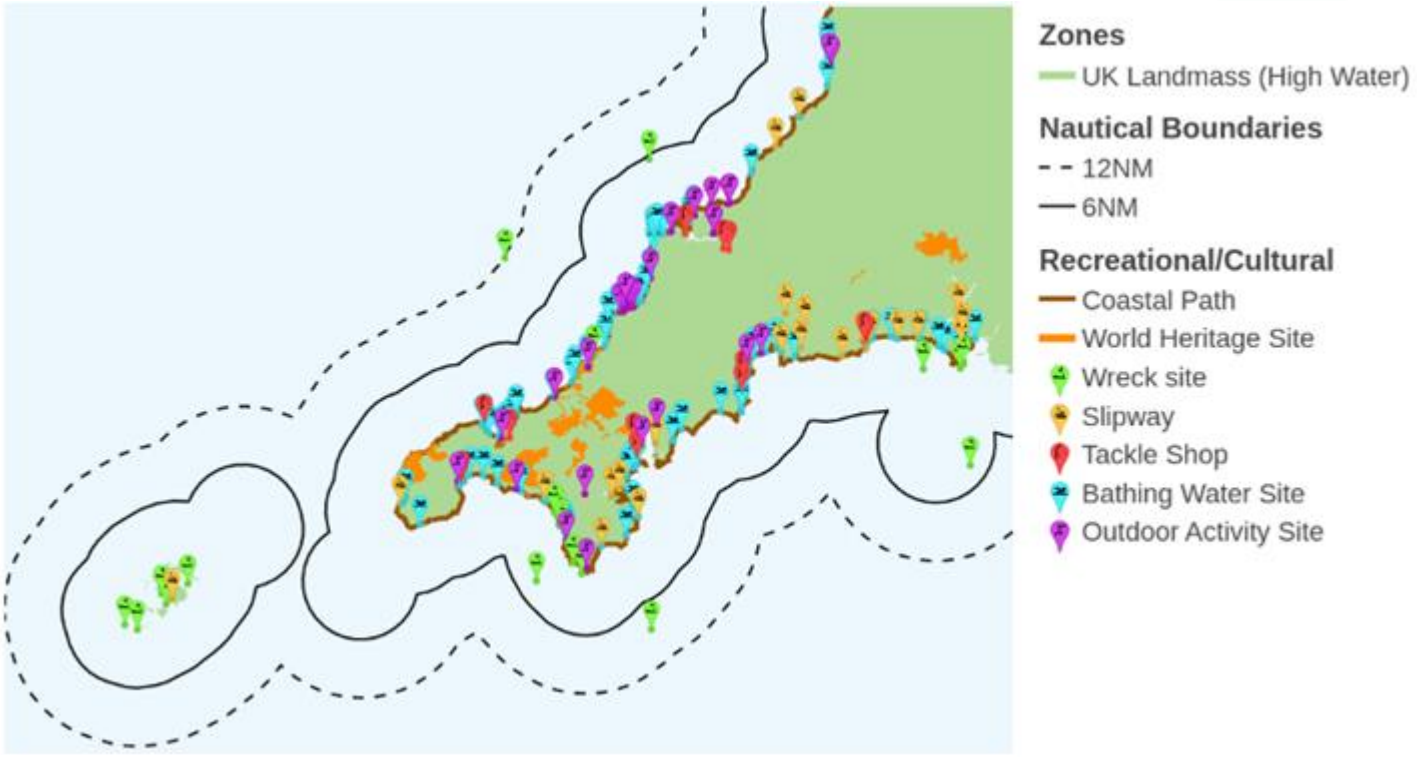

Figure 2. Spatial distribution of access points within Cornwall and the Isles of Scilly

2.4.3 Maritime industries

Other maritime sectors are illustrated in Figure 3 and include:

Characteristic	Description
Ports and docks	The largest dock in Cornwall is in Falmouth and is operated by A&P Ports. The latest estimate indicates that the docks employ over 650 people [10]. This dock is primarily for refit and maintenance activity as well as the home port for three Royal Fleet Auxiliary vessels.
Ferry terminals	Key ferry points operate between Penzance in Cornwall and Hugh Town, St Mary's in the Isles of Scilly. Smaller foot and car ferries operate elsewhere in the region, particularly car ferries. Truro to the Roseland (King Harry Ferry) and Polruan to Fowey.
Marine energy	There are two marine energy sites in Cornwall [11]: • Wave Hub (7.96km^2) licensed to operate as a test site for floating wind (first installation by 2025), with the potential to deliver 30MW energy. • Falmouth Nay Test Site (FaBTEST) pre-consented site for the development and testing of marine energy convertors (2.85km^2). In 2023, the Crown Estate revealed plans to lease sufficient seabed to support the construction of 4 gigawatts (GW) of floating wind power in the Celtic Sea by 2035 [11].
Aggregates and mineral extraction	There are no licensed aggregate extraction sites in Cornwall or the Isles of Scilly. Four sites (totalling 414.16km^2) have been licensed for offshore mineral exploration (lithium and other battery metals) [11].
Telecommunications	16 subsea fibre optic cables currently make land at Porthcurno, Sennen Cove, Goonhilly, Pentewan and Bude

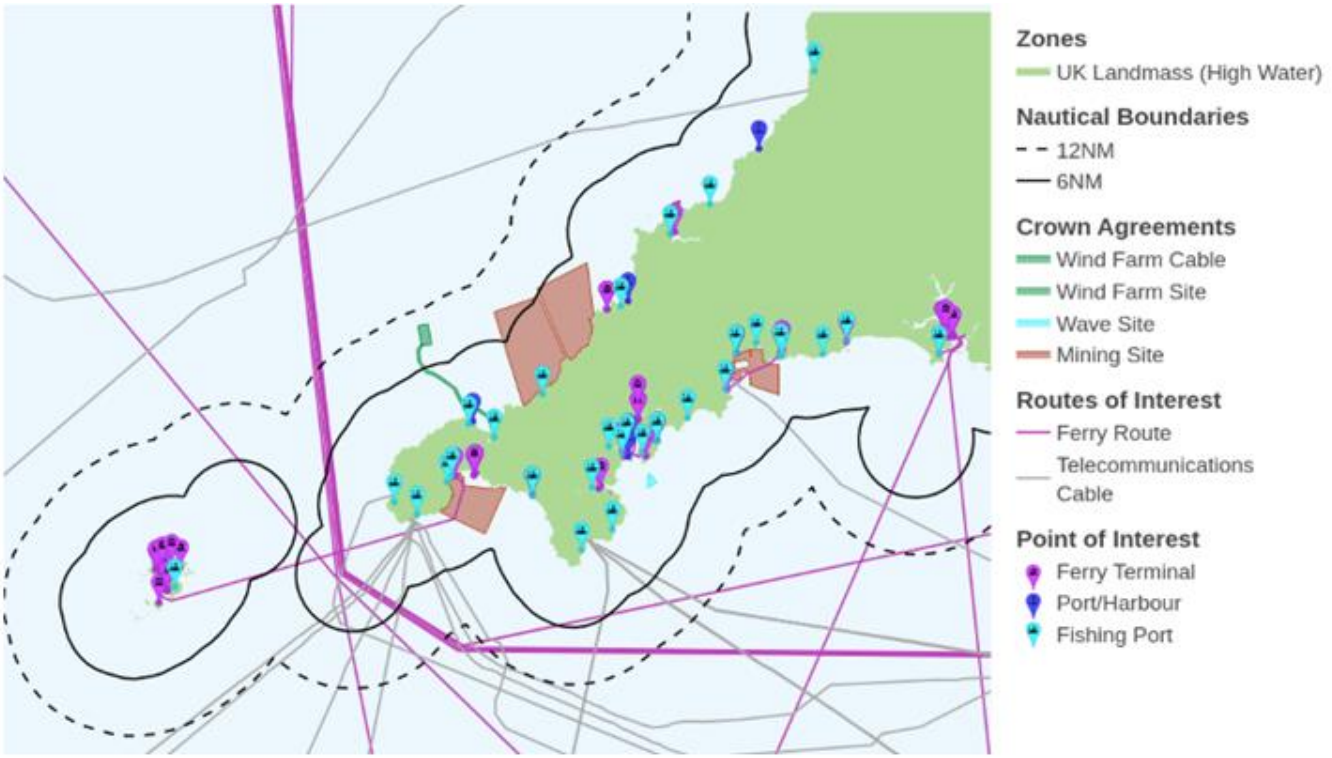

Figure 3. Location of marine infrastructure in Cornwall and the Isles of Scilly

3. Current Natural Capital Assets and Ecosystem Services

3.1 Benthic habitats

The benthic habitat map for the Cornish coast and the Isles of Scilly is shown in Figure 4. This illustrates the major seabed substrates in the area. Appendix 1 provides a complete listing of the EUNIS Level 3 habitats [12] which are in the scope of the assessment area, including their extent (ha) and proportion of the seabed.

Key points to note are as follows:

- The majority of the substrate is coarse ground including pebbles, rocks, sand and gravels;
- Sandy substrate exists to the west of the Lizard Peninsula and easterly from the Fal towards the Fowey river estuary;
- Significant areas of rock and reef exist on the north coast and around the Lizard peninsula.

Habitat designation is based upon the EU SeaMap 2021 [13]. These use a combination of modelled data and bathymetry survey to record seabed maps. Where uncertainty in the analysis exists, the default map is designated as Seabed or Sediment. A new version of the JNCC Combined Map is expected to be released shortly and it is anticipated that further definition will be available.

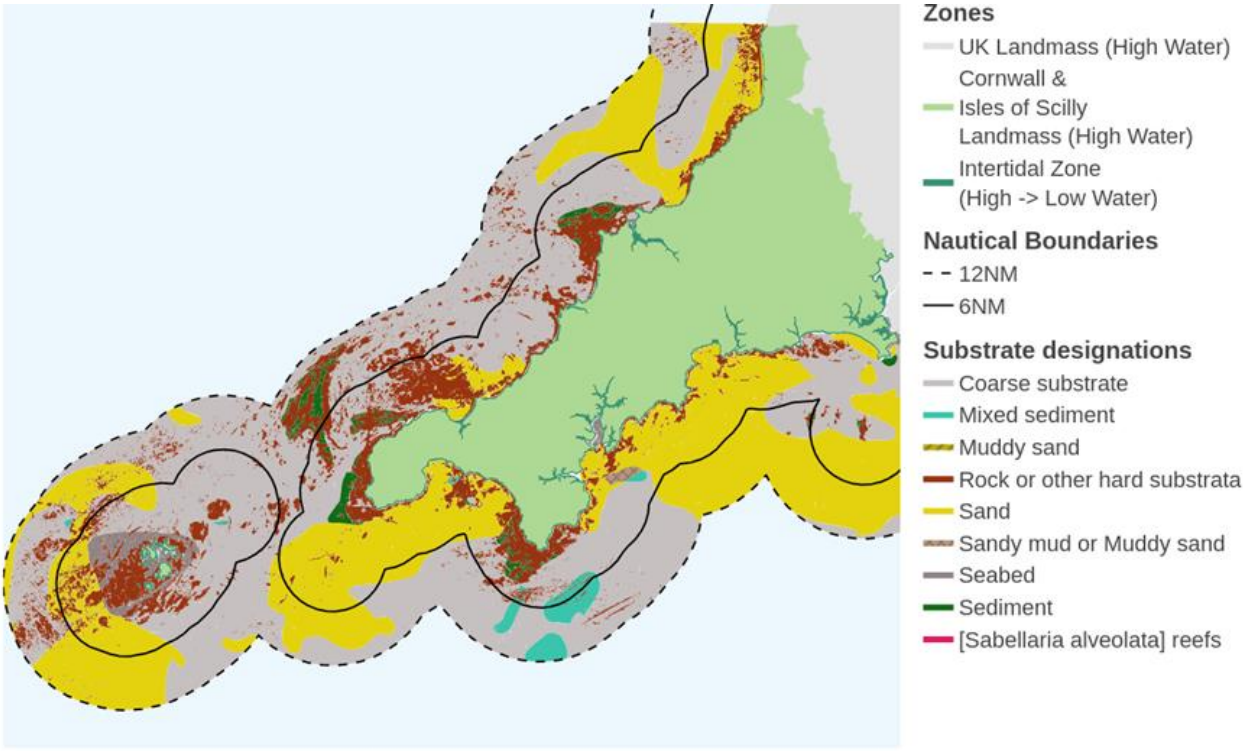

Figure 4. Distribution of habitats found around the Cornish coast and the Isles of Scilly

Using the JNCC universal Asset Service Matrix [14] the habitats within each of the study areas have been mapped to Ecosystem Services in the table below. This mapping provides a qualitative assessment of the contribution which a habitat can make to an ecosystem service.

Habitat	Wild Seafood	Water quality	Erosion control	Coastal protection	Climate regulation (carbon sequestration)	Wildlife watching	Aesthetics
A3.1 - High energy infralittoral rock	High	Med		High	Med	High	Low
A3.2 - Moderate energy infralittoral rock	High	Med		High	Med		Low
A3.3 - Low energy infralittoral rock	Med	Med	High	High	Med		Med
A4.1 - high energy circalittoral rock	Med	High		Med	Med	Med	High
A4.2 -Moderate energy circalittoral rock	Med	High		Med	Med		High
A4.3 - Low energy circalittoral rock	Med	High		Med	Med		High
A5.13 - Infralittoral coarse sediment	Med				Med		Low
A5.43 - Infralittoral mixed sediments	Low		Low	Med	Low		Low
A5.6 - Sublittoral biogenic reefs	High	Med	Med	High	Med		Low

Table 1. Mapping between habitats and ecosystem services

3.2 Threatened or declining habitats

The sites of greatest significance for conservation include maerl beds along the south coast of Cornwall , rossworm reefs around the entire coastline and several areas of seagrass beds in estuaries and around the Isles of Scilly. Natural England's Priority Habitat Inventory [15] indicates that there are 392ha of saltmarsh in Cornwall, but it is not possible to give an exact area for other threatened or declining habitats as only point data are available. The Environment Agency are currently undergoing kelp surveys, therefore understanding of this habitat is likely to improve in future.

Recent surveys during 2023 and 2024 have revealed larger beds of maerl than originally believed. Mapping data for these recent discoveries are not currently available. Maerl beds on the south coast of Cornwall are some of the largest known in England, offering biodiversity value and carbon storage benefits.

The contribution of these habitats to ecosystem services is summarised in the table below, based upon the analyses contained within the JNCC universal Asset Service Matrix [14]. This table illustrates that at least one of these 6 threatened habitats, provides a high level of contribution

across seven key marine ecosystem services including coastal protection, seafood production and regulating the environment.

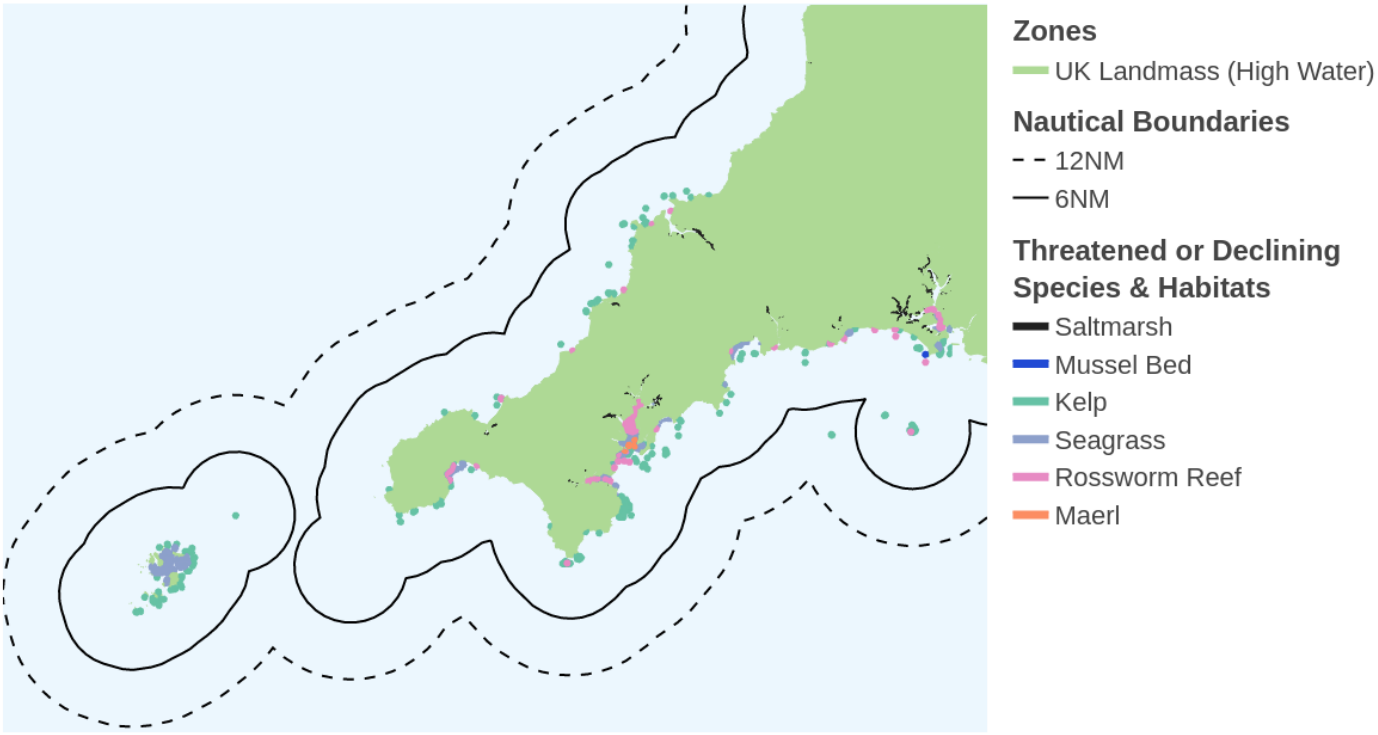

Figure 5. Threatened or declining habitats around the Cornish coast and the Isles of Scilly (as defined by OSPAR).

Habitat	Seafood	Water quality	Erosion control	Flood protection	Coastal protection	Refuge, nursery and feeding habitat	Pest and disease control	Climate regulation (carbon sequestration)	Regulating the environment (incl. atmosphere conditions)	Recreation & Tourism	Aesthetics
Saltmarsh	High	Med	High	Med	High	Med	Med	High	High		Med
Seagrass beds	High	Med	Med	Med	High	Med	Med	Low	Med		Med
Kelp beds		High	High		High	High		High	High		
Rossworm reefs	High	Med	Med	Med	High			Med	High		Low
Mussel beds	High				Med			High	Med	Med	
Maerl	Med			Med	High		Low	Med	High	Med	Low

Table 2. Contribution of threatened habitats to ecosystem services

3.3 Species assets

This section provides an overview of the key species which are present within the coastal waters.

3.3.1 Sea mammals

Cornwall and the Isles of Scilly is a national hotspot for marine mammals, both residential and as visitors. Their activity is monitored by a number of conservation groups, including the Cornwall Seal Group Research Trust and Cornwall Wildlife Trust. The Cornwall Wildlife Trust run the Seaquest Southwest Project, a citizen science marine recording project which maintains sightings records of cetaceans since 1960.

The contribution to ecosystem services for key sea mammal species, as defined by the JNCC universal Asset Service Matrix[14], is summarised below.

Species	Wildlife watching	Research	Aesthetics
Minke whale	High	Med	High
Short-beaked common dolphin	High		
Risso's dolphin	High	Med	High
Bottlenose dolphin	High	High	High
Atlantic grey seals	High	Med	High

Table 3. Contribution of sea mammals to ecosystem services

The summary of recorded sightings for cetaceans, provided by the Cornwall Wildlife Trust, is shown in Figure 6. It is difficult to assign an effort level to these sightings and therefore conclusions on the size of population or its potential growth should not be made.

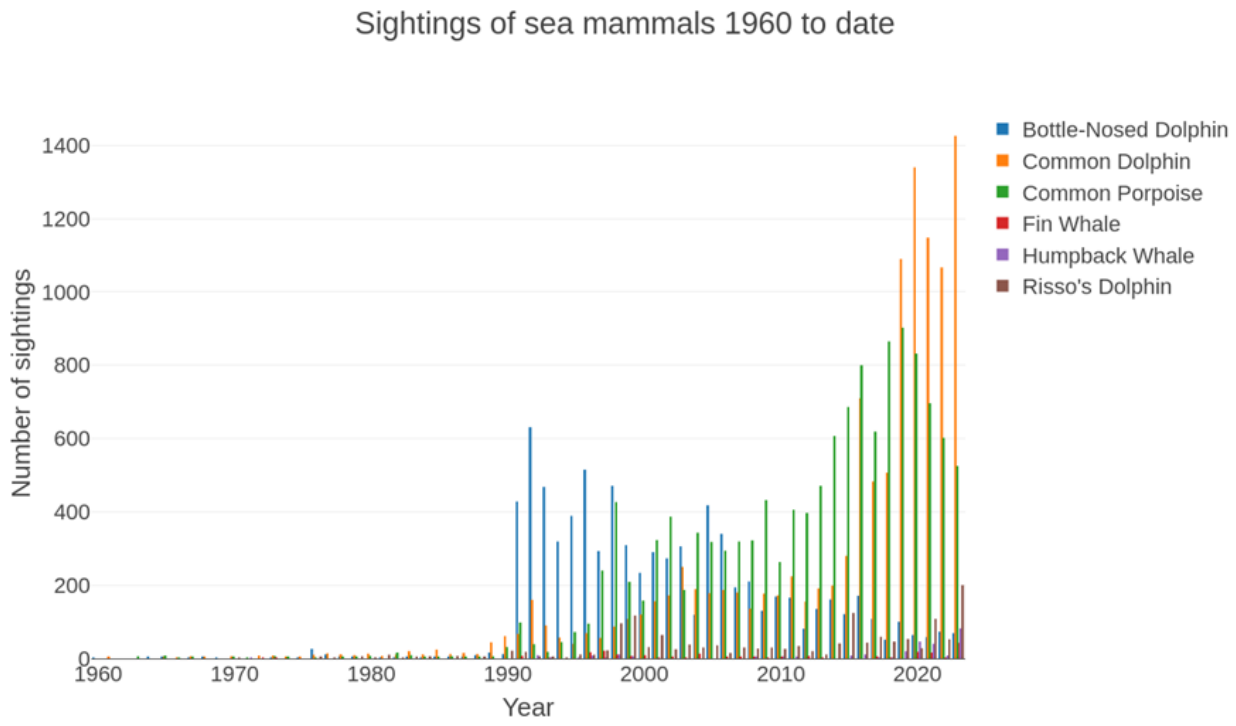

Figure 6. Sightings of sea mammals between 1960 and 2023

3.3.2 Fresh water migrating (diadromous) fish species

There is very little observational data regarding the migrating fish species in UK waters. The majority of the data are supplied as by-catch reports from the fishing industry and commentary observations from benthic surveys. This is despite the obligation of estuarine SAC's designated to monitor species levels.

The population levels of all native diadromous species in UK waters have declined rapidly since the 1970's, (Limburg and Waldman, 2009) due to anthropogenic pressures such as commercial fishing and water pollution. The contribution of these species to marine ecosystems, as defined by the JNCC universal Asset Service Matrix [14], is summarised in the table below.

Freshwater migrating fish species	Wildlife watching	Research	Aesthetics
Allis shad		Med	
Twaite shad		Med	
European eel		Low	High
European river lamprey, river lamprey		Med	
Smelt, sparling		Low	
Sea lamprey		Med	
Atlantic salmon	Low	Med	High
Sea trout	Low		

Table 4. Contribution of protected fish species to ecosystem services

The reported catch of these species in Cornish waters over the last 60 years is shown in Figure 7 below. This indicates a continued decline in catch since the mid 1990s.

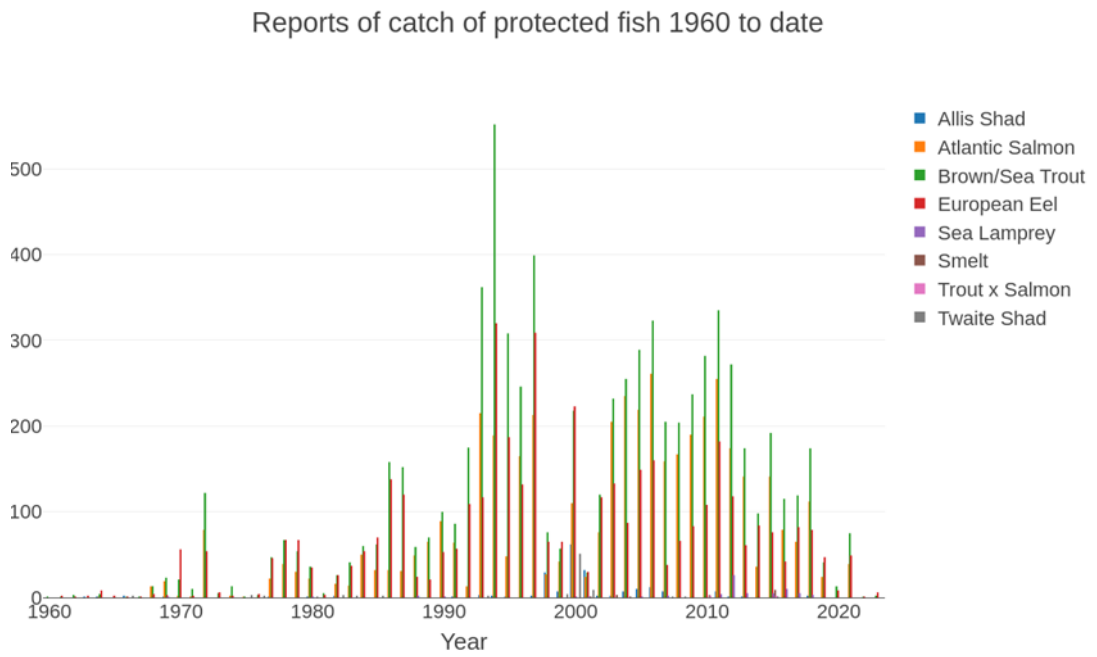

Figure 7. Number of reported catch of protected fish species in Cornish and the Isles of Scilly Waters (courtesy of Cornwall Wildlife Trust)

3.3.3 Sea bird species

Sighting records of birds have been kept by the Cornwall Wildlife Trust and date back to 1960. The number of sightings per year for sea bird species is reproduced in Figure 8 below. The trend indicates that populations of seabirds have maintained a presence in the area for several decades. It is difficult to assign an effort level to these sightings and therefore conclusions on the size of population or its potential growth should not be made. Other groups have made efforts to monitor bird populations in Cornwall and the Isles of Scilly, specifically Cornwall Birds, the BTO and the RSPB however it was not possible to include this data in this assessment.

Due to conservation efforts, the population of the once extinct chough has been steadily increasing in recent years, now reaching around 200 birds [16].

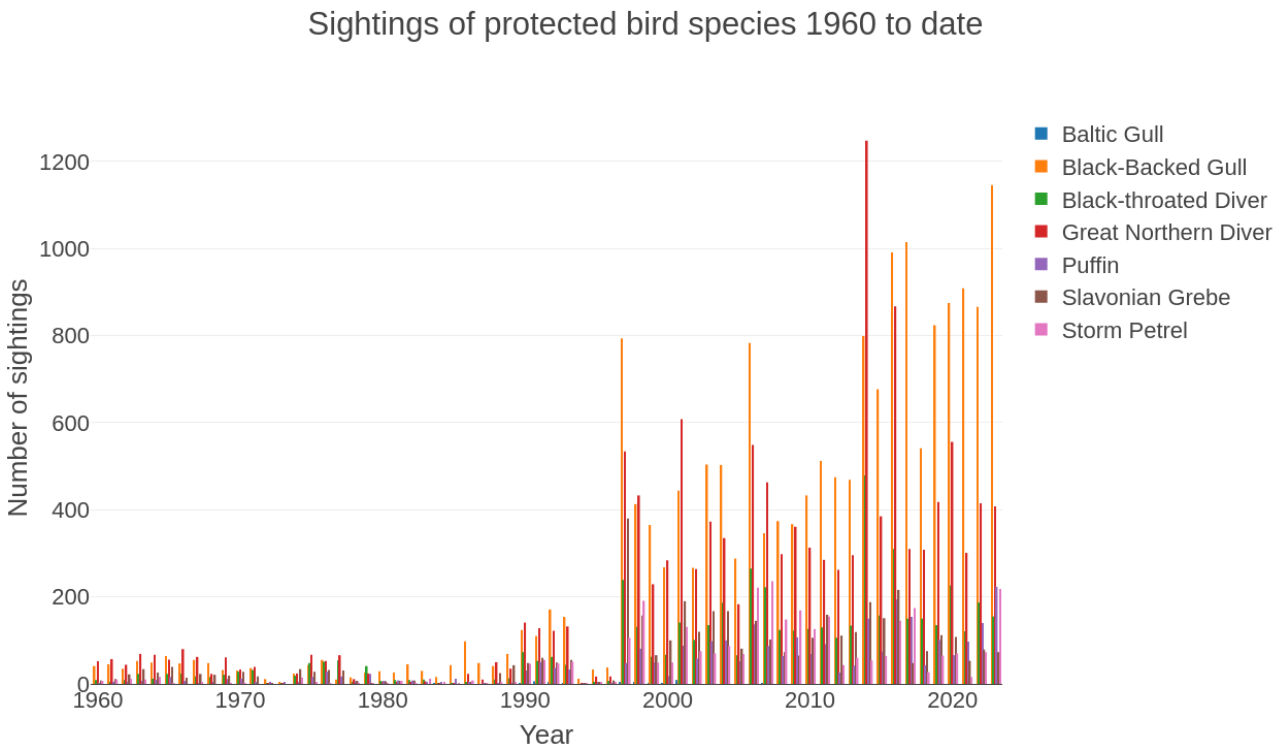

Figure 8. Sightings of protected Sea bird species in Cornish and the Isles of Scilly Waters (courtesy of Cornwall Wildlife Trust)

4. Valuation

Details of the methods used to calculate the values presented in this section can be found in the accompanying guidance document.

4.1 Provisioning services

The only provisioning service that can be valued in monetary terms is the provision of wild seafood, see Appendix B for detail of trends in landings volume, value and price per tonne.

. Service	Indicative value	Confidence	Value trend	Comment

Wild seafood	In 2023, landings values (sales) were [4]: Pelagic fish: £0.8M Demersal fish: £4m Shellfish: £3.2m	High in the data. Low confidence as a complete value estimate.		Fisheries landings and values are demand driven. Value trend does not reflect decreasing volume of landings. The landings value does not account for the costs associated with fishing (e.g. wages, boat running costs etc.) and are therefore an overestimate of the value of the ecosystem service. Without stock assessments it is not possible to understand if the decrease in landings reflects the state of the natural capital assets (i.e. fish stocks). Recreational angling is not accounted for.
Cultivated seafood	Insufficient data - not possible to value			There are two licensed aquaculture sites in Cornwall and some hand gathering of seaweed, but there are no accessible data to support monetary valuation.
Non-food products from non-living resources	Not currently producing, but being explored			Four sites have been licensed for the exploration of minerals (lithium and other battery minerals) but there is no extraction as yet [11]. Artisanal sea salt production does occur but there are no accessible data to support monetary valuation.
Energy	Not currently producing, but potential identified			The two sites licensed for offshore energy production and testing are not currently producing electricity. Future economic benefits will likely result for Cornwall from Offshore Wind Leasing Round 5, which seeks to establish floating offshore wind in the Celtic Sea [11].

Table 5. Valuation of contribution of Cornwall's seas to provisioning services

4.2 Regulation and maintenance services

Table 6 below provides a summary of the analysis of regulation and maintenance services within the SPA. Carbon Sequestration rates are taken from ONS marine natural capital accounts [17] and carbon values from data table 3 of the Treasury Green Book supplementary appraisal guidance on valuing energy use and greenhouse gas (GHG) emissions [18].

Service	Indicative value	Confidence	Value trend	Comment
Refuge, nursery and feeding habitats	Insufficient data - not possible to value			Structurally complex vegetated and biogenic habitats can provide important nursery areas. Fish, including juvenile fish will also move in and out of intertidal areas when these are submerged to feed. Estuarine and riverine linkages are also important. Valuation requires information on residency of species within these habitats.
Erosion control	Insufficient data - not possible to value			These ecosystem services are challenging to value. The habitats implicated in these services are primarily saltmarsh, seagrass meadows and kelp forests, which are typically found in sheltered locations. Valuation requires data on the type and value of property being protected, understanding of the ability of the habitat to attenuate wave energy or store water, and details of habitat extent and height.
Flood protection	Insufficient data - not possible to value			
Storm protection	Insufficient data - not possible to value			

Carbon sequestration	392 ha of saltmarsh sequesters 1,235 tonnes C annually, valued at £160,524. 424252 ha of sand sequesters 123,033 tonnes C annually, valued at £16 million. 1672 ha of mud sequesters 735 tonnes C annually, valued at £95,638. (all 2022 prices)	Low confidence in the value estimate.	Unknown	Value estimates do not consider the condition of the habitat and should therefore be assumed an overestimate. If habitat extent remains the same, value will increase due to increased £/tonne of carbon.

Table 6. Valuation of contribution of Cornwall's seas to regulation and maintenance services

4.3 Cultural services

Service	Indicative value	Confidence	Value trend	Comment
Recreation: day visits	From April 2021 to March 2023, 9.9 million - 11.1 million leisure visits lasting more than 3 hours were estimated to be taken in Cornwall to seaside and other coastal locations. These equated to £186 million total spend/year.[20] In 2012 it was estimated that visitors using the South West Coast Path (SWCP) spent around £436m (approximately £600m in 2024 prices) [2]. Value of surfing (spend): £153 million/year [19].	Confidence in the data: high. Confidence in the value estimate as representative of coastal recreation: low		The proportion of spend attributable to Cornwall is assumed from the proportion of spend for seaside and other coastal trips to the southwest, which may be unrealistic. The values estimated from the Great Britain Tourism Survey for leisure visits and that estimated for the SWCP are not directly comparable as they capture different forms of expenditure. The SWCP spend will, for example, include overnight stays while the leisure visits spend will not. A Surfers Against Sewage supported study in 2015 estimated that there were 87,453 surfers in Cornwall, 17.49% of all surfers in the UK. Spend among this group was estimated to be over £153 million annually, with surfing events such as Boardmasters bringing in additional spend. [19]
Tourism	On average between April 2021 and March 2023, overnight trips taken to Cornwall equated to £229.2 million total spend per year and 2.89 million nights per year [20].	Confidence in the data: high. Confidence in the value estimate as representative of coastal recreation: low		The proportion of spend attributable to Cornwall is assumed from the proportion of spend for seaside and other coastal trips for the southwest as a whole, which may be unrealistic.

Service	Indicative value	Confidence	Value trend	Comment
Aesthetic experience	Average price premium for a property with a view over green or blue space: £6,164 per property (2020/2021 prices)[18].	Confidence in the data: high. Confidence in the value estimate as representative of Cornish coastal aesthetic value: low.		Value based on ONS hedonic modelling of house price data. Value provided is a national average, not specific to Cornwall or marine views.
Health and wellbeing	For respondents of the People and Nature Survey in the southwest who had visited a natural space in the last 14 days, 93.9% strongly agreed or agreed that this time outdoors was good for their physical health. 90.8% also strongly agreed or agreed that it was good for their mental health [21].	Confidence in the data: high. Confidence in the value estimate as representative of Cornish health benefit value: low.		Statistics are based on visitation to both green and blue spaces in the southwest, and so is not specific to Cornwall's marine environment.

Service	Indicative value	Confidence	Value trend	Comment
Heritage	Cornwall and the Isles of Scilly contain a third of all heritage coasts in England [8]. Qualitative research demonstrates the link between the marine environment and people's sense of cultural identity and heritage.	Confidence in the data: high. Confidence in the value estimate as representative of Cornish coastal heritage value: low.		Urquhart & Acott (2014) conducted 41 semi-structured interviews with fishermen, fishermen's organisations, tourism providers, heritage providers and artists across ten different ports or villages in Cornwall. Some interviewees closely linked their sense of cultural identity and heritage to current and past activities and ideas associated with the marine environment. Reed et al's (2013) interviews with 28 stakeholders across two sites in Cornwall (Padstow and Newlyn) found that fishing had an important role in supporting the tourism industry through its heritage value. Early findings from Falmouth University's Re:voice research project found that interviewees often associated Cornwall's intangible cultural heritage with the marine environment (Hodsdon, 2024).

Table 7. Valuation of contribution of Cornwall's seas to cultural services

4.4 The non-monetary value of ecosystem services

Even when monetary values are available for a range of ecosystem services, these values do not represent the total value of these services. Value can also be interpreted in a relative sense. For example:

- The Cornwall and Isles of Scilly seafood industry represents around 27% of South West regional employment in seafood and around 3-4% of national seafood industry employment in 2021 [28].

- 39.5% of the Cornish coast and 100% of the Isles of Scilly coast defined as heritage coast, established to conserve the best stretches of undeveloped coast in England [8]. Cornwall and the Isles of Scilly contain a third of all heritage coasts in England [27].

Social and cultural values are created through the experiences that individuals and communities have at the coast. These values can be expressed, for example, through:

1. **The sense of identity and social connections of those who live along the coast.**

"Well it's [fishing] *important for two reasons, obviously it creates employment but... it's part of the social fabric here really.*" (Jamie, fishermen's organization; Urquhart & Acott, 2014, p13)

Urquhart & Acott's (2014) interviews found that Cornish fishermen often value their profession in relation to the intangible value of identity. This is linked to family histories and traditions of fishing, highlighting how value is also generated through the relationships between people, their occupations, and the marine environment. The Cornish Fish Producer's Organisation's (CFPO, 2023) interviews with seafood processors in Cornwall also noted that there was equal recognition of the economic value and community value of seafood. This was illustrated by the interviewee quotes such as the following:

"It's the fabric of the community here" and *"If you don't have fishing, you don't have communities"* (CFPO, 2023, p56)

Falmouth University's Re:voice research project on minority cultures and cultural heritage in Cornwall found that Cornwall residents frequently evoke the sea, and practices associated with it, as being central to their identities. This is clearly demonstrated by interviewee quotes such as:

"I'm 100% Cornish, it flows through my veins... I'm fully rooted in the sea and the land." (Cornwall resident; Hodsdon, 2024, p3)

2. **The sense of place**

If it wasn't for fishing in the first place, we wouldn't have all these picturesque little harbours. (Jamie, fishermen's organization; Urquhart & Acott, 2014, p13)

The marine environment itself can also shape individual and community attachment to particular places. For participants in Urquhart & Acott's (2014) study, several noted that the physical landscape and their connection to it was closely linked to historic and current fishing practices in the marine environment. The role of the sea in nurturing a sense of place and place-based identity is also indicated by interviewee responses from the Re:voice research project. More widely, visitors to Cornwall were found to also use the sea as a means of forging an emotional connection to Cornwall (Hodsdon, 2024).

3. **The contribution that fishing and other coastal heritage makes to the tourism sector.**

"I think actually being in a place where there are real live people that you can talk to in the pub or on the harbourside does bring things to life, I think again it adds another dimension to people's holiday the fact that they're not living in some museum" (Lucy, tourism provider; Urquhart & Acott, 2014, p14)

Urquhart & Acott (2014) found that fishing in Cornwall is valued by fishermen and the wider community for its indirect contribution to the tourism industry by creating a unique sense of place

based on fishing culture and heritage. Reed et al's (2013, p67) interviews with stakeholders in Padstow and Newlyn reiterate that the fishing industry attracts tourists and *"is very much an added value part of the tourism industry"*.

4. **The positive health and wellbeing benefits associated with living near or visiting the coast.**

The CFPO's (2023) report on the value of seafood to Cornwall and the Isles of Scilly included findings from a series of interviews conducted with business people, in which they were asked if the wanted to share any thoughts about the value of seafood in Cornwall. Amongst these interviewees, there was a strong appreciation of the overall wellbeing benefits of being involved in the seafood industry and this was mentioned as a key value of Cornwall's fishing industry.

5. **Connection to nature felt by those living and working on the coast**

"…being in a rural place, where there's farming and things going on all around, and fishing, which relate to the tides and the moon, and the sun, it's like, it's an intrinsic part of, of your understanding of your place in the world." (Cornwall resident; Hodsdon, 2024, p3)

In Urquhart & Acott's (2014) study, Cornish fishermen expressed a strong attachment to the marine environment and felt that fishing gave them a connection to nature. Some Cornwall residents interviewed as part of Falmouth University's Re:voice project also expressed how aspects of the marine environment are closely linked to their view of their place in the world (Hodsdon, 2024).

6. **Creative arts, storytelling and singing**

Falmouth University's Re:voice research project has indicated that much of Cornwall's intangible cultural heritage is closely linked to the sea and coast, shaping and informing perceptions of cultural events and practices (Hodson, 2024).

Interviewer: What comes to mind when you think of Cornish culture? *"Sea shanties in pubs and male voice choirs in pubs, singing."* (Cornwall resident; Hodsdon, 2024, p7)

"...I also sing, and I like singing traditional songs about the sea." (Cornwall resident; Hodson, 2024, p7)

5. Pressures on natural capital

5.1 Overview

Pressure on natural capital assets come from many sources including but not limited to:

- Commercial fishing
- Water borne pollution
- Water borne noise
- Recreation and tourism (including recreational and charter fishing)
- Shipping
- Energy infrastructure
- Cables
- Aquaculture

Data are not readily available for all of these pressures, however, where data are available (commercial fishing, water-borne pollution, marine noise, recreation and tourism) these have been discussed below.

5.2 Commercial Fishing

The sensitivity of the habitat to fishing pressure can be considered under five primary categories:

- Abrasion and penetration of the seabed;
- Target species removal;
- Non target species removal (i.e. bycatch);
- Greenhouse gas emissions;
- Contribution to marine litter by both ghost fishing (loss of nets) and general loss of equipment at sea including buoys, ropes and plastics.

The fishing potential pressure maps, Figure 9, provide an indication of inshore areas with habitat suitable for mobile towed gear including scallop dredges (shown in hatched blue), beam and otter trawl (shown in hatched orange). These represent the greatest fishing pressure on the seabed. Areas where current towed gear bans are in place, as defined in the Kingfisher Byelaws Database [26], are excluded. This map does not represent where actual fishing activity takes place. Further data, sourced from inshore Vessel Monitoring Systems (iVMS) would be needed to understand the actual level and location of fishing effort using these gears.

These maps indicate that there is potentially significant pressure on the benthos throughout the area and within designated marine conservation areas.

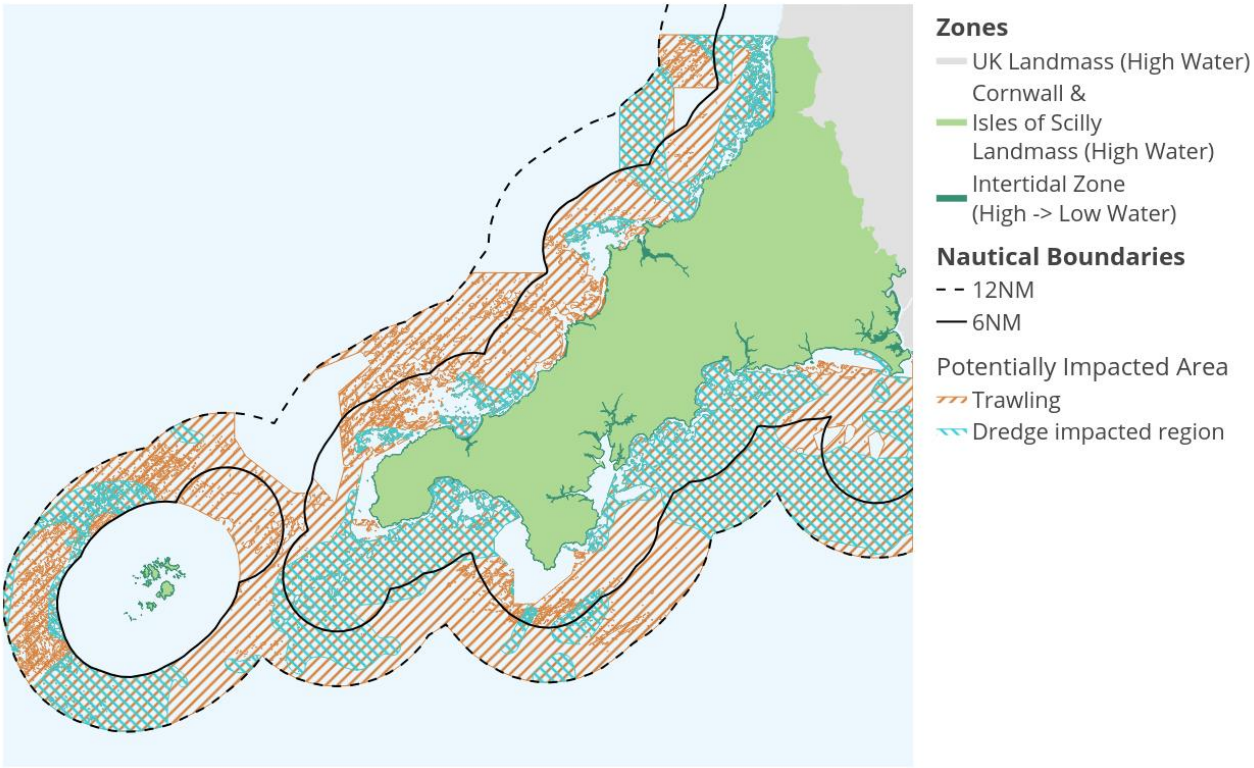

Figure 9. Potential pressure map of mobile bottom contacting fishing gear (based on habitats, activity and fishing gear utilised) in Cornish and Isles of Scilly waters

5.2 Waterborne Pollution

The water pollution data provided by the Environment Agency is geospatially referenced and identifies where discharge has occurred from combined storm overflows within 10km of the sea [22]. This provides an indicator of where volumes of contaminants from sewage are likely to have entered the marine environment.

Additionally, the Environment Agency Challenges Report provides indication of detected pollution events which include nutrient release and heavy metals. These images, Figure 10, are provided for one year (2022) and indicate that this pollution is likely to reach the marine environment. South West Water, Cornwall's primary water provider, ranked the worst company (out of 9) for number of pollution incidents, with 194 actual incidents in 2023 [23]

Significant further work is required to understand how the species and habitats of the coastline are impacted by the frequency, timing, volume and category of the pollution.

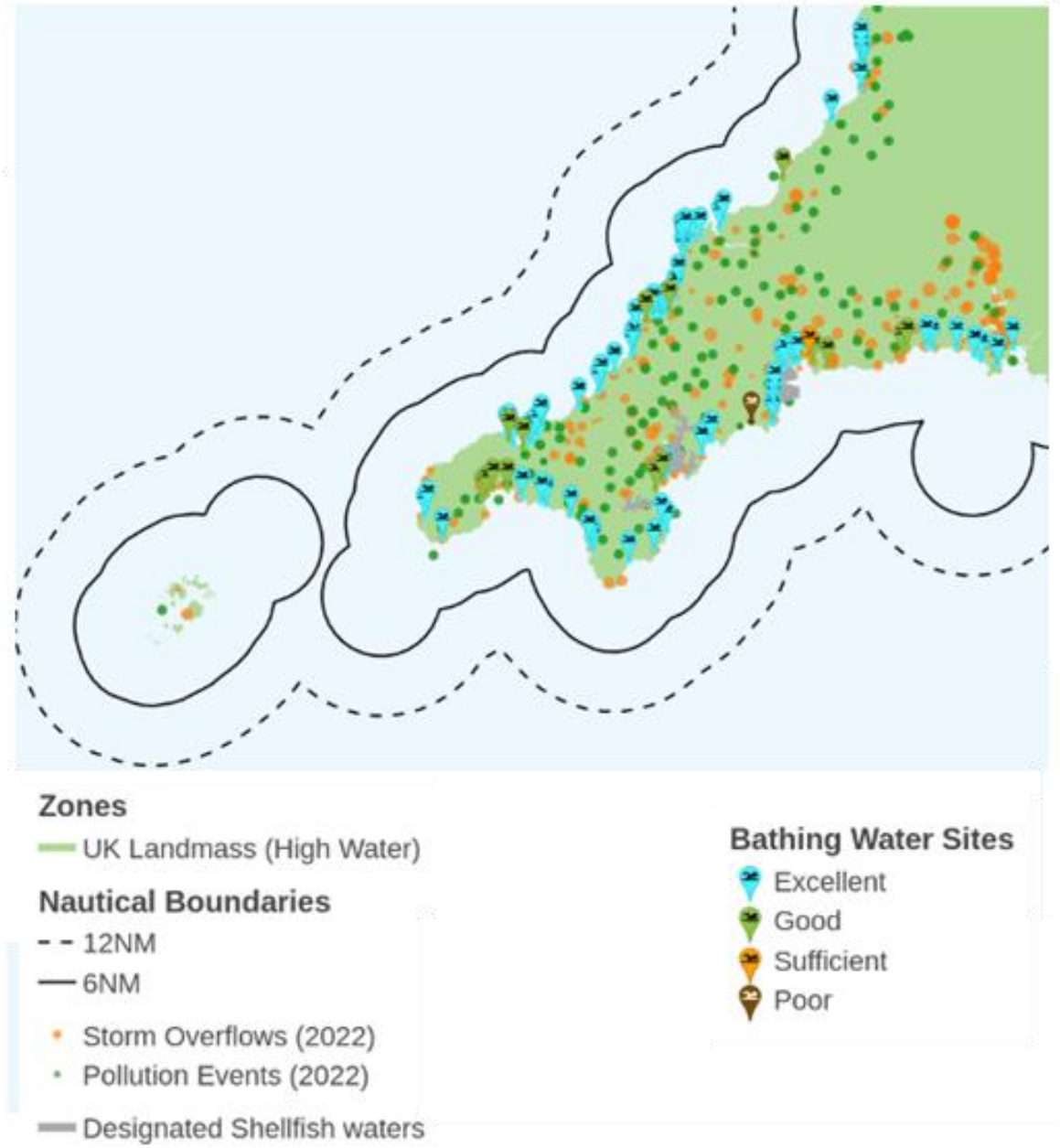

Figure 10. Water borne pollution as measured by Environment Agency in 2022 compared with distribution of bathing sites

5.3 Waterborne Noise

Noise pollution, as recorded by organisations who have reported marine noise activity either as a result of a licensing condition provided by MMO or by the requirements of The Crown Estate, is recorded in the Marine Noise Registry [24]. This covers impulsive noise (e.g. from piling, seismic and explosives) and high-power sonar (either from military use or acoustic surveys).

Figure 11 presents the results for 2022. Planned laying of cables for National Grid infrastructure, oil and gas licensing activities and carbon capture and storage will all potentially increase the noise profile in inshore waters. Noise is recorded in a format known as 'Pulse Block Days' to indicate the number of days within the period in which low frequency noise sources (in the range 10Hz to 10KHz) were known to be operating in a block. The block sizes are approximately 16km in latitude (Northing) and 10km in longitude (Easting).

Research into the impacts of marine noise on a range of species including cetaceans, sharks, rays and commercial fish is ongoing.

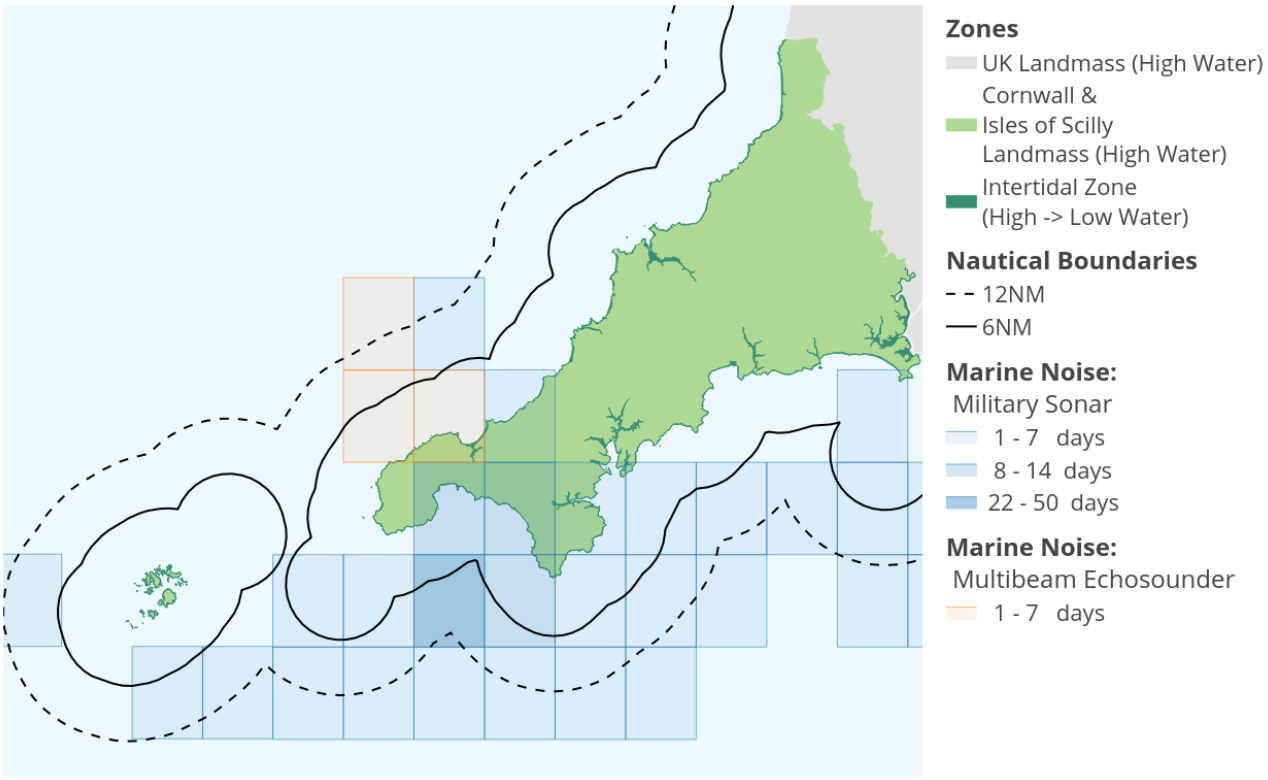

Figure 11. Waterborne noise pollution as registered in the Marine Noise Registry for 2022

5.4 Recreation and tourism

The Cornwall Marine and Coastal Code Group (CMCCG) collect data on marine and coastal wildlife disturbance in Cornwall. Their most recent, 2021, report shows that coastal users/ walkers were the top cause of marine disturbance during 2014-20, followed by tripper boats and paddle sports[25]. According to this report, privately owned leisure boats are one of the biggest threats to cetaceans in Cornish waters.

6. Summary of potential and next steps

6.1 Summary of potential for enhancement of natural capital and ecosystem services

This Case Study sets out the context for, and the habitats and species prevalent within, Cornish and the Isles of Scilly marine waters. Mapping of habitats to ecosystem services helps to identify where there is potential for improvement in the delivery in ecosystem services through action to protect and restore natural capital. Ideally, valuation would help to present a case for such action. Valuation data are limited, however, so a logical step would be to prioritise the importance of different ecosystem services to the local area and the local population. There are many ways that this can be achieved, for example, through exploration of Cornwall Council's Local Nature Recovery Strategy survey or from the outputs of focused research. This would help to provide a ranking of areas from which improvement in ecosystem services will have most effect.

Examples of action plans which could be delivered include:

- Natural recovery of key habitats through conservation. Examples include native oysters, seagrasses, kelp beds, maerl, mussel beds, rossworm beds. All of these habitats exist in Cornish Waters and the Isles of Scilly waters and have the capability to be conserved, recovered and allowed to expand (as demonstrated through, for example, the REMEDIES seagrass project).
- Restocking of species where appropriate. This is already conducted by the National Lobster hatchery in Padstow and this programme could be expanded geographically and to cover more species.
- Eradication of rats to protect seabirds and other ground nesting birds, as currently takes place on the Isles of Scilly.
- Introducing codes of conduct (such as Cornwall Wildlife Trust's Marine and Coastal code) or licensing to help manage disturbance of wildlife & ensure a sustainable ecotourism industry

6.2 Summary of challenges involved in delivering potential enhancement

Two major challenges exist in delivering potential enhancement:

1. Securing the backing of the community: requires participatory workshops, communication plans and beneficiary mapping; and
2. Securing necessary finance to deliver and maintain the improvement: requires robust costing, thorough risk management, investment analysis and benefits realisation.

6.3 Next steps

The case study process completed to date has been performed as a feasibility study to demonstrate what can be achieved for a local scale assessment at a preliminary or basic level following the guidance developed, which provides a baseline prior to considering where action is most needed and best applied.

A "Lessons Learnt" report has been prepared in parallel with this Case Study identifying where improvements would be beneficial. Additionally, processes, tools and methods have been developed as part of this Case Study which would make further such studies quicker and less resource intensive.

An output summarising the findings of this case study has been produced to show how the findings from natural capital assessments can be presented in an easily digestible format.

Appendix A – Habitats and their extent

The table below shows the area (in hectares) of each substrate and the relative contribution of that habitat to Cornish and the Isles of Scilly waters.[12]

EUNIS Code	EUNIS Description	Habitat Area (ha)	Area as % of Sea Area
A3	A3: Infralittoral rock and other hard substrata	360.59	0.03
A3.1	A3.1: Atlantic and Mediterranean high energy infralittoral rock	16675.10	1.58
A3.2	A3.2: Atlantic and Mediterranean moderate energy infralittoral rock	2960.33	0.28
A3.3	A3.3: Atlantic and Mediterranean low energy infralittoral rock	3001.91	0.28
A4	A4: Circalittoral rock and other hard substrata	112.38	0.01
A4.1	A4.1: Atlantic and Mediterranean high energy circalittoral rock	69792.65	6.6
A4.12	A4.12: Sponge communities on deep circalittoral rock	850.04	0.08
A4.2	A4.2: Atlantic and Mediterranean moderate energy circalittoral rock	15242.41	1.44
A4.27	A4.27: Faunal communities on deep moderate energy circalittoral rock	28598.95	2.71
A4.3	A4.3: Atlantic and Mediterranean low energy circalittoral rock	1406.70	0.13
A4.33	A4.33: Faunal communities on deep low energy circalittoral rock	18345.19	1.74
A5	A5: Sublittoral sediment	12690.70	1.2
A5.13	A5.13: Infralittoral coarse sediment	3008.45	0.28
A5.14	A5.14: Circalittoral coarse sediment	164002.29	15.52
A5.15	A5.15: Deep circalittoral coarse sediment	333443.50	31.55
A5.23 or A5.24	A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand	8744.99	0.83
A5.25 or A5.26	A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand	103926.81	9.83
A5.27	A5.27: Deep circalittoral sand	231570.87	21.91
A5.33	A5.33: Infralittoral sandy mud	10.64	0
A5.35	A5.35: Circalittoral sandy mud	615.45	0.06
A5.37	A5.37: Deep circalittoral mud	1045.65	0.1
A5.43	A5.43: Infralittoral mixed sediments	32.94	0

A5.44	A5.44: Circalittoral mixed sediments	230.45	0.02
A5.45	A5.45: Deep circalittoral mixed sediments	13823.52	1.31
A5.612	A5.612: Sabellaria alveolata on variable salinity sublittoral mixed sediment	2.75	0
Na	Not available or not known	13711.72	1.3

Appendix B – Trends in fish landings (volume and value)

Figure B1 shows the downward trend of the landings of demersal and pelagic finfish and shellfish by weight (tonnes) into Cornish ports by UK registered boats under 10m [4]. Vessels under 10m are more likely to fish close to their home port and so can be assumed to fish in Cornish and the Isles of Scilly waters.

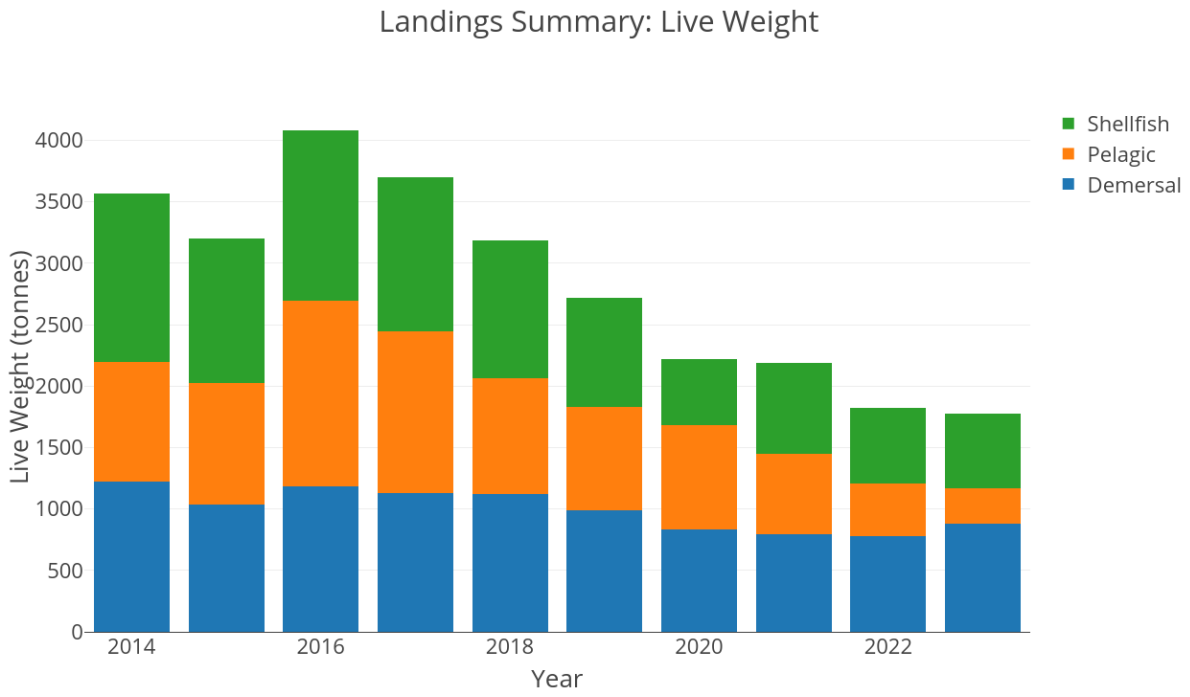

Figure B1 - Fish (pelagic and demersal) and shellfish landings live weight in Cornwall from vessels under 10m.

Figure B2 shows the sales value at the point of first sale for the same categories of fish into Cornish ports by UK registered boats. While landings have decreased, total sales values have fluctuated.

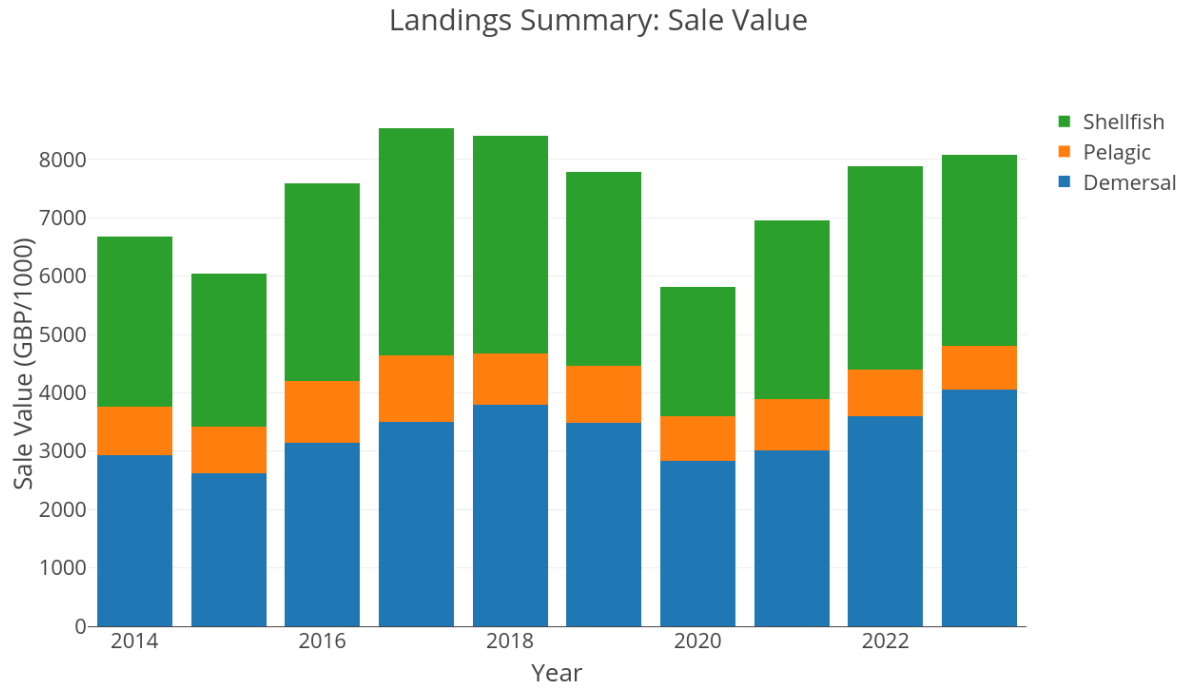

Figure B2 - Fish (pelagic and demersal) and shellfish landings sale value in Cornwall

Despite this, the economic price per tonne of fish and shellfish has increased over the same time period (Figure B3).

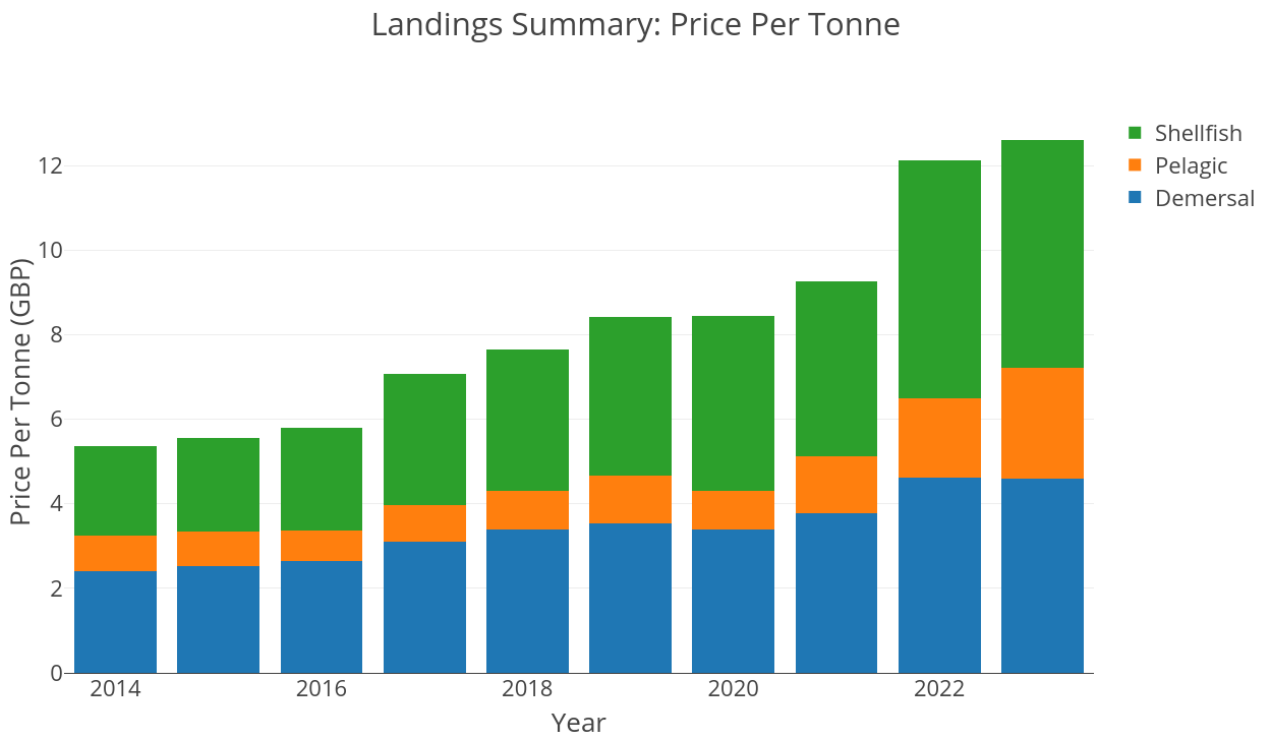

Figure B3 - Price per tonne of fish (pelagic and demersal) and shellfish

These three graphs illustrate that the value of fresh fish has increased significantly since 2020. This is co-incident with the impacts of Brexit, the Covid-19 pandemic and the war in Ukraine. These had significant impacts on market demand, the regulatory environment and input costs (especially diesel).

The emergence of valuable fish species in Cornish waters, such as blue fin tuna which can receive prices between £10 and £17 a kilo may also help to drive increases in the price per tonne, but catches are currently small. The 2024 quota is 66.15 tonnes, 39 of which are for a trial commercial fishery, 16 for recreational fishing and the remainder as commercial bycatch and for tagging programmes.

Appendix C – Reference list

Referenced Datasets

Document Reference []	Description	Included in Natural Capital search tool	Access method
1	National trust spatial boundaries data	Yes	https://open-data-national-trust.hub.arcgis.com/
2	South West Coast Path visitors	Yes	https://www.southwestcoastpath.org.uk/love-the-coast-path/everymilematters/economy/
3	JNCC Marine Protected Areas – Designated Marine Sites	Yes	https://jncc.gov.uk/our-work/marine-protected-area-mapper/
4	Marine Management Organisation - fisheries landings data	Yes	https://www.gov.uk/government/publications/2023-uk-and-foreign-vessels-landings-by-uk-port-and-uk-vessel-landings-abroad-provisional-data
5	UK Government Census 2021	Yes	https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/adhocs/2661ct210369census2021
6	Environment Agency Bathing Water designations	Yes	https://environment.data.gov.uk/bwq/profiles/help-understanding-data.html
7	Outdoor Activity Centres, Slipways, Tackle shops and other advertised amenities	No	Google API (Open source) - "Outdoor Activity Centre"
8	Heritage Coast	Yes	https://naturalengland-defra.opendata.arcgis.com/datasets/heritage-coasts-england/explore
9	UNESCO World Heritage Sites	Yes	https://unesco.org.uk/our-sites/world-heritage-sites
10	Falmouth Ship Repair employment	No	https://www.ap-group.co.uk/
11	The Crown Estate	Yes	https://opendata-thecrownestate.opendata.arcgis.com/
12	EUNIS Broadscale designation of habitats	Yes	https://emodnet.ec.europa.eu/en/euseamap-2021-emodnet-broad-scale-seabed-habitat-map-europe
13	EU SeaMap 2021	Yes	https://emodnet.ec.europa.eu/en/euseamap-2021-emodnet-broad-scale-seabed-habitat-map-europe
14	Joint Nature Conservation Committee - universal Asset Service Matrix	Yes	https://www.marlin.ac.uk/asm
15	Natural England Priority Habitat Inventory	Yes	https://naturalengland-defra.opendata.arcgis.com/datasets/Defra::priority-habitats-inventory-england/about
16	Cornish Choughs	No	https://www.cornwallwildlifetrust.org.uk/news/cornish-choughs-move-in-

			land#:~:text=%E2%80%9CThe%20re-turn%20of%20chough%20to,chough%20be-came%20extinct%20in%20Cornwall.
17	Office for National Statistics Ma-rine Natural Capital Assets	Yes	https://cy.ons.gov.uk/economy/environmen-talaccounts/methodologies/marinenaturalcapi-talaccountsukmethodologyguide
18	Her Majesty Treasury Green Book inc supplementary advice	Yes	https://www.gov.uk/government/collec-tions/the-green-book-and-accompanying-guid-ance-and-documents#supplementary-guid-ance:-subject
19	An Estimation of the Economic Impact of Surfing in the United Kingdom	Yes	https://www.researchgate.net/publica-tion/282908470_An_Estimation_of_the_Eco-nomic_Impact_of_Surfing_in_the_United_King-dom
20	Great Britain Tourist Survey 2022	Yes	https://www.gov.uk/government/statistics/an-nouncements/great-britain-tourism-survey-overnights-2022-and-2023-revision
21	Natural England People & Na-ture Survey	Yes	https://www.gov.uk/government/collec-tions/people-and-nature-survey-for-england
22	Environment Agency Challenges Report	Yes	https://www.gov.uk/government/publica-tions/river-basin-management-plans-updated-2022-challenges-for-the-water-environment
23	South West Water Performance Report	Yes	_https://www.gov.uk/government/publica-tions/water-and-sewerage-companies-in-eng-land-environmental-performance-report-2023/south-west-water-epa-data-report-2023#total-pollution-incidents-sewerage-met-ric-category-1-to-3
24	JNCC Marine Noise Registry	Yes	https://mnr.jncc.gov.uk/public-app/activity-out-puts
25	Cornwall Marine Wildlife Dis-turbance Assessment 2021	Yes	_https://www.cornwallwild-lifetrust.org.uk/sites/default/files/2021-11/Ma-rine%20and%20Coastal%20Wildlife%20Disturb-ance%20in%20Cornwall%202021%20Report.pdf
26	Kingfisher IFCA Bye-laws data-base	Yes	https://kingfisherrestrictions.org/
27	Heritage Coast Review 2022	No	https://www.coastalcommuni-ties.co.uk/knowledge_hub_files/Herit-age%20Coast%20Review%20-%20Final%20Re-port%20and%20Appen-dices%20July2022_WFNf.pdf
28	Value of Seafood to Cornwall	No	https://www.gov.uk/government/case-stud-ies/cornwall-value-of-seafood

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