MMO FIR 1 and FIR 2
September 2024

MLA/2023/00307 and MLA/2023/00308

Contents

Chapter 1: Marine Policy Assessment

Preface

The following assessment has been rewritten in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence application, as referenced above.

The assessment has been conducted with resources taken from mariculture strategies, The South West Marine Plan (Inshore), Sustainable Development Goals, marine plans, research papers, and independent input from researchers (CEFAS) based on MMO Project No. 1184 (MMO 2019, 2021) – spatial planning.

This assessment should be read in conjunction with all assessments submitted as part of the licence application process, including new and updated assessments (May, June, September 2024).

The questions covered as per MMO FIR 2 were:

8.1 Following the changes requested in this letter, you should also reconsider the responses given as part of your South West Marine Plan Policy Assessment. The plan should be replicated within the application document with updated responses provided. This will ensure that the considerations of the plans align with the updated information and not the initial application.

In response to these concerns, we have reproduced the Marine Policy Assessment with consideration of the plans aligning with the updated information. Please refer to this assessment. This assessment has been written cumulatively, similarly to all new and updated chapters, assessments, and supporting documents. This updated analysis has been submitted with this FIR however, we are unable to actually make changes to the licence applications on the MMO portal other than upload FIR responses. These uploads should be regarded as our changes to the online licence portal.

1.0 Introduction & Background

In England, marine planning is a relatively new approach to managing the seas and maritime activities. The coastline and inshore waters are divided into different areas for planning and management purposes.

The current proposals are for two seaweed farms located in the nearshore, in Port Quin Bay, North Cornwall. Port Quin is within the Cornwall North water body GB610807680002. The water body is 19,160.18 Ha of water in total. Therefore, the proposed 100.8 Ha farms would occupy an equivalent of 0.52% of the Cornwall North water body. The proposed farms fall into area 8: The South West Marine Plan (Inshore).

Area 8 covers 2,000 km of coastline and 16,000 km^2 of sea from Mean High Water Spring (MHWS) to 12 nautical miles. It stretches from the River Severn (Wales) to Dart River, Devon.

Whilst the South West Marine Plan was in draft format, the Marine Management Organisation (MMO) directed that the UK Marine Policy Statement (MPS) be referred to for marine licensing purposes. A document, which is designed to meet the requirements of the EU Marine Strategy Framework Directive (2008/56/EC) at a national level. The South West Marine Plan (Inshore) is now ratified. Therefore, the project has been considered against the UK MPS, the South West Marine Plan (Inshore) and a report produced by Seafish in 2020: The English Aquaculture Strategy.

2.0 UK Marine Strategy

The driving principle is sustainable development of the UK marine area. It requires regulatory bodies to adopt a spatial planning approach for marine activities balancing the use of the sea as a resource, a wide range of activities and how those activities interact. There are several areas that the MPS focuses on that are of relevance to this project.

2.1 Sustainable Marine Economy

Goals: promote safe, profitable and efficient marine businesses. The marine environment and its resources should be used to maximise sustainable activity, prosperity and opportunity for all. This applies to the current and future periods.

Increasing employment, advancing education, supporting eco-tourism and driving economic, environmental and societal benefits through sustainable development are vital to generate export and tax revenues.

2.2 A Strong, Healthy And Just Society

Goals: the use of marine resources should benefit society as a whole and promote marine businesses that are safe. Current and new marine businesses should act responsibly, respecting the resources available and seascapes. Businesses should act to mitigate climate change according to the Climate Change Act 2008 (reaching targets for low carbon production).

There should be equitable access for all those who want to work in, use or enjoy the coast, seas and a wide range of marine resources and assets.

2.3 Living Within Limits

Goals: Biodiversity protection and conservation should be a priority. Maintaining healthy habitats is vital and has benefits to commercial marine businesses in the short and long term.

2.4 Science

Goals: Understanding the marine environment will improve through new scientific and socio-economic research. Data collection and analysis is vital. Decisions need to be based on sound evidence and monitoring, which will underpin marine management and policy development.

2.5 Promoting Good Governance

Goals: Decision making by regulatory bodies should involve a wide range of stakeholder input with regards to regulated marine business. The use of the marine environment should be spatially planned. Marine cultural heritage needs to be recognised.

2.6 Conflict Avoidance And Compatibility

Goals: The aim is to avoid, minimise or mitigate real and potential conflict between different sets of users with regards to marine resources. However, the underpinning principle is to encourage the co-existence of multi-users.

3.0 Sustainable Seaweed Farming

The proposed seaweed farms support a growing seaweed industry which is starting to thrive in the UK and catch up with its European counterparts. Seaweed farming is a form of aquaculture and is recognised as a legitimate use of the sea.

Seaweed farming is considered to be the most sustainable form of aquaculture due to the fact it requires no fresh-water input, land, feed, fertilisers and produces no waste into the marine environment.

It is recognised that seaweed farming is an integral part of realising blue growth potential within coastal regions and creating economic opportunity at a local level. It has a strong role in providing local employment, education, careers, supporting local businesses as service/equipment providers or supplying them with farmed seaweed and seaweed-derived products (Refer to Chapter 15).

There is clear, scientific evidence (published research) that demonstrate seaweed farming enhances biodiversity, restores marine habitats and provides ecosystem services such as bioremediation (improving water quality). The research is evidenced and results reported throughout the application documents submitted.

Farming seaweed has potential to address climate change through directly sequestering carbon into the marine environment, although this requires more research to acquire tangible data to be able to accurately quantify the potential in different species and locations and understand it's potential. However, the farmed seaweed and seaweed-derived products are proven to indirectly avoid or mitigate carbon production which contributes significantly to climate change (examples: feed, bio-fertilisers and bio-materials as replacements for oil-based plastics). The farmed biomass can be used to resolve pressing societal issues and drive circular economies.

The applicants work closely with a number of regulatory bodies, local universities and marine organisations. Biome has operated seaweed farms over four growing seasons (2020 to 2024) at increasing scales of production. During that time, Biome has been involved in PhD and MSc. research projects assessing the risks and benefits of seaweed farming on the marine environment. This has led to published research in peer reviewed journals. Currently Biome is involved in a range of different projects from researching fish movements in farms to assessing carbon potential. Sharing data and providing opportunities provides vital industry knowledge and involves aspects of community engagement and educational outreach.

During the application process, applicants have pre-engaged with a range of sea-users, had a period of 56 days in total for public consultation and submission of representations, held a mediated public meeting and continued dialogue and engagement across a number of experts in their field, researchers, stakeholders and businesses.

4.0 South West Marine Plan (Inshore)

The applicants for the marine licences for the proposed seaweed farms have assessed the development against the South West Marine Plan (Inshore). The key is to avoid, minimise or mitigate any potential negative impacts, if identified under the various plan codes (Section 5.0). The proposed farms fits with the plan's vision for 2041 in that it will achieve a sustainable marine economy and ensure a strong, healthy, just society living within environmental limits. Seaweed farming is a viable activity as part of the plan under code SW-AQ-1.

"*By 2038, the south marine plan areas will have maintained its distinctive natural beauty and diversity while sustainable economic growth, protection of the natural and historic environment, as well as the well-being of those who live, work and visit the south coast, will have been enhanced through balanced and sustainable use of its resources" (Department for Environment Food and Rural Affairs, 2018a).*"

Port Quin Bay covers an area approximately between 5.54 and 5.16 km^2. The proposed seaweed farms cumulatively occupy 1 km^2 of the nearshore centre of the Bay. This represents between 18-19.37% of the Bay area total. And is below the 32% level of coverage which could restrict essential habitat use for certain marine mammals (Ribeiro et al. 2007). In addition, open sea channels between longlines mean the cumulative infrastructure occupies a total of 10% of the 1 km^2 (0.1 km^2 and 1.8-1.9% of the Bay area total).

Port Quin was selected as a site for a range of key reasons which are covered across the various chapters submitted and within the updated report in detail. This included (but is not limited to) proximity of natural kelp ecosystems, depths, currents, allocation as a strategic area for aquaculture by the MMO, land-based infrastructure to support farming (harbours) and levels of fishing in the Bay and agreement by fishers the farms will not negatively impact current fishing levels, which are very low. A very important factor in selecting the site was sediment type within the Bay. Coarse sediment is not a supporting habitat for marine mammals in terms of prey. There are very little fish present. Sand eels will likely be present to the west of the proposed farms over the sandy deposit, where they can also spawn – providing a food source for mammals (porpoise for example) and birds. The farms are located at distance from the sandy deposit and there are no pathways for impact on this area of the seabed, given the engineering report provided and stability of the infrastructure to be deposited at sea. The farms will be located entirely over coarse sediment. Marine mammal access to the sandy deposit is not hindered by the presence of the farms. Shellfish are found closer to the shore (crabs, lobsters, spider crabs) – within natural kelp systems and reef areas which is where potting occurs. In conclusion, the farms do not interfere with the critical feeding habitats of marine mammals when in the locale of the Bay and will not reduce prey availability within the Bay – but will enhance it.

There has been discussion around the suitability of Port Quin Bay for farming seaweed. This was partially based on MMO spatial maps that indicate broadly areas suitable for seaweed farming. The area in question has been allocated by the MMO as a strategic site for aquaculture. However, when seaweed data is investigated on the same maps, they do not indicate that the Bay is a suitable area for farming sugar kelp or oarweed. Biome has had direct discussions with the CEFAS team. CEFAS prepared the maps (MMO, 2019, Figure 1.0). There was limited evidence and data available when compiling these maps. It was to act as an indicator and therefore worked within wide ranges and parameters as a starting point – which resulted in sites being excluded. The intention was then to build on these maps, updating them with real, ground-truth data from operators – who select sites based on their knowledge and expertise.

The MMO used the CEFAS study (MMO, 2019) as a basis to creating their interactive spatial maps which indicate areas for strategic marine aquaculture and suitable sites for seaweed cultivation. To achieve this, they applied a second set of parameters which resulted in the final maps (CEFAS, pers comm, MMO 2021).

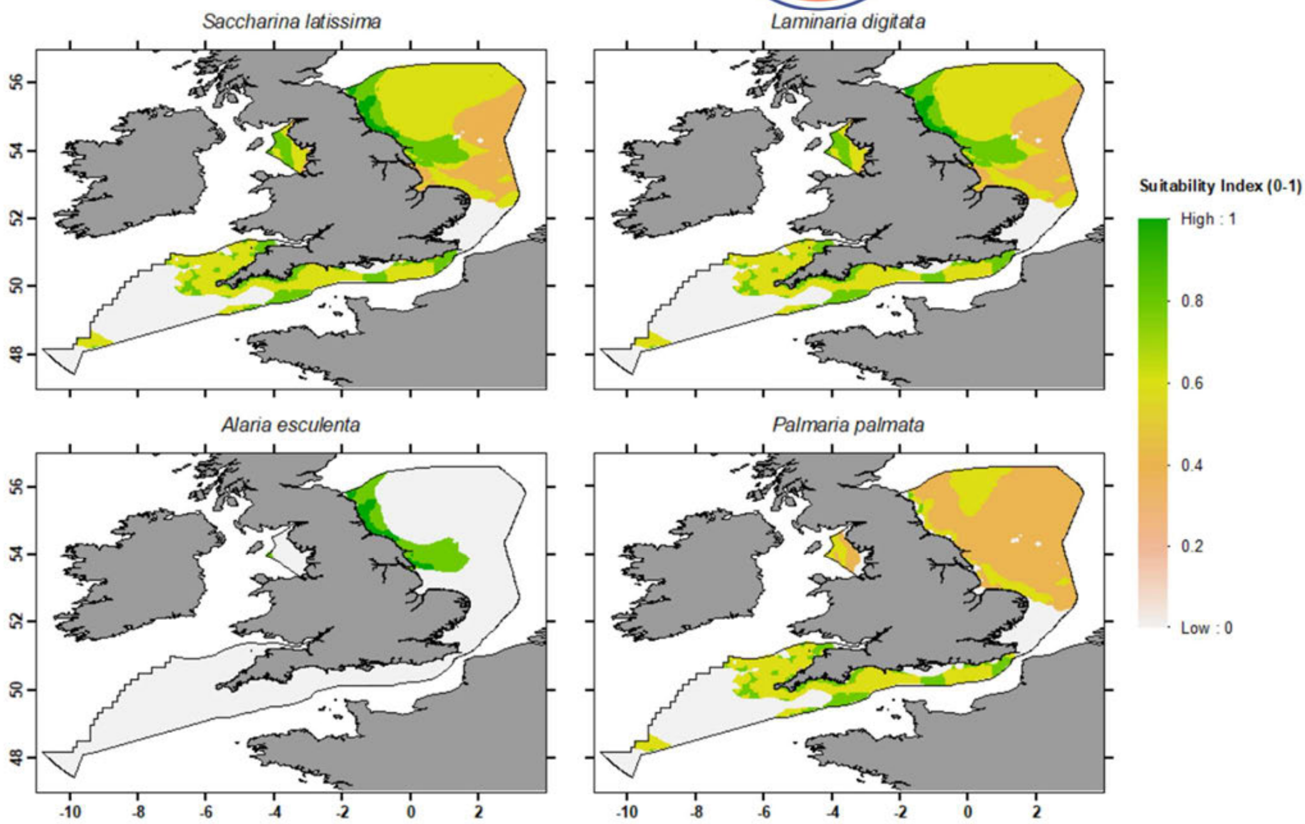


Figure 1. MMO mapping for suitable areas for seaweed species growth off the English Coast. Source: MMO Project No: 1184 (MMO, 2019) prepared by CEFAS.

According to the current MMO interactive spatial maps, seaweed species cannot be farmed in St Austell Bay, Cornwall, Torbay – South Devon, Porthallow – South Cornwall or Bideford Bay in North Devon. However, this is not the case. The criteria described above were applied to sites when farmers selected them, applying data, knowledge and expertise, as sites for seaweed cultivation. Successful cultivation has occurred at each of these sites. In 2020-21, 5 T sugar kelp was grown in St Austell Bay. This was followed in 2021-2022 by 40 T. In 2024, 20 T of sugar kelp was farmed in this region. In Torbay, 5 T of sugar kelp was farmed in 2022-23, followed by 40 T sugar kelp in 2023-24 and oarweed test lines. Sugar kelp has been successfully cultivated in Porthallow since 2019 and in Bideford Bay since 2022-23.

Following discussions with CEFAS, the aim is that current operators will update CEFAS and the MMO with cultivation data and parameters, which will then be reflected in the interactive MMO spatial maps.

Based on data, knowledge and expertise, alongside infrastructure engineering reports, Port Quin is a suitable site for seaweed cultivation.

Taking all this into consideration, the South West Marine Spatial Plan and interactive maps do indicate that there are a range of nearshore sites (albeit located in the majority in front of AONB's that form the Cornwall National Landscape) that are suitable for aquaculture (Figure 3.0). Port Quin Bay is identified as an area for strategic aquaculture (Figure 4.0). Please refer to chapter 14.

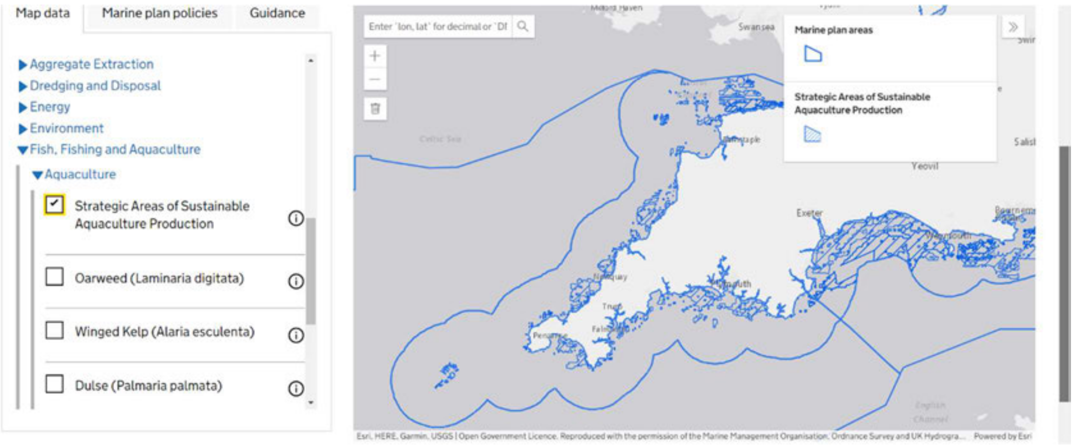


Figure 3.0: MMO interactive tool for South West Marine Spatial Plans, indicating areas for strategic locations for marine aquaculture (accessed June 2024).

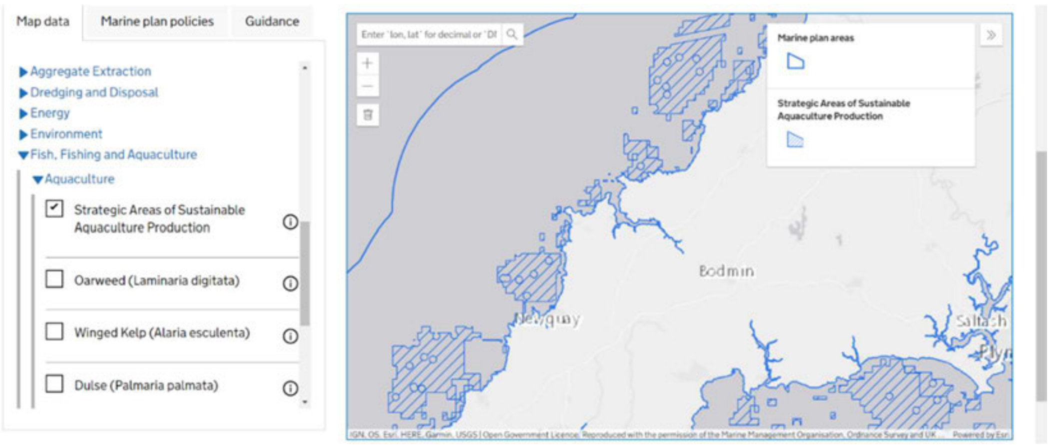


Figure 4.0: MMO interactive tool for South West Marine Spatial Plans, indicating an area for strategic aquaculture in Port Quin Bay.

5.0 Marine Plan Policies

Relevant code	Impact	Information
SW-ACC-1	Yes	The proposed sites are static seaweed farms and comprise infrastructure at the surface of and below the water. Navigational safety markers alert the public and vessels of the farm's presence. The farms are also mapped on appropriate admiralty and navigational charts. Access into the farm is limited for deep draft vessels (refer to Chapter 16 and Appendix V). However, vessels with shallow drafts (ribs, leisure boats for example) and personal water equipment (paddleboards, kayaks for example) can access the farms safely. Marine farms by law do not exclude other sea users. It is more a decision of safety and responsible use of the sea. An independent marine engineering report on the farm infrastructure demonstrates that the infrastructure will have absolute stability across 50-year storm data in Port Quin Bay, due to anchoring with appropriately weighted eco-blocks and with good maintenance. Therefore, the farms infrastructure will be stable in the Bay (Chapter 5, Appendix I). In order to minimize and mitigate access issues, the farms are arranged with longlines in rows – with clear 20 m channels between rows which are open ended and enable sea users to move through the farm infrastructure safely. Plans related to RNLI access and practice drills have been incorporated into the 'Navigational Safety and Emergency Response Plan' (chapter 16) and farm risks have been brought to ALARP. In addition, although a 100.8 Ha (1km^2) is required in total for both seaweed farms, the physical infrastructure occupies 10% of this footprint at maximum farming capacity (10.08 Ha), which leaves 90.72 Ha as open sea. Operational profiles of the farms indicate that farm activity will be at a minimum during Summer – when tourism and sea users are expected to be at peak values (Chapters 4 and 13). A full safe anchorage assessment has been completed within this document, evidenced and assessed as no significant impact to human health.

SW-AGG-1	NA	Not relevant to the proposed projects.
SW-AGG-1	NA	Not relevant to the proposed projects.
SW-AGG-1	NA	Not relevant to the proposed projects.
SW-AIR-1	No	Seaweed does not emit greenhouse gases and has potential to mitigate climate change. Typical working boats (vessels) servicing farms around Devon and Cornwall currently operate with diesel engines. Vessel maintenance ensures emissions are within acceptable limits. Operational profiles indicate that vessel engines will be switched off when operating along longlines to minimise emissions. In the future, it will be possible to use hybrid and electric vessels. Biome has had a hybrid seaweed vessel designed and signed off by MECAL – ready to build. When this is economically viable, the applicants will aim to utilize this technology. Processing is conducted in low energy, renewable-based processing facilities which are scalable and do not require heat to dry the seaweed. Transport of resultant products will utilise carbon neutral carriers where possible.
SW-AQ-1	Yes	The proposed seaweed farms are a form of sustainable aquaculture and are proposed within an area identified by the MMO as an area of strategic aquaculture. Port Quin Bay is a suitable site for seaweed farming (refer to section 4.0). At this time, no other aquaculture operations are active in Port Quin Bay. Therefore, compatibility of seaweed farming with other forms of aquaculture will not be a current issue. However, it is evident from research and physical co-location of farms in Devon and Cornwall, that seaweed farming is compatible with longline shellfish farming and lobster hatcheries. Farm infrastructure has been independently assessed as absolutely stable. Please refer to Chapters 5,7,8,9,10, and 11 which present the evidence for infrastructure stability, co-location of farms (compatibility), co-existence of the proposals with

		other sea users and provide evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services. An economic assessment has been submitted (chapter 15).
SW-AQ-2	Yes	The proposed seaweed farms provide infrastructure for sustainable aquaculture. This is evident through all evidence and assessments submitted with the applications (chapter 5, Appendix I). In this case, one of the applicants is a fisher (Camel Fish) who has trawled and potted for 50+ years in Port Quin Bay and surrounds. Following a recent decline in the viability of the fishing industry, Camel Fish wish to diversify and utilize their skills, knowledge and infrastructure/resources to farm seaweed sustainably. They will partner with Biome who have farmed seaweed for four seasons (2022 to 2024 inclusive) and have skills, knowledge, expertise and infrastructure/resources. Fishers have been engaged by the applicants throughout the process, and support is evidenced within assessments submitted. Please refer to Chapter 12, 13 and 16. An independent marine engineering report on the farm infrastructure demonstrates that the infrastructure will have absolute stability across 50-year storm data in Port Quin Bay, due to anchoring with appropriately weighted eco-blocks and with good maintenance. Therefore, the farms infrastructure will be stable in the Bay (Please refer to Chapter 5 and Appendix I).
SW-BIO-1	Yes	Both applicants have researched, assessed and presented robust evidence related to the environmental benefits of seaweed farming in Port Quin Bay and generally as an activity within the marine environment. Please refer to Chapters 5, 7,8,9,10, and 11 all of which present the evidence for infrastructure stability, operational profiles and provide tangible evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services. Where risks were identified within these assessments (marine mammals, birds, AONB, MCZ and pink sea fans, Salmonids) these have been assessed and avoided, mitigated or minimised where/if required to non-significant levels. Monitoring programs with independent expert research groups have been proposed.
SW-BIO-2	Yes	Both applicants have researched, assessed and presented robust evidence related to the environmental benefits of seaweed farming in Port Quin Bay and generally as an activity within the marine environment. Please refer to Chapters 5,7,8,9,10 and 11 all of which present the evidence for infrastructure stability, operational profiles and provide tangible evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services. Where risks were identified within these assessments (marine mammals, birds, AONB, MCZ and pink sea fans,

		Salmonids) these have been assessed and avoided, mitigated or minimised where/if required to non-significant levels. Monitoring programs with independent expert research groups have been proposed.
SW-BIO-3	Yes	Both applicants have researched, assessed and presented robust evidence related to the environmental benefits of seaweed farming in Port Quin Bay and generally as an activity within the marine environment. Please refer to Chapters 7,8,9,10 and 11 all of which present the evidence for infrastructure stability, operational profiles and provide tangible evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services. Where risks were identified within these assessments (marine mammals, birds, AONB, MCZ and pink sea fans, Salmonids) these have been assessed and avoided, mitigated or minimised where/if required to non-significant levels. Monitoring programs with independent expert research groups have been proposed.
SW-HAB-1	NA	The proposed farms are located in depths of 10-15m (17 m max) across the footprint of the farm sites. There are no deep-sea habitats.
SW-CAB-1	NA	The proposed farm site does not have cable installations (evidenced in the Crown Conflict Plan).
SW-CAB-2	NA	The proposed farm site does not have cable installations (evidenced in the Crown Conflict Plan).
SW-CAB-3	NA	The proposed farm site does not have cable installations (evidenced in the Crown Conflict Plan).
SW-CC-1	Possible	Seaweed farming has been widely discussed in the research literature to have potential for both flood defense and carbon sequestration. Flood defense is in its infancy as to the potential of seaweed farms to mitigate it. The potential of farms to sequester carbon is also being actively researched. Biome is actively involved in carbon research related to seaweed farms. However, more tangible evidence and data is required to explore its direct sequestering potential for different UK farmed species, locations, farming methods and at different scales. The end products (seaweed and seaweed derived products) can indirectly help avoid or mitigate carbon footprints along value chains (examples: feed, bio-fertilisers, bio-materials to

		replace oil-based plastics). Please refer to Chapter 14.
SW-CC-2	Yes	The proposed seaweed farms do not significantly impact coastal change or climate change adaptation measures inside and outside of the proposed farm footprints, which is assessed throughout the application (please refer to all assessments and specifically the independent marine engineering report related to infrastructure). An independent marine engineering report on the farm infrastructure demonstrates that the infrastructure will have absolute stability across 50-year storm data in Port Quin Bay (farm life), due to anchoring with appropriately weighted eco-blocks and with good maintenance. Therefore, the farms infrastructure will be stable in the Bay. A report has been submitted (Commercially sensitive and therefore available to primary assessors as part of the MMO marine licensing process but not the wider public). The location of the farms (nearshore (550-600m minimum from land in a marine environment) will not be directly impacted by coastal erosion or flooding. Seaweed farming is in line with climate change policies (See SW-CC-1 and refer to Chapter 14.
SW-CC-3	No	The proposed seaweed farms do not significantly impact coastal change or climate change adaptation measures inside and outside of the proposed farm footprints, which is assessed throughout the application (please refer to all assessments and specifically the independent marine engineering report related to infrastructure). An independent marine engineering report on the farm infrastructure demonstrates that the infrastructure will have absolute stability across 50-year storm data in Port Quin Bay (farm life), due to anchoring with appropriately weighted eco-blocks and with good maintenance. Therefore, the farms infrastructure will be stable in the Bay. A report has been submitted (Commercially sensitive and therefore available to primary assessors as part of the MMO marine licensing process but not the wider public).

		The location of the farms (nearshore (550-600m minimum from land in a marine environment) will not be directly impacted by coastal erosion or flooding. Seaweed farming is in line with climate change policies (See SW-CC-1 and refer to Chapter 14.
SW-CO-1	Yes	Please refer to all assessment documentation submitted, including new and updated chapters for June 2024. Please refer to SW-ACC-1 and SW-AQ-2. Any impacts are non- significant or have been avoided, minimized or mitigated.
SW-CBC-1	No	The proposed seaweed farming operations are operated within the UK, within the South West Marine Spatial Plan (Inshore) Area 8.
SW-CE-1	Yes	Please refer to all assessment documentation submitted, including new and updated chapters for June/September 2024. Please refer to SW-ACC-1 and SW-AQ-2. Any impacts are non- significant or have been avoided, minimized or mitigated.
SW-DEF-1	NA	The proposed farm sites do not affect the MOD.
SW-DIST-1	Yes	Both applicants have researched, assessed and presented robust evidence related to the environmental benefits of seaweed farming in Port Quin Bay and generally as an activity within the marine environment. Please refer to Chapters 5,7,8,9,10 and 11 all of which present the evidence for infrastructure stability, operational profiles and provide tangible evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services. Where risks were identified within these assessments (marine mammals, birds, AONB, MCZ and pink sea fans

		(sessile), Salmonids) these have been assessed and avoided, mitigated or minimised where/if required to non-significant levels. Monitoring programs with independent expert research groups have been proposed.
SW-DD-1	NA	No dredging activity at the proposed farm locations.
SW-DD-2	NA	No disposal sites at the proposed farm locations.
SW-DD-3	NA	Seaweed farming does not involve dredging or disposal of dredged material.
SW-EMP-1	Yes	Please refer to Chapters 14 and 15 for an overview of both applicant's contributions to marine-related employment, training, skills, diversity, opportunities, implementing technologies and bringing opportunities to a deprived region.
SW-FISH-1	Yes	Please refer to Chapter 12 and 13 submitted with the applications. Please also refer to Chapter 14. Please refer to SW-AQ-2.
SW-FISH-2	No	There are no adverse effects of the proposed seaweed farms on fishing activities. This has been avoided through continued consultation and engagement. And is an example of co-location of seaweed farming and fishing. Please refer to both updated Fisheries Assessments June 2024 submitted with the applications. Please refer to, Cornwall National Landscape Assessment June 2024'. Please refer to SW-AQ-2.
SW-FISH-3	Yes	Both applicants have researched, assessed and presented robust evidence related to the environmental benefits of seaweed farming in Port Quin Bay and generally as an activity within the marine environment. Please refer to Chapters 5, 7, 8, 9, 10,

		11, 12 and 14 all of which present the evidence for infrastructure stability, operational profiles and provide tangible evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services. Specifically, please refer to Chapter 11 where impacts are assessed as low and protective measures are suggested to further reduce any risk to migratory routes of Atlantic Salmon.
SW-HER-1	Yes	Heritage assets are not directly or significantly impacted by the proposed farms due to their location, farming methodologies, anchor type (gravitational eco-blocks) and assessed pathways to impact. This is evidenced in all the assessments submitted with the licence applications. Specifically refer to Chapters 5 and 14 and Appendix I, 6, 7 and 9.
SW-INF-1	Yes	Both applicants have marine infrastructure that supports land-based activities and land-based infrastructure that supports marine based activities. Biome have been farming and processing seaweed over 4 seasons (2020 to 2024 inclusive) and Camel Fish have resources at sea and on land that can be adapted to support seaweed farming. All infrastructure meets appropriate legal and HSE standards.
SW-INF-2	No	See SW-INF-1.
SW-INNS-1	Yes	The founder of Biome is a published researcher with expertise in marine invasive species. Both applicants have submitted bio-security protocols – a Biome specific protocol and a protocol developed by relevant authorities in Cornwall. This has been implemented by Biome since 2020. It is reviewed annually, updated and training offered to farm operators. See SW-INNS-2.

SW-INNS-2	No	The applicants are not a public authority. However, the applicants work with and are willing to work with public authorities with a role in managing INNS spread or introduction – through practicing the biosecurity protocol, assessing and updating the protocols under advisement or upon detection of an issue, transparent data sharing and training of operational staff. Monitoring and research with independent research groups are also options. Please see Appendix III and IV and monitoring comments in all relevant chapters.
SW-SOC-1	Yes	Both applicants have researched, assessed and presented robust evidence related to the environmental benefits of seaweed farming in Port Quin Bay and generally as an activity within the marine environment. Please refer to Chapters 7, 8, 9, 10 and 11 all of which present the evidence for infrastructure stability, operational profiles and provide tangible evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services. Monitoring programs with independent expert research groups have been proposed. Biome currently shares their farming journey across social media, in magazines, articles and through attending local festivals and workshops. The applicants aim to share data with local and national conservation groups and databases.
SW-ML-1	Yes	The applicants are not public authorities. However marine litter is addressed within a number of the Assessments submitted with the application. A policy is in place. And it fits into good operational practice. Biome currently recycles all old ropes. Refer to Chapter 7 as an example.
SW-ML-2	Yes	Marine litter is addressed within a number of the Assessments submitted with the application. A policy is in place. And it fits into good operational practice. Biome currently recycles all old ropes. Refer to Chapter 7 as an example – which also references the polluter pays principle, to support clean-up charities. In addition, please refer to Chapter 14 and Appendix V, which actions lost equipment to avoid marine littering.
SW-MPA-1	Yes	Both applicants have researched, assessed and presented robust evidence related to the environmental benefits of seaweed farming in Port Quin Bay and generally as an activity within the marine environment. Please refer to Chapters 4, 7, 8, 12 and 14 all of which present the evidence for infrastructure stability, operational profiles and provide tangible

		evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services. Where risks were identified within these assessments (marine mammals, birds, AONB, MCZ and pink sea fans, Salmonids) these have been assessed and avoided, mitigated or minimised where/if required to non-significant levels. Monitoring programs with independent expert research groups have been proposed. An independent marine engineering report on the farm infrastructure demonstrates that the infrastructure will have absolute stability across 50-year storm data in Port Quin Bay, due to anchoring with appropriately weighted eco-blocks and with good maintenance. Therefore, the farms infrastructure will be stable in the Bay. Please refer to Chapter 5 and Appendix I.
SW-MPA-2	Yes	See SW-MPA-1 and SW-CC-1
SW-MPA-3	No	See SW-MPA-1 and SW-CC-1. Marine protected areas in the locality of the proposed farms are not deteriorating.
SW-MPA-4	No	See SW-MPA-1 and SW-CC-1.
SW-OG-2	NA	The proposed farm locations do not impact oil or gas extraction.
SW-PS-1	Yes	Harbour authorities were consulted. Although the proposed farms are outside of the harbour jurisdiction. Camel Fish currently work out of Padstow Harbour – the intended harbour to service both farms. Support was given before the authorities were made consultees by the MMO – where they had to withdraw the letter of support. Activities involved in seaweed farming at the two proposed sites can be accommodated by the harbour. Please refer to Chapter 13, 16 and Appendix V.

SW-PS-2	NA	Please refer to Chapter 16 and Appendix V. Not relevant.
SW-PS-3	NA	Please refer to Chapter 16 and Appendix V. Not relevant.
SW-PS-4	No	Please refer to Chapter 16 and Appendix V. Not relevant.
SW-REN-1	NA	Not relevant.
SW-REN-2	NA	Not relevant.
SW-REN-3	NA	Not relevant.
SW-SCP-1	Yes	Please refer to Chapter 16 and Appendix V and also Chapter 14, which includes a visual impact assessment (VIA).
SW-TR-1	Yes	Please refer to Chapters 14, 15, Chapter 16, Appendix V and SW-ACC-1.
SW-UWN-1	No	Due to the change in anchoring systems (gravitational eco-blocks), the proposed farms will not emit impulsive sound. Noise is assessed throughout the assessment documents submitted (low impact).
SW-UWN-2	Yes	See SW-UWN-1. Please refer to Chapter 7. Low impact, avoided, minimized or mitigated and non-use of ADD's to deter large mobile species.

SW-WQ-1	Yes	Seaweed farming does not deteriorate water quality. It has potential to improve water quality through bioremediation. This ecosystem service requires further research. No feeds or fertilisers are added. Seaweed does not produce waste. In addition, organic enrichment of sediments or water by seaweed has been scientifically assessed as not significant, especially in high energy waters such as those found in Port Quin Bay. Please refer to Chapter 14. Both applicants have researched, assessed and presented robust evidence related to the environmental benefits of seaweed farming in Port Quin Bay and generally as an activity within the marine environment. Please refer to Chapters 7, 8, 9, 10, 11, 12, 13 and 14 all of which present evidence of the benefits of seaweed farms for biodiversity net gain, habitat provisioning and restoration and ecosystem services.

6.0 English Aquaculture Strategy 2020 (Seafish)

The report (published in 2020) incorporated seaweed farming for the first time on a formal basis. Priority targets include increasing aquaculture diversity over 20 years, providing 15% of seafood from aquaculture, creating 5,000 jobs within the sector by 2040 and integrating aquaculture into the UK 'blue economy'.

Several key strategies and actions were identified to facilitate the seaweed farming industry to keep pace with development in Europe and reach its maximum potential:

1. Critical: Develop a streamlined, transparent, balanced and proportionate marine licensing system for macroalgal culture.
2. High priority: Encourage aquaculture 'hubs' and IMTA, where feasible.
3. High priority: Encourage projects around the English coast.

7.0 UN Sustainable Development Goals

On an international/UN scale the proposed farm can help contribute to achieving the United Nations adopted sustainable development goals. This project specifically supports goal **14**, LIFE BELOW WATER (FAO, 2018). Seaweed farming can be one of the ways the United Kingdom meets targets:

- **14.1:** By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.
- **14.2:** By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans
- **14.3:** Minimise and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels.
- **14.4:** By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-

based management plans, in order to restore fish stocks in the shortest time possible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

The proposed seaweed farms (Biome and Camel Fish) will contribute to:

- **2** - NO HUNGER
- **3** - GOOD HEALTH
- **5** – GENDER EQUALITY
- **9** - INNOVATION AND INFRASTRUCTURE
- **11** - SUSTAINABLE CITIES AND COMMUNITIES
- **12** - RESPONSIBLE CONSUMPTION
- **13** – CLIMATE ACTION
- **14** – LIFE BELOW WATER

Chapter 2: Farming In Cornwall And Devon

Overview

In Devon, Biome farms seaweed on a 10 Ha licenced site (2022-2024). In the same Torbay region, there is a similar sized mussel farm (10 Ha) and a 50 Ha scallop farm operating since 2015, with 120 longlines deployed. All farms operate using longline systems. In addition, there is a longline mussel farm licenced in Lyme Bay since circa 2010, for 1,500 Ha. This farm currently has 282 active longlines deployed. In addition, there is an active 100 Ha seaweed farm licenced in north Devon (Bideford Bay).

In Cornwall, there is a small licenced area for longline seaweed and shellfish farming in the Porthallow/Helford region (10 Ha) that has been operating since 2010. In addition, there are approximately 300 Ha of longline shellfish and seaweed farms licenced in St. Austell Bay with approximately 200 Ha being farmed to full capacity by various operators since 2010. Biome farmed seaweed in this region between 2020 and 2022. These are all located on the south coast.

An additional 100 Ha site has been licenced (2022) in Port Isaac on the north coast. However, this site is currently not operational. Plans around operating the farm are uncertain.

In total, there are 410 Ha currently licenced longline farms in Cornwall and 1,670 Ha in Devon. The Port Quin farms would increase this to 510.8 Ha in Cornwall (1/3 of Devon).

Chapter 3: Proposed Sites

Overview

The proposed farming areas cumulatively cover an area of 100.8 Ha (50.4 Ha per farm site). The co-ordinates are as follows in Table 1.0:

Coordinates for corner points of proposed Biome Algae East farm location

Farm Corner	Latitude	Longitude
NorthWest	50.597784	-4.891862
NorthEast	50.59801	-4.881677
SouthEast	50.591715	-4.881306
SouthWest	50.591518	-4.891385

Coordinates for corner points of proposed Camel Fish Ltd West farm location

Farm Corner	Latitude	Longitude
NorthWest	50.597496	-4.90274
NorthEast	50.597764	-4.892561
SouthEast	50.591496	-4.892087
SouthWest	50.591242	-4.90231

Table 1.0: Coordinates of proposed farm sites

Sites are indicated in Figure 1.0 (map):

Price et al. 2017 defines the farms as not inshore (not adjacent to the shoreline) but nearshore farms (less than 3 miles from the shore).

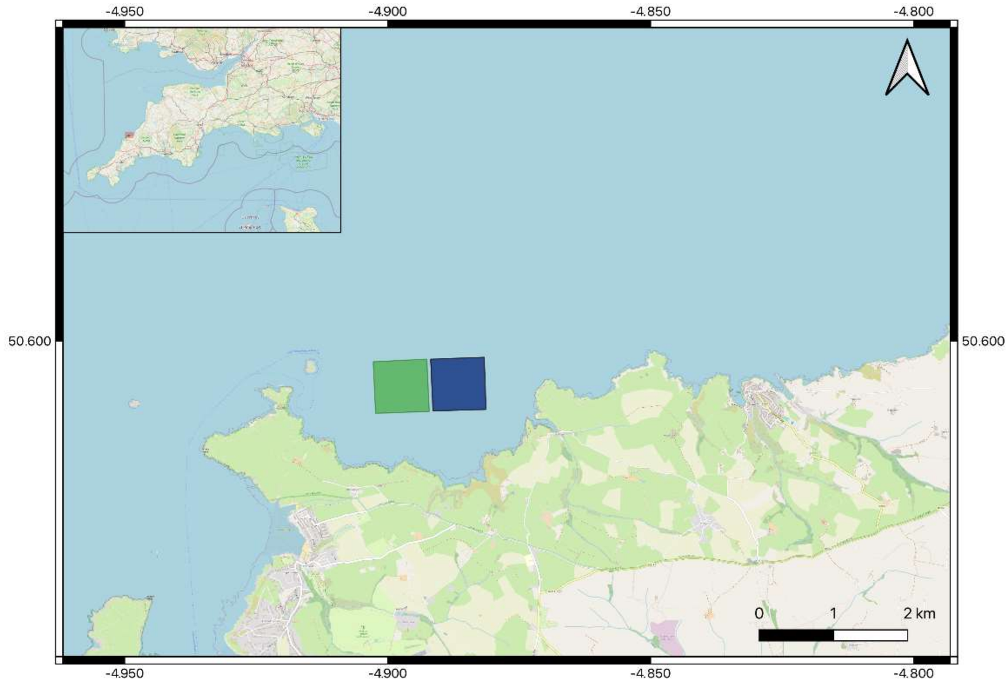


Figure 1.0 Map of proposed farm sites

The proposed longline infrastructure will occupy a maximum of 10% of the cumulative sites (10.08 Ha) at full operational scale (288 x 160m longlines). The remaining 90.72 Ha is open sea (spacing between longlines 20m + escape channels with no dead ends). The farms will be built up to full operational scale over time, with a smaller number of lines deployed within the first year of operations. The infrastructure is in water depths of 10-15 m (17 m max).

Chapter 4: Operational Profile Port Quin Farms

Overview

Through providing an overview of the farm operations, it will facilitate risk assessment related to a farming season (Figure 1.0). Farm operations are considered cumulatively for the two farm sites (100.8 Ha). Profiles are based on Biome's four seasons of farming experience (2020-2024) combined with Camel Fish's experience in the Bay as fishers for 50+ years.

Farm Activity	O	N	D	J	F	M	A	M	J	J	A	S
Deploying anchors & longlines												
Deploying seeds												
Farm maintenance/research												
Harvesting												

Figure 1.0: Operational profile over a typical farming season

Deploying eco-block anchors and longlines (see chapter 4) would take place in typically in September each season. August, October and early November are options too. Deploying anchors and lines will occur each season as the farms are filled (288 lines maximum over 100.8 Ha). It is anticipated this would take several seasons (three to four). A number of lines will be deployed in season one at the new sites. Followed by building up infrastructure to full capacity, working with the Crown Estate. Any deployment activities would require appropriate marine notices circulated with the relevant authorities, issued in advance of the activity and when the activity has ended. This will be detailed in the licence (see chapter 16).

Navigational Marker Buoys are placed in position first and remain on site for the farm duration (1-day total work with a single work vessel). They are monitored, maintained and tested regularly. And fitted with GPS markers and site cams, alongside other sensor arrays for monitoring purposes (physiological and ecological).

Longline deployment involves the use of a mounted crane (for the eco-blocks) and a working vessel to run lines. In a given day (8 hours of operations), up to 8 longlines can be deployed. This would require approximately 36 days over the lifetime of the farms. The eco-blocks will last the lifetime of the farm (bar any required repairs/maintenance). The eco-blocks are deposited first and risers and headlines run in between. Once the blocks are deposited, risers and headlines can be replaced without raising the blocks. Therefore, the major works cease after the farms are fully deployed.

Seeding involves the addition of the seeded ropes to the longlines. This occurs typically in October/November/December each season. The seed material (sourced from local seaweed populations) overwinters on the tensioned lines, with a small amount of establishment and growth (a few cm). Two vessels can seed 8 seed lines a day (requiring 36 days of seeding between October and December at full farm capacities).

Between January and March, regular site monitoring and research (and maintenance of lines/buoys required) occurs following storms and on a weekly or fortnightly basis. Some monitoring is achieved remotely in real-time (GPS markers/sensors/catch cams). This requires approximately 12 physical sites visits across three months as a guide. It may be more dependent on research and monitoring programs in operation (data collection or surveys).

Harvesting of the grown seaweed involves removing the seeded ropes from the longlines – leaving the main headlines and risers in-situ. This occurs from April to June each season. At full capacity it is anticipated that up to 8 lines a day can be harvested, with harvesting events numbering from 36 to 72 across the three-month period.

July and August are inactive farm months (minimal maintenance/monitoring only). This is during periods when recreational vessels will increase in number during school summer holidays. Therefore, the operational profile does not add significantly to summer activity in the Bay area.

In total, over a typical season, outside of longline deployment, vessel days active will be approximately 120 out of 365 days, concentrated in November/December and April, May and

June. When longline deployment is required (first few seasons) deployment will be aimed for October/November each season where possible. In terms of noise, noise will be minimal over these 120 days (accessing/exiting the Bay (10-20 minutes) and moving between lines).

In terms of deploying the eco-blocks and longlines over the first few seasons (approximately 36 days over three to four seasons). The vessels will be work vessels with silencers on engines. There will be access and exit time into the bay and moving around the farm site to deposit blocks and running lines. In between, the mounted crane vessel can run auxiliary engines only to deposit blocks. The vessel running lines, main propulsion engines will be on during line running only. Having consulted the independent engineers, depositing the blocks onto the sediment surface will create minimal noise disturbance underwater. Block depositing is a slow, controlled and guided process with a short and small amount of noise created as the block is deposited on the sediment surface.

Chapter 5: Infrastructure Assessment

Overview

The questions covered as per MMO FIR 2 were:

7.2 Lost Gear (MMO FIR)

It has been noted that given the highly exposed nature of this site, there is considerable potential for farm gear to be lost, given the currents and rough seas recorded in the area. The MMO ask that you give consideration to this risk and how this would be mitigated.

In response to this concern, we have assessed infrastructure stability using independent marine engineers and reviewed our assessments and have made sure to include considerations to lost gear and the mitigation of lost gear in our updates. This has been done cumulatively for both proposed seaweed farm sites. Refer to Chapters 7,8,9,10, 13,14 and 15.

Biome and Camel Fish instructed an independent marine engineering company (Arc Marine), to assess the engineering of Biome's longline farm equipment, in the context of the site conditions in Port Quin Bay (Appendix I: Port of Quin Kelp Farm: Mooring Design (May 2024)). Stability was assessed. This report contains commercially sensitive information/IP.

The overall report was to determine appropriate anchorage of the longlines to keep lines tensioned and stable (not moving) based on current farm infrastructure set-up used by Biome and on Port Quin site conditions over 50 years, factoring in all relevant factors, for example, tides, wave heights, storm conditions etc. Assessments were based on coded practice (DNV-OS-E301) and the model was built in Orcaflex. Anchor method and weighting were determined using worst-case taut riser line configuration and unfavourable metocean directionality. It was determined 29.5 tonnes submerged weight would be required for **absolute stability across 50-year storm conditions** with Port Quin Bay. This weighting will also be applied to main navigational markers.

Screw anchors and oil rig anchors with chains were considered to provide penetrative anchorage (into the sediment). Gravity-based anchors (eco-blocks) were also considered. It was concluded that oil rig anchors/chains and screw anchors should be discounted. This is on the basis that neither are likely to be feasible within gravel sediment sea beds. Furthermore, investigations revealed that beneath the coarse sediment layer, is low-lying bedrock (which feeds into the reefs in the north). This would cause anchor refusal. Therefore, penetrative anchorage is not an option. This will alter the archeological assessment (chapter 12) as there will be NO sediment penetration and it was further assessed there is unlikely to be paleological deposits present as flat bedrock lies close to the surface.

Gravity-based anchors at the correct submerged force will secure the longlines and do not penetrate the sediment surface. They will compress the sediment within the first 5-10cm at point of contact. Sediment penetration is avoided. These anchors are used on Biomes Torbay site to great effect (sandy mud sediment). For a both farm sites, the eco-block anchors will occupy a total of 1.14% of the total farm footprint, with the remaining 8.86% comprising ropes and floats for 288 longlines (maximal site capacity for both farms). The eco-block function is very similar to the wall tiles produced locally that are used to boost marine life (biodiversity) across Cornish harbours and supported by the community.

Using the eco-blocks will increase local biodiversity within the Bay, alongside the farm itself (evidence provided in fisheries assessments, updated in June 2024). This is beneficial to marine mammals. Overspill effects are discussed, which may provide additional food resources for marine mammals, locally and within the natural eco-systems found within the Bay. Fish that have found food and shelter in the seaweed farm will disperse into and enhance the natural kelp bed environments found in the Bay which are close to sensitive seal sites (Corrigan et al. 2024).

Fishing will be excluded from the farm footprint, due to the nature of the farm infrastructure and following surveys with local fishermen, levels of potting (crabs, lobsters, spider crabs) are unlikely to increase above current levels – which occur close to shore. Fish are not target species for the current fishery within the Bay area and this will continue to be the case with the presence of the farms and infrastructure, effectively acting as a *defacto* MPA. Prior to the farms, trawling or netting for fish was not practiced, as the fishers found the coarse sediment does not support commercial fish or shellfish populations. This has been updated within chapter 12 and 13.

The design of the longlines ensures that the weighted scissor lifts on the risers and seed lines will maintain tensioning in the system (for example on low and high tides), which is important in addition to a completely static system and secure channels in between lines (Figure 1.0). The farm infrastructure does not comprise of strings. All components are substantive, tensioned ropes. Break strengths on all tensioned ropes used range from 28.9 kN or less (tensioned seed lines) up to 167 kN (for the strongest tensioned ropes).

In addition, the native seaweeds to be farmed are very robust and securely attached to the seed lines during the grow-out phase (average 1 m long). Generally, less than 10% natural loss of grown biomass can be expected over a season - naturally dispersed into the marine environment. Organic enrichment is not significant beneath farms (Corrigan et al. 2023). Organic assessments were carried out within and outside of farms, on sandy mud sediments. Evidence is presented within Appendix II.

[redacted]

Biome has farmed varying tonnages of seaweed across different sites from 2020 to 2024. In that period there has been frequent and intense storm action. There have been no significant losses of seaweed biomass and no incidences of significant amounts of farmed seaweed washing up in Bays or on shores. We maintain consistent growth along the seed lines. Sugar kelp, for example, remains connected to the seed lines in current speeds up to 1.5m/s. Maximal current speeds at the proposed site across 50 years, as reported by Arc Marine are 1.0m/s. Biome algae has provided test sites and data for assessments of these effects (see highlighted acknowledgements within peer-reviewed published studies) and has been instrumental in helping these assessments (biodiversity increase and lack of organic enrichment from seaweed drop-off; Corrigan et al. 2022, 2023, 2024). In addition, the farms may be trialing new camera-based technology which monitors growth rates of seaweed on longlines over time.

Additionally, native seaweeds are being farmed, sourced from local populations. Studies into biodiversity associated with seaweed farms indicate that populations of organisms found in seaweed farms reflect that of local natural populations (Corrigan et al. 2023, 2024). Combined with farming native seaweeds, this mitigates risks of disease introduction. Both operators have protocols related to invasive and non-native species that are followed by farm operators. Biome have had no significant impacts from farming at increasing scales over four seasons, in relation to disease or INNS.

Alongside other longline farmers, Biome continues to be part of various research programs that are building on these assessments (example: Ropes to Reefs research program). Conclusions are consistent.

In addition, the engineered infrastructure which will remain in-situ in all conditions across the life of the farm (with regular maintenance) ensures that pathways for impact within the MCZ, 350+ m to the closest point west of the proposed farms, as a result of lost gear, is avoided or very low risk (See Chapter 10).

Chapter 6: Sediment Assessment

Overview

The proposed farms are located over coarse sediment (subtidal coarse sediment A5.1). This is a lower sensitivity sediment type and is conserved within the adjacent MCZ (Figure 1.0). The proposed farms are not located within rocky reef regions or a small area of lower sensitivity soft subtidal sediment (A5.2, A5.3 and A5.4 sand/muddy sand) which lies at distance to the west of the proposed sites. As well as further east behind Mouls Island, within the MCZ.

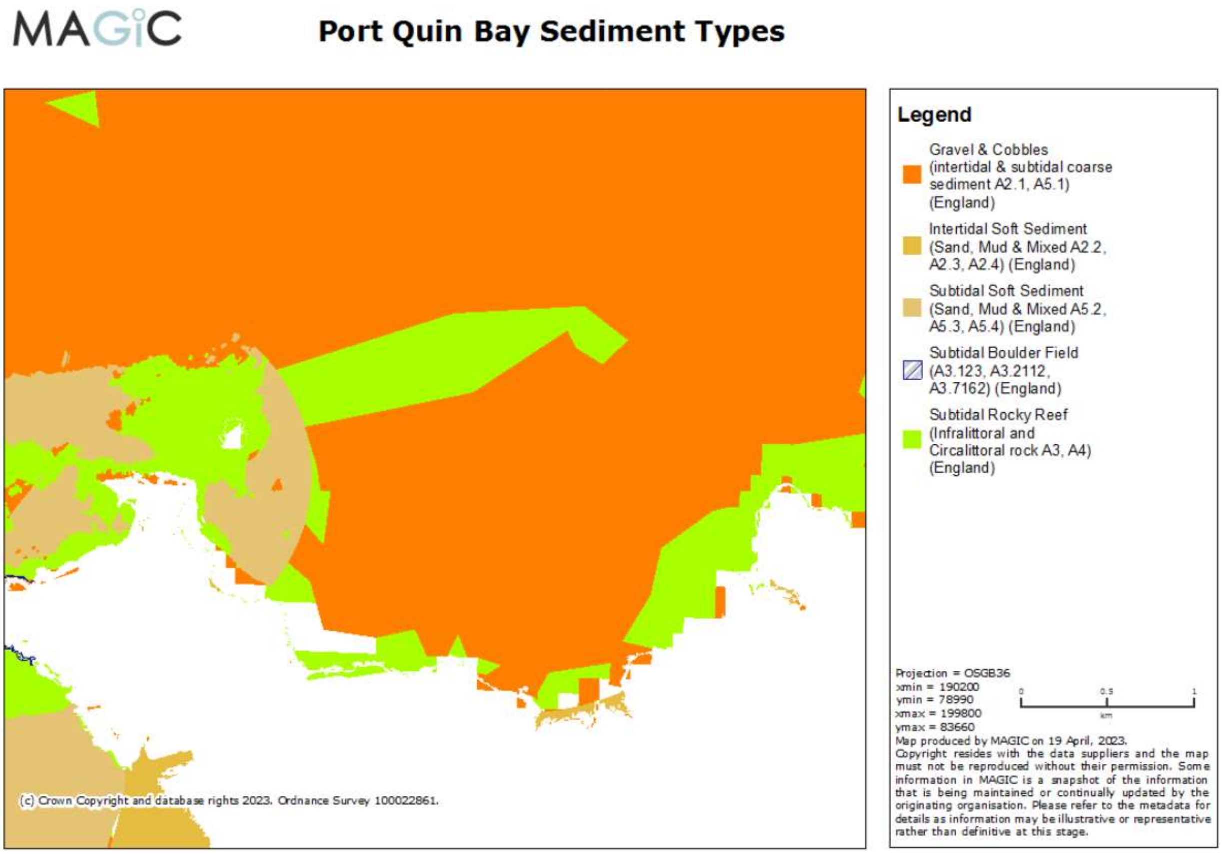


Figure 1.0: Sediment type within Port Quin Bay and surrounds (DEFRA Magic Map)

Chapter 7: Marine Mammal Impact Assessment

Preface

The following assessment is in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence application, as referenced above.

The assessment has been conducted with independent input from universities, prominent research groups (Cornwall, Devon, UK), AFBI/SABI, Northern Ireland, marine engineers and active farmers in the region. This represents a wide range of experts and leading, published scientists and certified experts in the field of marine mammals and aquaculture. Contact details can be provided confidentially to the MMO and primary advisors for verification purposes.

In addition, we have utilised information provided by the Seal Research Trust, Cornwall.

The assessment incorporates previous assessments conducted, where relevant and submitted to the MMO, to ensure all the information is accessible in one document.

- The previous report (Sediments, Fisheries and Marine Mammals) has been superseded by three chapters within this report (Chapters 6,7 and 11).
- The 'Marine Mammals Impact Assessment' was initially provided to the MMO on Monday 3rd of June.
- The Marine Mammals Assessment has been added as a chapter to this report with a correction related to distance between the proposed farm sites and the Mouls. (changed from 350 m to 750 m).
- The assessments have been updated throughout in response to MMO questions. Questions have been answered below and state the relevant changes in the chapter.

The questions covered as per MMO FIR 2 were:

7.2 Lost Gear (MMO FIR)

It has been noted that given the highly exposed nature of this site, there is considerable potential for farm gear to be lost, given the currents and rough seas recorded in the area. The MMO ask that you give consideration to this risk and how this would be mitigated.

In response to this concern, we have assessed infrastructure stability using independent marine engineers and reviewed our assessments and have made sure to include considerations to lost gear and the mitigation of lost gear in our updates. This has been done cumulatively for both proposed seaweed farm sites. Refer to Chapters 5,7,8,9,10, 13,14 and 15.

1.0 Objectives

- Assess the risk of entanglement of marine mammal species within seaweed farms globally and within Port Quin.
- Assess the risk of noise and disturbance on marine mammal species from the proposed seaweed farming operations.
- Discuss a proposed monitoring program.

2.0 Overview

The purpose of this chapter is to primarily assesses whether there is a **significant** risk of entanglement for marine mammals in relation to the proposed seaweed farms under application numbers MLA/2023/00307 and MLA/2023/00308.

A thorough literature review was undertaken from a global and historical perspective. Data was collated for the region in question: South West (Cornwall and Devon) and Port Quin (where available). Infrastructure currently used for farming seaweed was assessed independently by marine engineers. Various lead research groups from around the UK offered their expertise and insights. Local, active farmers provided observations and experiences whilst operating. All seaweed farming practices detailed within the report are already undertaken by Biome and will be adopted by Camel Fish.

In addition, the chapter considers the operational profile of the proposed farm activities and assesses if marine mammals are at **significant** risk from noise, vehicle collision (vessels) and loss of equipment. The fact Biome and Camel Fish will not be using ADD's as deterrent devices is discussed.

A long-term monitoring program is proposed in partnership with leading research groups within the UK.

3.0 Legislative Protection For Marine Mammals

Cetaceans (whales, dolphins and porpoise) are protected from 0 to 12 nautical miles under the Conservation of Habitats and Species Regulations (CHSR) 2017 and the Wildlife and Countryside Act (WCA) 1981 (as amended). Offences can be committed under regulations 43 and 45 of the CHSR and 9(4)(a) and 9(5) of the WCA.

Bottlenose dolphins are protected under Section 41 of the 2006 Natural Environment and Rural Communities (NERC) Act.

The proposed farm sites are located 350m + from the Padstow Bay and Surrounds MCZ boundary and Pentire Peninsular SSSI. They are within an SAC: Bristol Channel and Approaches/Dynesfeydd Mor Hafren SAC (designated for harbour porpoise (*Phocoena phocoena*). In terms of the Grey Seal (*Halichoerus grypus*), the licenced sites are located within the Isle of Scilly Complex and Lundy (Devon) SAC's, within which these Annex II species are a feature but not the main reason for site designation (JNCC). Here they hold grade C and D status (of at least national importance but not the main reason for designation to below SSSI quality and non-qualifying features). However, through migration, they are interconnected (functional connectivity) to North Cornwall (22 km east), West Cornwall (53 km southwest) and Pembrokeshire Marine SAC (140 km northwest).

North and West Cornwall are grade D (below SSSI standard and non-qualifying features). Pembrokeshire SAC and connected areas range from grade A/B (Outstanding to excellent examples of the feature) to C (of national importance). This is illustrated in Figure 1.0. Pembroke is the largest breeding colony on the west coast (2% of annual pup production).

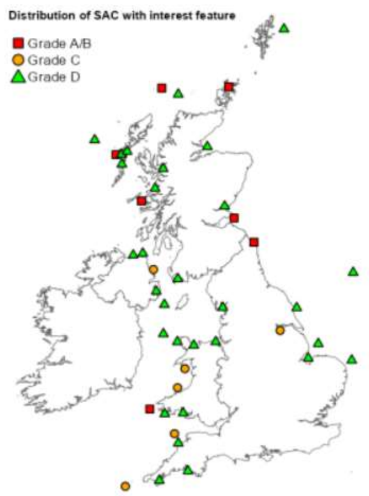


Figure 1.0: JNCC Distribution of species 1364 in SACs/SCIs and cSACs.

4.0 Global Assessment Of Entanglement Risk

4.1 Shellfish Longlines As A Proxy

Biome and Camel Fish have based the infrastructure design used to farm the seaweed on the structures used in longline mussel farms, as described in Price et al. 2017 (Figure 2.0). Therefore, studies conducted on marine mammal interactions and entanglement risk associated with mussel longlines is an excellent proxy for the farming methods to be employed at the two proposed farm sites.

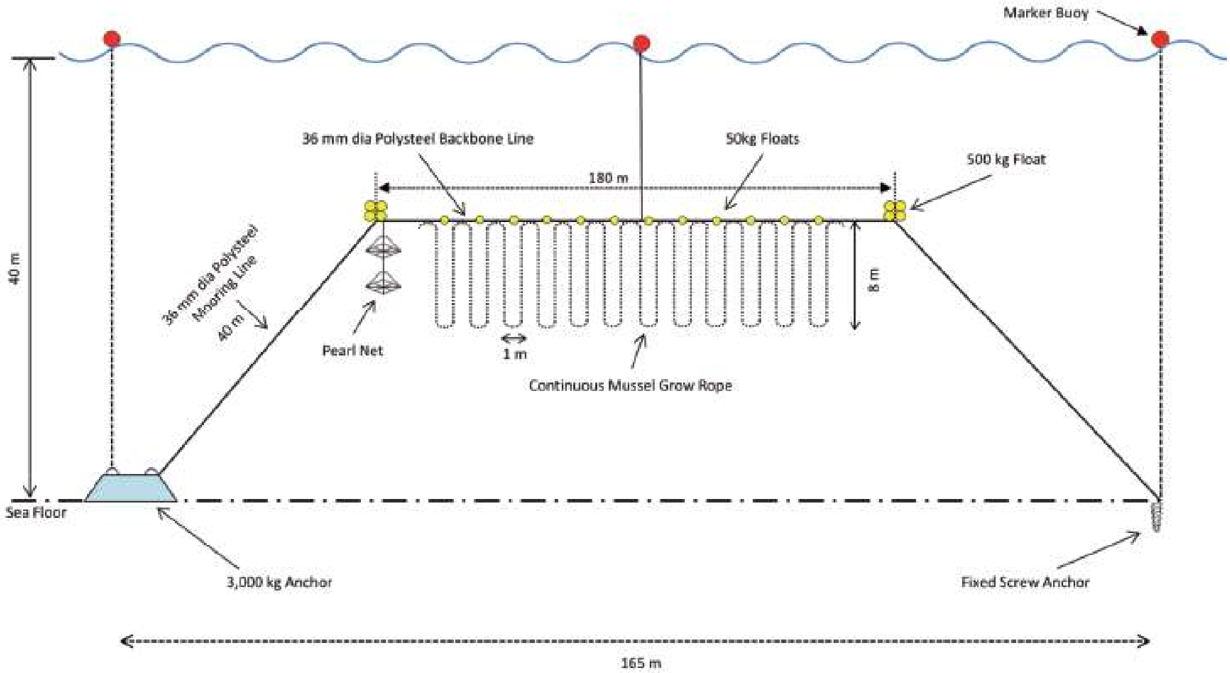


Figure 2.0: Example of mussel longline structure for illustration purposes only (Price et al. 2017)

There are several important factors that apply to both shellfish and seaweed lines and are of relevance when assessing risk to marine mammals. Longlines are:

- Individual (not rafted together) which was identified as an important factor to reduce risk by Clark et al. 2021
- Spaced out in the licenced area with no 'dead-ends' in the design
- Static when engineered correctly, with the correct stabilizing anchorage assessed across extremes of site conditions
- All tensioned (main longline structure and seed ropes) and
- All ropes have higher break strengths than typical creel fishing equipment.

In addition, in nearshore waters, less infrastructure is required which is of particular importance when considering the length of vertical lines (risers) in the water. The Biome and Camel Fish infrastructure engineering is reviewed in detail below.

4.2 Creel (Potting) Industry For Comparison

Leaper et al. 2022 conducted an assessment of the risk of the Scottish static creel (potting) industry related to Minke and Humpback whales. Creel pots can be set nearshore or offshore (which alters the amount of infrastructure and length of vertical lines in the water column). Generally, these are set over cetacean feeding grounds (e.g. nephrops and crabs). Creel lengths were typically 825-900m long, containing up to 60 creels (Figure 3.0).

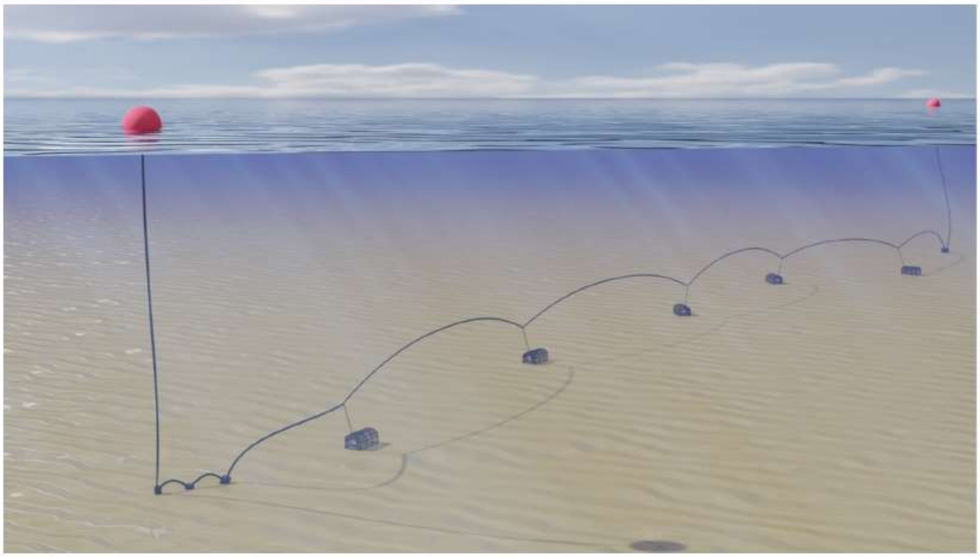


Figure 3.0: Typical creel line arrangement for illustration purposes (Leaper et al. 2022)

Main factors affecting the risk of entanglement for both whale species were identified as longer length of gear on seabed, longer length of vertical lines, non-tensioned lines, increasing number of creels, positioning over vital whale habitat (food) and distance from shore (further offshore increased risk).

Between 2009 to 2019, up to 51 minke and 11 humpback whales were entangled. Minke whales were most impacted by the ground line. Humpback whales were impacted by vertical and ground lines. Population impacts were considered in relation to local population sizes and sensitivities (Leaper et al. 2022). Therefore, the creel industry had the potential for impacts on both species, with humpbacks at most risk due to smaller local population size.

Leaper et al. 2022 noted that humpback whales were at a minimum presence in spring (March to May) and a maximum in summer and autumn for both Ireland and Scotland.

The major contributors to entanglement were identified as **unanchored, buoyant ropes**, with **low break strength** and a **lack of tensioning** – with structures that can be **moved** with sea conditions.

4.3 Wider Fishing Industry For Comparison

Generally, the wider fishing industry is considered a moderate/medium threat to cetaceans (Brown et al. 2015, Knowlton et al. 2015, Ryan et al. 2016, Wade et al. 2021). This is as a result of bycatch and entanglement. The risk is dictated by the gear type, with gillnets, purse seines, trawls and potting lines assessed. Brown et al. 2015 reports that gillnets are a risk for harbour porpoise and floating non-tensioned lines (pots) are a greater risk for Minke and Humpbacks. Dolphins are most at risk from nets. Factors that impact risk are the amount of gear in the water column and changing locations (Brown et al. 2015).

From 1992 to 2016, Ryan et al. 2016 reported that in surveys spanning 86,000km +, and with 213 sightings of minke and humpback whales, 12 were entangled (10 in creels, 1 unknown and 1 in a **netted** salmon pen). Gear loss was considered the greatest threat for injury and mortality. Knowlton et al. 2015 considered break strengths of ropes. Higher breakage strengths resulted in less minke entanglements. Whereas humpback whales could benefit from lower breakage strengths or built in breakers.

4.4 Historic Aquaculture-Related Entanglements

A number of studies have reviewed entanglement of cetaceans related to shellfish and seaweed farming. Price et al. 2017 provide an excellent review of aquaculture-related entanglement risk for protected mammal species from a spatial and temporal perspective – having performed a deep dive into all available studies and literature globally.

A review of the NMFS US Atlantic Gulf of Mexico Mammal Stock Assessment found very few instances of marine mammals being injured or entangled in aquaculture gear (Waring et al. 2012, 2015). In contrast, in the North Atlantic and other regions globally, ship collisions and ghost fishing gear (nets etc.) are the biggest entanglement threats (Waring et al. 2012, 2015) – often posing highest risks in the open ocean where migratory routes, feeding grounds and shipping lanes are found.

New Zealand has the richest data on marine mammal interactions with longline farms. At the time of assessment, there were 1100 active shellfish farms covering 22,000 Ha (Price et al. 2017). Lloyd 2003 reported that to date, a total of 2 incidences of Bryde's whale entanglement in farms were evident, though one is disputed (Clement et al. 2013). No incidences of farm entanglement for dolphins, pinnipeds or seabirds were reported. Clement et al. 2013 and Groom & Coughan 2012 both found the same additional case of a whale calf becoming entangled and set free in a farm in Western Australia between 1982 and 2010. No reports of pinnipeds or dolphin farm entanglements were found in that region (Clement et al. 2013).

A few other countries globally have reported entanglement of marine mammals with longline farming activities. In Argentina – from 2001-2011 (decade) there is one possible, unconfirmed report of a single right whale entanglement (Bellazzi et al. 2012). Iceland reports a total of 2 fatal marine mammal entanglements (Young 2015), a harbour porpoise in 1998 and a humpback whale in 2010. In February 2015, a North Pacific right whale was entangled in and escaped from mussel farm gear off Korea. Johnson et al. 2005 reported out of 20 North Atlantic Whale entanglement reports on file with NMFS, dating back to 1993, 1 was related to farming.

In Canada, between 2009 and 2016, there were three entanglements with longline farms, one of which was released (Price et al. 2017). There are no reports (media or scientific literature) of harmful impacts arising for marine mammals associated with active farms.

When compared with death or injury to marine mammals caused by ship collisions, plastics or fishing gear, the reported entanglement incidents collectively, over a long period of time, are magnitudes lower in terms of numbers. Considering studies over decades and globally extensive areas of aquaculture in coastal waters, entanglements with longline farms are rare (Price et al. 2017).

4.5 Interactions Of Marine Mammals With Longline Farms

Marine mammals that may encounter longline farms in UK waters (shellfish or seaweed) include pinnipeds (seals) and cetaceans (whales, dolphins and porpoises).

Price et al. 2017 provide an excellent overview of marine mammal interactions with longline shellfish (longline seaweed) farms from a spatial and temporal perspective – having performed a deep dive into all available studies and literature globally.

Echolocating marine mammals (toothed whales, dolphins and porpoises) can effectively perceive longline farms and navigate through or around them (Lloyd 2003, Markowitz et al. 2004). In contrast, baleen whales rely on visual and audio queues (Lloyd 2003).

In New Zealand, there were 1100 active longline farms covering 22,000 Ha in 2015 (Price et al. 2017). Clement 2013, set out to assess risks of longline farming in New Zealand on marine mammals. Entanglement, competition for space within critical habitat, underwater noise disturbance and altered trophic pathways were considered risks from aquaculture.

Markowitz et al. 2004 and Duprey (2007) found that dolphins, including bottlenose dolphins, tended to avoid entering longline farms, although pods were observed entering and navigating farms on occasions. Pearson (2009) noted increased foraging behaviour of pods adjacent to farms. Similar observations were made in Australia (Watson-Capps and Mann 2005). Therefore, siting farms on non-foraging habitats is an important factor in reducing risks to marine mammals found in coastal waters. Similar observations were noted in southern Chile for different dolphin species (Heinrich 2006). With dolphins reported feeding within and outside of farms.

Ribeiro et al. 2007 reported that Chilean dolphins would use Bay areas with less than 30%

coverage by longline farms, but were absent from areas with 60% coverage. Anything above 32% was considered a concern if it restricted use of essential habitat. Given the proposed farms occupy 1 km^2 of approximate 5.16 to 5.54 km^2 Bay area, cumulatively they occupy approximately 18-19.37% of the Bay (with maximal levels of infrastructure occupying 10% of the 1 km^2).

Pinnipeds (seals) do not feed on shellfish (or seaweed) and are less likely to visit farms (Nash et al. 2000, Wursig & Gailey 2002). Following a global review, Price et al. 2017 could find no reported interactions (or negative interactions) of those species with longline farms.

In Bantry Bay, Ireland, Roycroft 2004 conducted a study on seals and nearshore mussel (longline) farms (up to 20 m depths maximum). Seal abundance was the same within and without farm areas and no negative interactions were reported. Price et al. 2017 do acknowledge inquisitive or playful creatures will be at more risk. However, no negative interactions between static longline farms and seals, for example, highlights these risks are low – specifically where farms are tensioned. Pinniped interactions with fish farms are not comparable to longline farms as they offer a prey driven risk (fish) and netted systems (Price et al. 2017). Longline farming, which includes seaweed farming do not take harassing or lethal approaches to controlling interactions.

4.6 Good Farming Practice

Clement et al. 2013 assessed risks to marine cetaceans as significantly lower from longline shellfish (or seaweed comparative) systems compared to netted systems. They note loose ropes are more risky than thicker, tensioned lines. Design, deployment and tensioning of the systems is integral in reducing entanglement risks to low levels (Lloyd 2003, Keeley et al. 2009, Clement et al 2013, Price et al. 2017).

Forrest and Hopkins 2016 reported seaweed farms may have more risk than longline shellfish farms if they comprise overlapping (netted) warp lines in areas of poor visibility, moorings that are unable to resist an encounter strength-wise and locations that overlap with critical foraging habitat. They noted the importance of channels within farms (sea space) as escape pathways.

Clement et al. 2013 suggest siting farms where there is little to no overlap with critical habitat (foraging). Site selection to minimize or avoid spatial overlap with species significant home ranges, critical breeding grounds and main migratory routes can help further reduce risks, alongside site and longline management and continuous monitoring of marine mammals in the vicinity or general region of the farm.

Wilding et al. 2021 reported a general lack of evidence for seals and finfish entanglement with kelp farms, which reflects low incidence. However, they note that ensuring no overlap with feeding grounds was important. WWF (2023) suggest use of different coloured vertical ropes for increased visibility for baleen whales (red and yellow – Kraus et al. 2014) and use of monitoring equipment, alarms (sensors) or implementation of monitoring programs to further reduce low risks from longline aquaculture.

Clark et al. 2021 reported the importance of safeguarding marine life through regular maintenance of seaweed and shellfish longlines, retrieval of lost gear (if loss arises), reductions of noise during operations, clearance space below infrastructure, as well as ensuring policies regarding marine cetaceans are in place around farm operations.

4.7 Researcher Risk Assessment

Campbell et al. 2019 states that entanglement of marine mammals related to aquaculture cannot be ruled out 100% but that risks are low, which is also indicated by Wilding et al. 2021. WWF (2023) reported that given the length of time longline and seaweed aquaculture has operated globally, combined with a lack of reported incidences of related entanglement and responsible approaches to farming, risks from entanglement are low. In New Zealand, where some 22,000 Ha of coastline is covered by active longline farms, entanglement is considered low risk, if best management practices are followed (Price et al. 2017).

Clement et al. 2013 suggests that tensioned farms located out of main offshore migratory routes and foraging grounds, combined with low reported incidences of farm entanglement globally, mean entanglement risk for marine mammals is likely to be low with few negative interactions anticipated globally (not significant). This conclusion is consistent with earlier studies (Kemper et al. 2003, Baker 2005, Keeley et al. 2009).

4.8 Conclusions

There is agreement across studies globally, that static, longline farms, when engineered and managed properly, **do not pose a significant risk** to marine mammals. It is consistently assessed as low risk. And risk can be further reduced through farm design and best management practice implemented by operators.

5.0 Local Assessment Of Populations/Sightings

5.1 Sediment Type At Proposed Farm Sites

The proposed farms are located over coarse sediment (see Chapter 6).

5.2 Local Data And Information For Marine Mammals

5.2.1 Grey Seals

Great Britian holds some 124,000 grey seals (figures reported in 2000: JNCC). A further 300-400 are found on the Isle of man and in Northern Ireland (JNCC, 2000). This includes pupping sites. The proposed sites are outside of the Lundy SAC and Isles of Scilly Complex SAC, but share interconnectivity with these sites (graded under section 4.0). According to Natural England, specific to seaweed farming, sensitivities are listed as noise above water, visual disturbance, abrasion/disturbance of seabed substrate, introduction of INNS (Invasive Non-Native Species) and penetration of the seabed below the surface. Entanglement risk is not listed by Natural England (Sayer et al. 2015) but is assessed here.

Based on information and data provided by the Seal Research Trust (SRT) related to the applications, Biome and Camel Fish understand the following related to local seal populations. 750m + from the proposed farms is a seal haul out site located on the southeast side of Mouls. This site is interconnected to other sites as described above (Figure 4.0). Interconnectivity is directly evident for North Cornwall and Isles of Scilly sites in number levels of between the range between 1-5 individuals from 2017 to 2021. At locations south of the Port Quin region, between 6 to up to 85 seals move along the coastline to different locations over the same time period.

Between 2011 and 2022 (11 years), SRT have 279 survey records for the Mouls, totaling 648 sightings. Seal presence covered 10 months (excluding March and December). Peak occupancy occurred between April and October. The maximum recorded number of seals was 8. However, there are a total of 144 different seals within SRT's Photo ID catalogue. This demonstrates the Mouls is used by a small number of regular seals. This included a majority of pregnant females. However, it is also utilized by other migratory seals.

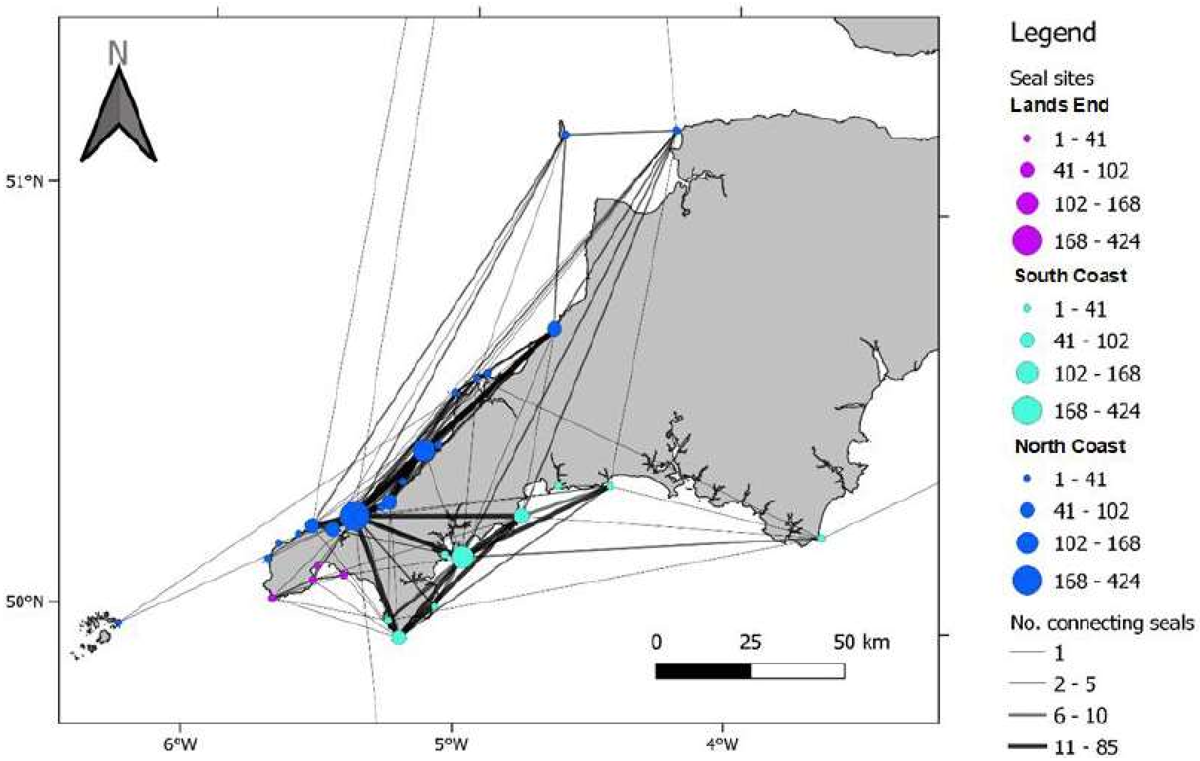


Figure 4.0: Photo ID seal linkages between SW England sensitive seal sites 2017-2021. Site size reflects number of Photo ID connections and line width number of seals connecting sites (SRT, 2023).

There are two seal water-resting sites around the inshore of the Rumps (750m + west of the proposed farm sites and close to the Mouls). Connectivity of these sites is also taken into account when assessing risk. SRT have 198 survey records for the rumps, recording 518 seal sightings between 2011 and 2023 (12 years). The maximum number of seals recorded at one time was 20. And there are 168 different seals in SRT's Photo ID catalogue, with only 8 being recorded at Mouls. This included a majority of pregnant females.

Therefore, in total, 304 different seals are found regularly within 350m + of the proposed seaweed farms (Figure 3) which is approximately 0.24% of the overall Great British population reported in 2000.

Within the Port Quin Bay itself, SRT have ad hoc records from 2012. Since 2021, SRT volunteers have recorded 35 seals on the west side of the Bay (closer to Rumps and Mouls) or in the passage between Rumps and Mouls. Between 2021 and 2023, there have been 26 sightings covering 9 months of the Bay. The maximum recorded was 7 seals in January 2021. It is not clear if these seals are also captured in Mouls and Rumps. Interconnectivity would suggest this may be likely.

In comparison, SRT reported the following for St. Austell Bay (southwest coast); over 10 years, from 681 surveys (3 x Rumps survey effort and comparable to Mouls survey effort), 3, 869 seal sightings were recorded, with a mean haul out number of 6, although up to 53 at one time have been recorded. Peak months were November to March.

SRT note that post weaning grey seals will be in their dispersal phase during spring and summer.

5.2.2 Harbour Porpoises

SRT have conducted quarterly systematic POLPIP boat survey transects between Trevose and North Cornwall between 2011-2022. This represents 115 km of coast and occurred in January, April, July and October of each year. There were 49 surveys in total and it is noted these are offshore (Figure 5.0). There is an indication porpoise would be present in the Bay and have been observed in the Bay. SRT establish the offshore transect line as being an important area for porpoise in autumn, winter and spring. Their use of the Bay is less clear (redacted data). In other literature (JNCC) the Bristol Channel SAC population is noted as being a winter population (for peak numbers) from October to March inclusive.

Cornwall Wildlife Trust published a Seaquest Southwest report in 2022. And they provided a PowerPoint presentation which was a review of land-based effort data (surveys) from 2010 to 2020 under the same Seaquest project.

Surveys were conducted all around the Southwest coast. Of 172 surveys captured in the 2022 report, covering 35.5 hours of surveys, 5 megafauna species (marine mammals) were identified in North Cornwall. On the South coast, survey times spanned 38 to 99.5 hours for five other sites. Between 5-7 megafaunal species were identified across the five sites. Peaks for all species sightings were recorded in July, August and September.

Harbour porpoises were spotted in the seascape from Rumps, with evidence of porpoise in the Bay. Alongside common dolphins, they were the most commonly sighted within the overall survey data for the southwest region and were present year-round.

From 2010 to 2020, 1,856 surveys were conducted at 190 locations, totaling 4,684 survey hours. Locations for surveys were concentrated on headlands with ease of access, with around 74-102 surveys concentrated at the Rumps (which captures Port Quin Bay and surrounding seascape) where marine mammals were identified. St. Austell Bay had a similar density of surveys where marine mammals were identified. Overall, sightings of harbour porpoise increased over time.

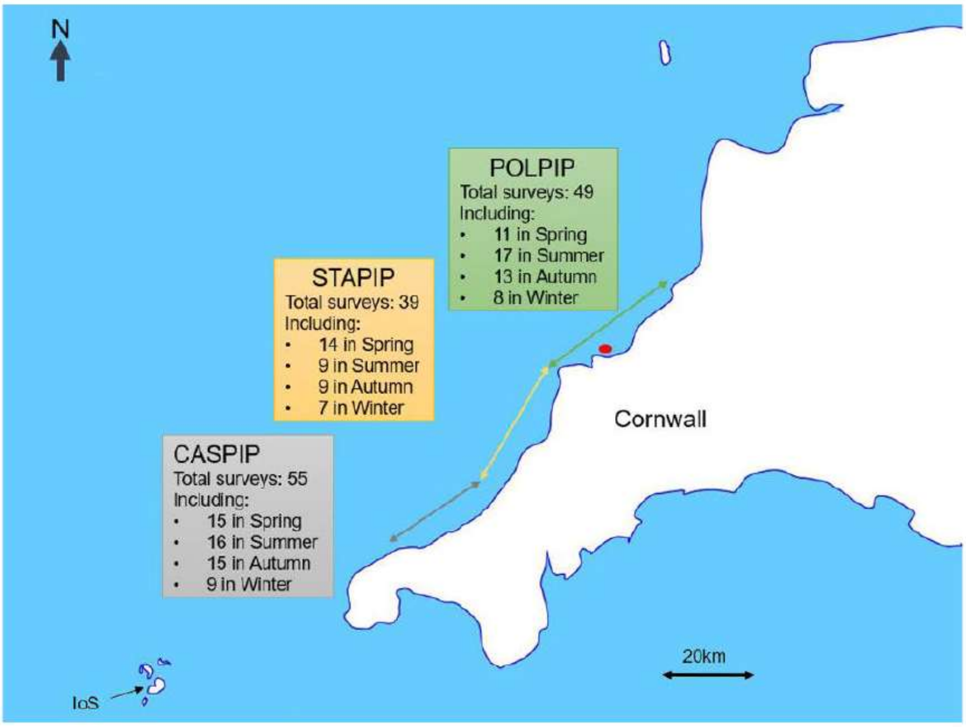


Figure 5.0: SRT POLPIP survey transects, 2011-2022.

Generally, porpoise travel in pods of around a dozen individuals. Incidental sightings are recorded by people from the coast and people active at sea, including fishers. Biome approached the Cornwall Mammal group, requesting data or maps of sightings on 13th December 2023. Available sightings information held is illustrated in the ERCCIS map available on http://cornwallmammalgroup.org/harbour-porpoise. We can estimate that 16,450 individuals make up the SAC population and occupy the SAC waters, coastlines and harbours.

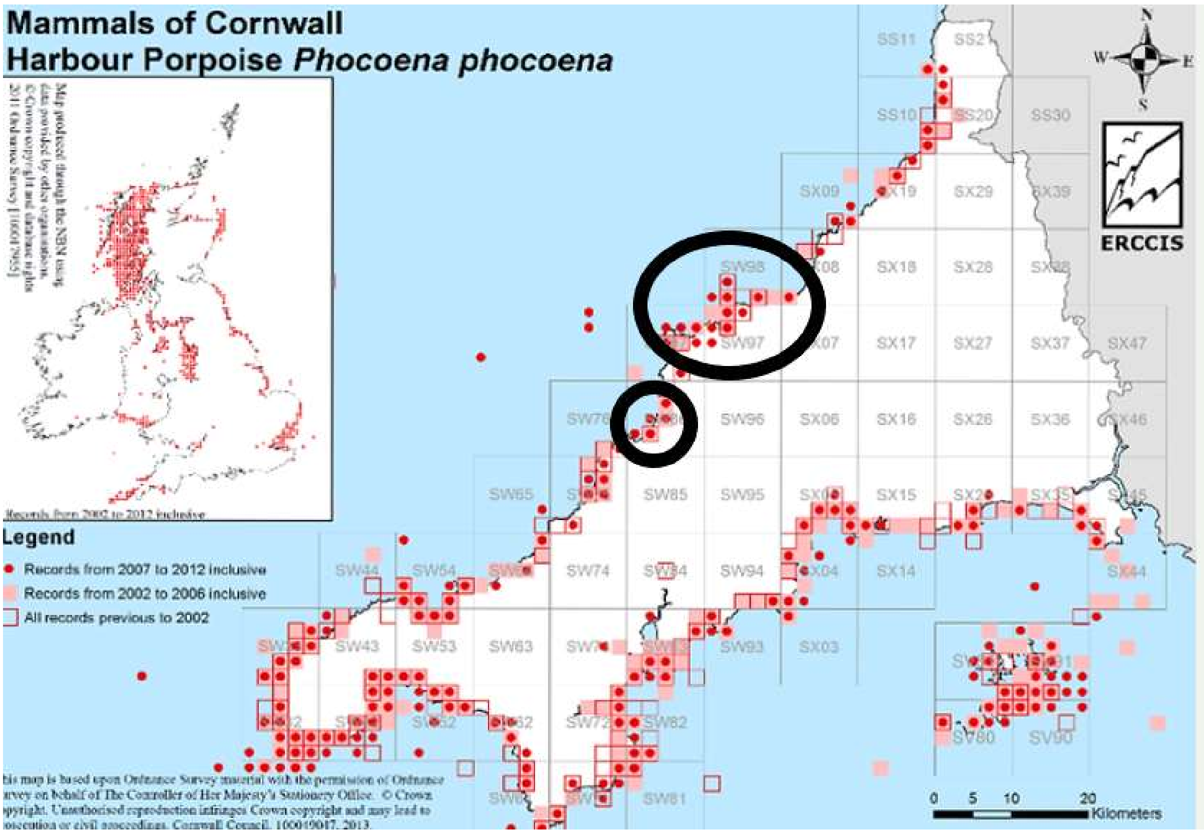


Figure 6.0 ERCCIS data for harbour porpoise sightings from 2002 to 2012.

The overall UK population is concentrated in the North (Scotland). This data (Figure 6.0) adds to sightings data in the South of England/Wales/Ireland, albeit in lower numbers. Sightings since 2022 have been recorded within the vicinity of the two proposed farms.

Harbour-porpoise (Phocoena Phocoena, Morhogh) are protected in the UK (Annex II species) within the Bristol Channel Approaches/Dynesfeydd Mor Hafren SAC established in February 2019. It covers 5,850 km^2 the centre of which is 51 021/-4 9093 latitude/longitude and covers the Western Channel and Celtic Sea. Sediment type within the SAC is coarse sediment and muddy sand, the latter providing supporting habitat for prey species. In the UK there are approximately 350,000 individuals and the SAC protects approximately 4.7% of the population. Adults are 1.9 m long and swim at speeds of up to 22 km/hour, although generally, they swim much slower. They mainly swim in water depths of 20-100 m and dive for five-minute periods, usually in depths of 15-30 m. Feeding occurs mid-water to the seafloor. Communication and echolocation to detect structures is achieved through series of clicks. Mating occurs in the summer months, with a 10 to 11-month gestation period. Calves are born in the summer and by three months old feed independently. It is estimated 16,450 individuals make up the SAC population.

The goals of the SAC are to maintain site integrity achieved through CO1: viable site component, CO2: no significant disturbance and CO3: condition of supporting habitats and processes maintain availability of prey.

The proposed farms as a whole occupy 0.0017% of the SAC cumulatively (1 km^2/5, 850 km^2). The coarse sediment over which the proposed farms will be located does not provide a critical supporting habitat for prey species – which would be provided by the muddy sand to the west and within the MCZ, further west and the wider SAC (sand eels for example). Sea depths related to the farms are between 10-15 m. There are 20 m + channels for clearance between longlines and underwater clearance of between 5-10 m. The farms occupy approximately 18 – 19.37% of the Bay (1km^2) with maximal levels of infrastructure occupying 10% of the 1 km^2(1.8-1.9% of the Bay). This is less than 32% which can prevent general use of an area by porpoises or dolphins.

Please refer to the detailed HRA (chapter 9).

The proposed farms will not have a significant impact on CO1, CO2 or CO3. Overall, SAC site integrity will be maintained. CO3 will be enhanced through use of bio-engineering blocks.

5.2.3 Dolphins

SRT have conducted quarterly systematic POLPIP boat survey transects between Trevose and North Cornwall between 2011-2022. This represents 115 km of coast and occurred in January, April, July and October of each year. There were 49 surveys in total and it is noted these are offshore (Figure 5.0). There is an indication common dolphins would be present in the Bay and have been observed in the Bay. SRT establish the offshore transect line as being an important area for common dolphins in autumn, winter and spring. Other dolphin species noted within the offshore transects include Rissos and Bottlenose dolphins. Their collective use of the Bay is less clear. Orca reports 14 common dolphins reported in the Bay in July 2021, 6 common dolphins reported in the Bay in August 2022 and above the Bay, closer to Port Isaac, 5 and 2 bottlenose dolphins were reported in August 2021 and 2022 respectively Figure 7.0a/b).

Cornwall Wildlife Trust published a Seaquest Southwest report in 2022. And they provided a PowerPoint presentation which was a review of land-based effort data (surveys) from 2010 to 2020 under the same Seaquest project.

Surveys were conducted all around the Southwest coast. Of 172 surveys captured in the 2022 report, covering 35.5 hours of surveys, 5 megafauna species (marine mammals) were identified in North Cornwall. On the South coast, survey times spanned 38 to 99.5 hours for five other sites. Between 5-7 megafaunal species were identified across the five sites. Peaks for all species sightings were recorded in July, August and September.

Bottlenose dolphins were sighted outside of the Bay. In other areas around the coast, Rissos dolphins were spotted in March and White Beaked dolphins were spotted in June and August. Common dolphins were the most commonly sighted in the Bay and surrounding seascape, alongside common dolphins when assessing the overall survey data for the southwest region.

From 2010 to 2020, 1,856 surveys were conducted at 190 locations, totaling 4,684 survey hours. Locations for surveys were concentrated on headlands with ease of access, with around 74-102 surveys concentrated at the Rumps (which captures Port Quin Bay and surrounding seascape) where marine mammals were identified. St. Austell Bay had a similar density of surveys where marine mammals were identified. Overall, common dolphin sightings increased over time.

Common and bottlenose dolphins were spotted in similar densities in Port Quin Bay area and surrounds and in St. Austell Bay.

5.2.4 Whales

Humpback whales and Minke whales do transition (migratory route) within the same offshore transect area identified for porpoise and dolphins within the POLPIP surveys. Orca reports one Minke whale recorded in the Bay in August 2022 Figure 7.0a/b). They are seasonal visitors to the region. Therefore, risks will be lower than for permanent residents (seals/harbour porpoise/common dolphins). However, the permanent residents have larger population sizes in comparison to the seasonal visitors, therefore risks at the population level are less compared to whales.

Cornwall Wildlife Trust published a Seaquest Southwest report in 2022. And they provided a PowerPoint presentation which was a review of land-based effort data (surveys) from 2010 to 2020 under the same Seaquest project.

Surveys were conducted all around the Southwest coast. Of 172 surveys captured in the 2022 report, covering 35.5 hours of surveys, 5 megafauna species (marine mammals) were identified in North Cornwall. On the South coast, survey times spanned 38 to 99.5 hours for five other sites. Between 5-7 megafaunal species were identified across the five sites. Peaks for all species sightings were recorded in July, August and September.

Minke whales were noted outside of the Bay, alongside blue fin tuna and sunfish. Fin whales were present in the seascape in January and September. Baleen whale numbers have increased over time. Humpback whales are noted to be at their peak (Ireland and Scotland) in Summer and Autumn and have been spotted within the Bay seascape in September. Due to their size, humpbacks are unlikely to venture into the shallower areas of the Bay where the proposed farms are to be located (10-15 m depths) (Pers comm, researcher, AFBI).

From 2010 to 2020, 1,856 surveys were conducted at 190 locations, totaling 4,684 survey hours. From those surveys, 58 Baleen whales were identified around the Cornish coast over 10 years. Locations for surveys were concentrated on headlands with ease of access, with around 74-102 surveys concentrated at the Rumps (which captures Port Quin Bay and surrounding seascape) where marine mammals were identified. St. Austell Bay had a similar (although slightly lower) density of surveys where marine mammals were positively identified.

Note: basking sharks were found off Land's End in July.

Note: Within the reports available, exact numbers and specific locations (for example within the Bay or on transitionary/migratory route outside of the Bay) were unavailable (redacted or missing). Although bias for location sightings was accounted for by producing a sightings rate (number of sightings/effort), there is no breakdown of numbers and effort for separate locations, but rather over time collectively.

The Orca maps (Figure 7.0 a/b) accessed in May 2024, demonstrates that marine mammals are spotted all around the coastline of the Southwest, with a concentration of recorded sightings in South Cornwall. Although this may vary seasonally, main migration (transitionary) routes/patterns are indicated by the data, with a concentration of migration between South Cornwall and France/Spain. Mammals move around the Cornwall coast with a main migration route in the Celtic Sea (northward) toward Ireland and Scotland. On the North Cornwall coast and along the Welsh coast, there is evidence that mammals move away from the main migratory route and visit the nearshore coastline, albeit in lower numbers than on the South Cornwall coast and South Devon coast (according to recorded sightings data). Although this data captures a range of marine mammals, including porpoise (pink) and dolphins (yellow, blue, turquoise), it is also indicative of larger marine mammal migration patterns although numbers are lower (whales: other colours).

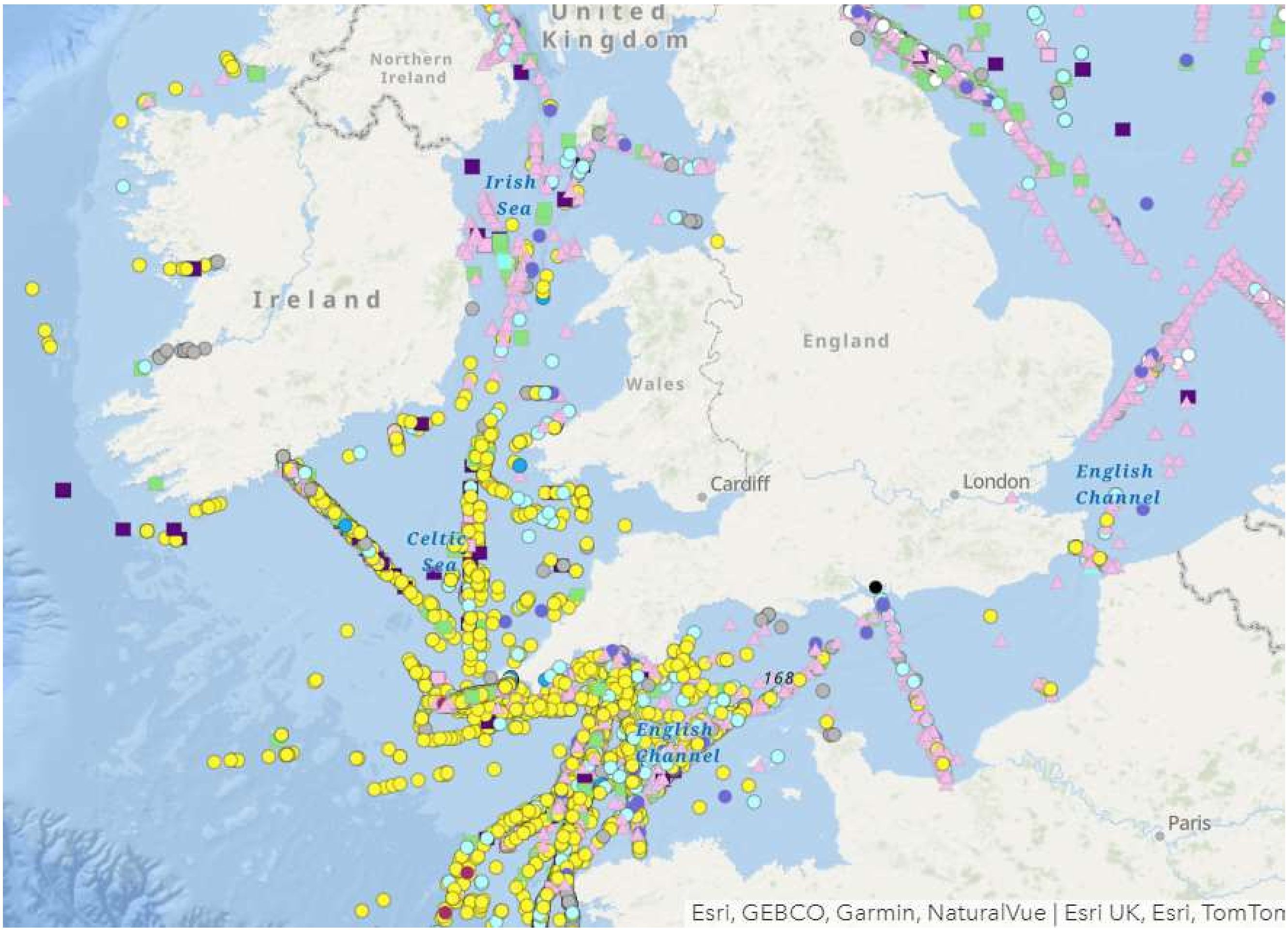


Figure 7.0a: Orca map of marine mammal sightings (accessed May 2024).

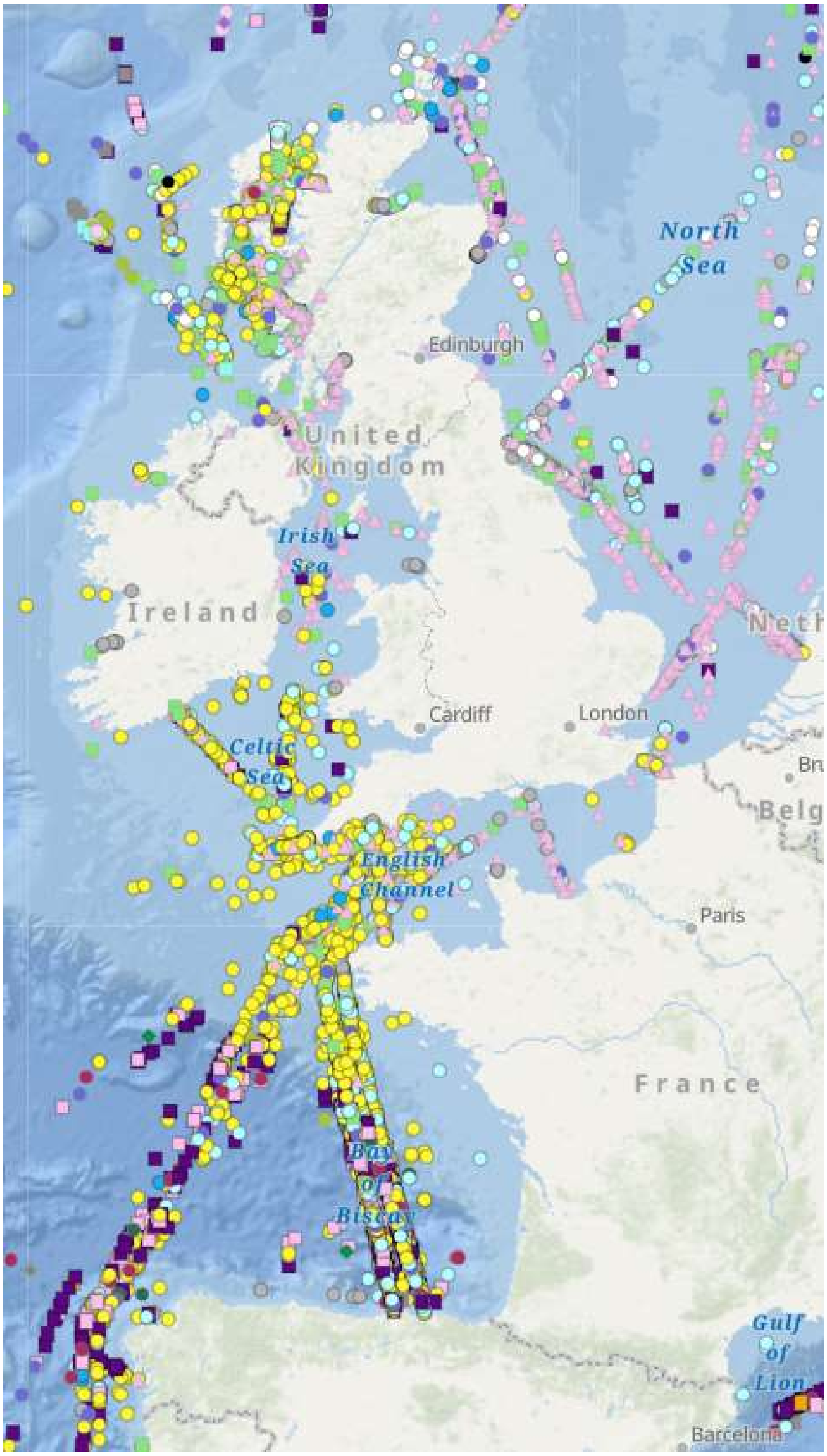


Figure 7.0b: Orca map of marine mammal sightings (accessed May 2024).

6.0 Farming In Cornwall And Devon

Please refer to Chapter 2 for an overview.

7.0 Evidence Of Interactions: Active Farmers

Biome discussed farming and marine mammal interactions with several of farmers operating in both Devon and Cornwall. And were able to relate to our own farming interactions with marine mammals from 2020 to 2024.

In Lyme Bay, where there are currently 282 active longlines, operators have noted a range of interactions with marine mammals within and outside of the farm as far back as 2010. Large pods of dolphins are frequently seen within and outside of the farm. Family pods of whitebeak and a few porpoises also visit the farm or feed on its periphery. Individual bottlenose dolphins have been spotted – one rubbing its back along a headline. The dolphins appear to be eating the scad and mullet which in turn eat the crustaceans on the lines. Larger cetaceans (whales) have been seen by-passing the farm.

In Torbay, operators have noted pods of dolphins in the Bay regularly, which will play in the wake of the boat (travelling average 4-6 knots) but generally, stay away from the different farms. There are many seals in the harbour areas but they do not venture out to the farms.

In St. Austell Bay, where there is approximately 200 Ha + of full farms operating since 2010, operators noted young seals swimming around the farms towards the coast. Pods of dolphins and porpoise have been spotted within and outside of the farms.

Although there are not specific count data or records, these anecdotal records match wider global observations of marine mammals interacting with longline farms. And reflect the data available which indicates numbers of marine mammals observed within the different areas.

Specific to Cornwall, St. Austell Bay represents the largest farming area in Cornwall (longlines), since 2010 and their presence does not appear to have altered figures of seals hauling out or present in the area, as with other marine mammals (dolphins, porpoises).

Despite the presence of large, longline farms in both Cornwall and Devon, there have been no reported incidences of marine mammal entanglement as a result of interactions with farms since 2010 (14 years).

There are no incidences of major equipment loss reported across the farms. Farmers in the different regions are exposed to a variety of different site conditions and weather patterns, but maintain engineered farms regularly to prevent equipment loss. In case of loss (only buoys infrequently), farmers mark equipment, can trace it using GPS marker technology and successfully retrieve them as a result within hours to a day or so.

8.0 Strandings And Entanglement In Cornwall

Another approach to assessing risks of farming structures and entanglement for seal and cetacean species within Cornwall, is to review past strandings data and causes for those events. In assessing this, reference was made to a 'Marine Strandings in Cornwall and the Isles of Scilly' report 2022 (Cornwall Wildlife Trust: MSCI) which analyses causes and an SRT annual report for 2023 (Seals SW) which includes information on strandings and causes.

MSCI reported 156 cetacean strandings in 2022. Common dolphins represented the majority of strandings (57%), followed by harbour porpoises (14%). Post mortems were conducted on 30 strandings. Causes of death included. In-situ examinations were conducted on 70 strandings. Causes of death included starvation, infectious diseases, live strandings, gastric impaction, intestinal impaction, boat/ship strike, bottlenose dolphin attack and bycatch (fishing gear). Bycatch was responsible for 30% of the cetaceans that were examined by post mortem.

In addition, an MSN Bycatch Evidence Evaluation Protocol (BEEP) can be conducted in-situ. This assesses bycatch injuries and entanglement. Of the remaining 126 cetacean strandings recorded, 70 were assessed using this protocol and verified by ERCISS. 13% (9) had features consistent with bycatch injury or entanglement in fishing gear. This was based on net entanglement marks.

Seaweed farming does not involve nets. There was no evidence or reports of entanglement in active, static longline farms (shellfish and seaweed).

MSCI reported 192 seal strandings in 2022, with 19 being whitecoat pups or maternally dependent. Strandings occurred across the year, although peaks differed for different age seals. Of those examined at post mortem (28), trauma was the leading cause of death (9 seals), followed by infections (8 seals). Physical trauma with secondary infections followed.

In addition to post mortem examinations, in-situ examinations were conducted using Seal Evidence Evaluation Protocol (SEEP), similar to BEEP but more problematic as seal skin/pelt structure reduces clarity of external marks. 87 seals were assessed. 64 had no notable features, 10 were inconclusive, 4 had features associated with trauma and 4 had definite entanglement around their necks (neck rings).

The Seal Research Trust (SRT) produced an annual report in 2023; 'Seals SW'. in total 4,567 discrete surveys were completed around the Cornish coast, recording a mean of 9.2 seals up to a max of 458. 56% were males and 44% females. There were 581 sightings of white coated pups at 39 different locations. 5 or more were recorded 37 times at 10 different pupping sites in the North Cornwall complex (4 sites). 94% of pups were born on the north coast sites with the majority of pups being born in September followed by August in 2022. Harbour seals were recorded in south coast locations (Cornwall and Devon).

In the same period, 6 dead seals were identified and 81 unique entangled seals were identified. Seals were classified as currently entangled or ex-entangled (based on healed wounds). 13 hooked seals were recorded (hooked in line from the local inshore mackerel fishery), incidences of which were new and notable since 2021. This may be a result of peak seal numbers moving to December/January and the fishery moved later in the year causing overlap. Bycatch includes the live entanglement of animals who have interacted with lost fishing gear and dead seals caught up in operational fishing gear. *There was no evidence of entanglement within active static aquaculture farms located in Cornwall.*

There were 155 serious disturbance incidents at haul out sights involving 1,328 seals. People accessing beaches was a major cause.

Conservation efforts included a focus on making seal disturbance illegal and banning flying rings (which can cause neck entanglement). There was also a focus on climate change mitigation (climate change on seals).

Given there are operational longline farms within Cornwall, these results are consistent with the wider global research studies and reviews which identify fishing and vessel strikes as moderate to high risk and longline static farming as low risk for entanglement.

Within St. Austell Bay (South Cornwall) there are currently licenced areas for up to 300 Ha of farming (mussels and seaweed). 200 Ha + is operational and active. These farms have been active since 2010 onwards (14 years; seaweed farms 2020 onward (4 years)). This represents the largest active farming area along the Cornish coastline. Farms comprise of longline designs, as proposed for the Port Quin seaweed farms and currently used by the applicants and other farmers on farm sites in Devon.

As identified within the reports assessed and referred to within this report, surveys indicate St. Austell Bay has a number of marine mammal visitors, including seals, dolphin species and harbour porpoise. Whales have been spotted in the Bay on occasion. These farms are located on muddy sand to sandy sediment – so are located over potential feeding grounds for the cetacean species – unlike at Port Quin. There are more haul out sites within the vicinity for seals compared to Port Quin. White coated pups and moults are present in the area.

In that 14-year period, the presence of the farms does not appear to have impacted use of the Bay by the marine mammals listed. There have been no physical or reported incidences of mammal entanglement attributed to the farms (interviews with operators and the applicant's personal experiences of operating in St. Austell Bay with the mussel/seaweed farm operators from 2020 to 2022).

One stranding is noted within the St. Austell Bay vicinity – a porpoise which was the result of trauma (likely vessel collision: 12th April 2022). Active farm operators (including Biome from 2020 to 2022) have not collided with marine mammals during operations. They operate farms under sensible vessel speeds, clear operational profiles and protocols, regular line and vessel maintenance and spending majority of time on farm sites attached to longlines with engines off during operational work.

9.0 Infrastructure Assessment

Please refer to Chapter 5 for an overview.

The design of the longlines ensures that the weighted scissor lifts on the risers and seed lines will maintain tensioning in the system (for example on low and high tides), which is important in addition to a completely static system and secure channels in between lines, in ensuring a low risk to marine mammals (Figure 1.0, Chapter 5). For the most common species of marine mammals: common dolphin and harbour porpoise, as echolocators, they will be easily able to navigate within the tensioned, static, stable farm and its channels, as observed globally. The farm infrastructure does not comprise of strings. All components are substantive, tensioned ropes. Break strengths on all tensioned ropes used range from 28.9 kN or less (tensioned seed lines) up to 167 kN (for the strongest tensioned ropes), which is favourable for resisting Minke whales (Knowlton et al. 2015).

10.0: Port Quin Farms: Site Specific Considerations

Port Quin Bay covers an area approximately between 5.54 and 5.16 km^2. The proposed seaweed farms cumulatively occupy 1 km^2 of the nearshore centre of the Bay. This represents between 18-19.37% of the Bay area total. And is below the 32% level of coverage which could restrict essential habitat use for certain marine mammals (Ribeiro et al. 2007). In addition, open sea channels between longlines mean the cumulative infrastructure occupies a total of 10% of the 1 km^2 (0.1 km^2 ad 1.8-1.9% of the Bay area total).

Main migratory routes are identified outside of the Bay, although marine mammal visits to the Bay are evident. In addition, the 20m + channels between the longlines, absolutely static and tensioned longlines and ample navigational distances around the farms (550 m to 750 m from land) enable mammals to navigate around or within the farms. These distances also ensure the farms and farm operations are at ample distance from sensitive haul out/breeding sites for seals. Disturbance of marine mammals will be avoided or reduced to low risk through operational profiles and operational procedures upon accessing or working within farms. DEFRA recommends maintaining 100 m distances from sensitive sites. SRT discuss maintaining 100 and up to 400 m distances from sensitive sites. Maintaining distance will be policy, as it is in current farms operated by Biome.

Port Quin was selected as a site for a range of key reasons which are covered across the various chapters submitted and within the updated report in detail. This included (but is not limited to) proximity of natural kelp ecosystems, depths, currents, allocation as a strategic area for aquaculture by the MMO, land-based infrastructure to support farming (harbours) and levels of fishing in the Bay and agreement by fishers the farms will not negatively impact current fishing levels, which are very low. A very important factor in selecting the site was sediment type within the Bay (Figure 8.0). Coarse sediment is not a supporting habitat for marine mammals in terms of prey. There are very little fish present. Sand eels will likely be present to the west of the proposed farms over the sandy-mud deposit, where they can also spawn – providing a food source for mammals (porpoise for example) and birds. The farms are located at distance from the sandy-mud deposit and there are no pathways for impact on this area of the seabed, given the engineering report provided and stability of the infrastructure to be deposited at sea. The farms will be located entirely over coarse sediment. Marine mammal access to the sandy-mud deposit is not hindered by the presence of the farms. Shellfish are found closer to the shore (crabs, lobsters, spider crabs) – within natural kelp systems and reef areas which is where potting occurs. The farms do not interfere with the critical feeding habitats of marine mammals in the locale of the Bay and will not reduce prey availability within the Bay.

There has been discussion around the suitability of Port Quin Bay for farming seaweed. This was partially based on MMO spatial maps that indicate broadly areas suitable for seaweed farming. The area in question has been allocated by the MMO as a strategic site for aquaculture. However, when seaweed data is investigated on the same maps, they do not indicate that the Bay is a suitable area for farming sugar kelp or oarweed. Biome has had direct discussions with the CEFAS team. CEFAS prepared the maps. There was limited evidence and data available when compiling these maps. It was to act as an indicator and therefore worked within wide ranges and parameters as a starting point – which resulted in sites being excluded. The intention was then to build on these maps, updating them with real, ground-truth data from operators – who select sites based on their knowledge and expertise.

According to the current MMO interactive spatial maps, seaweed species cannot be farmed in St Austell Bay, Cornwall, Torbay – South Devon, Porthallow – South Cornwall or Bideford Bay in North Devon. However, this is not the case. The criteria described above were applied to sites when farmers selected them, applying data, knowledge and expertise, as sites for seaweed cultivation. Successful cultivation has occurred at each of these sites. In 2020-21, 5 T sugar kelp was grown in St Austell Bay. This was followed in 2021-2022 by 40 T. In 2024, 20 T of sugar kelp was farmed in this region. In Torbay, 5 T of sugar kelp was farmed in 2022-23, followed by 40 T sugar kelp in 2023-24 and oarweed test lines. Sugar kelp has been successfully cultivated in Porthallow since 2019 and in Bideford Bay since 2022-23.

Following discussions with CEFAS, the aim is that current operators will update CEFAS with cultivation data and parameters, which will then be reflected in the MMO spatial maps. Refer to the updated Marine Spatial Plan Assessment June 2024.

11.0 Port Quin Farms: Operational Profiles

Please refer to Chapter 4 for an overview.

Reducing disturbance to marine mammals will be achieved through a combination of the operational profile rules and good practice by both farm operators (see below). Vessels will maintain safe distances from sensitive coastal sites for wildlife. Accessing/exiting the Bay (5 minutes to reach farms from point of Bay entry and vice versa) will circumvent Mouls Island (seal haul out site) and never cut through the Rumps channel (seal site). Distances will at least be 750 m +. In addition, vessels will be well maintained, to mitigate engine noise. The engines are fitted with silencers to reduce noise further. Work vessels operate at lower decibels to smaller recreational craft (speedboats and ribs). This is as the engine is undercover (integrated) within the vessel. In addition, when vessels arrive at farms and attach to the longlines (to seed or harvest or maintain), the main engines are turned off. Only auxiliary (low noise) engines are on to run hydraulics. Therefore, disturbance risk through noise is minimized.

Vessel noise in the future may well be further reduced by the use of hybrid and electric vessels, where operational profiles will enable them to access site without engine noise, recharge on site (auxiliary engine only) and exit the farm sites without engine noise. Operators will explore these options in due course should it be viable.

Removing the tensioned seed ropes over July, August, September and October (1/3 f the year) further reduces the risk of marine entanglement for marine mammals during this period. Which is important as these are recorded as peaks across many of the groups of mammals. And in summer, young, post weaning seals will be in their dispersal phase and open to learning through play. This also occurs in Spring, but active harvesting of the lines will reduce the tensioned seed ropes over time. It is important to re-state that no global studies have found evidence of pinniped entanglement in farms with observations noting seals are not attracted to farms. This is captured in the anecdotal evidence of active farmers in the South west region too.

Seal sensitivities to consider in the locale of the proposed farms are as follows: they appear to peak in numbers between April and October (although not present in March or December). Of the 304 individual seals recorded in the Bay area, the majority of seals are pregnant females –

probably using the area as a resting site before migrating. It is important females can feed in Summer, in order to feed pups born in Autumn so they can survive their first winter. In addition, noise disturbance needs to be at a minimum during Autumn (pupping).

There will be vessel activity during seal peak times but operational profiles will keep noise and disturbance to a minimum during harvest in April. In October (end of autumn) seed deployment starts. Operational profiles will keep noise and disturbance to a minimum. The farms are not operational during summer months, apart from minimal maintenance (only if required). Therefore, pregnant females should be able to feed and rest to migrate to interconnected seal sites and support autumn born pups. Autumn born pups or mothers should not experience significant disturbance due to operational profiles and policies and as a result of reduced farm activities. In terms of longline deployment whilst it is required, there can be flexibility around deployment timings.

A similar operational profile is operated in St Austell Bay on longline farms since 2010 (200+ Ha). Over a 10-year period, 3,869 seals have been observed in the area and hauling out, whilst the farms are in operation. Shellfish farms are more active across the year and in summer than seaweed farms.

Porpoise sensitivities to consider in the locale of the proposed farms are as follows: JNCC consider the population in the Bristol Channel SAC to be a winter population (October to March inclusive). This may refer to peak numbers. SRT surveys have revealed a presence all year round, albeit in lower numbers. They were recorded as present in the region in January, April, July and October. During their peak of October to March, there will be seed deployment and farm maintenance. Operational profiles and precautions should limit noise disturbance within the Bay area. However, it is important to note that given the nature of the sediment in the majority of the Bay (coarse) and under the proposed farms, porpoise will not be excluded from important feeding grounds within the SAC. In addition, the stable, tensioned infrastructure with clear channels will facilitate effective echolocation in these more common species in the region. Entanglement risks will be reduced further (from non-significant) during July to October, as tensioned seeded lines are removed.

Common dolphins and bottlenose dolphins may be present in the Bay area in autumn, winter and spring. Peak numbers appear to be in July, August and September. A minke whale was recorded in the Bay area in August (2022). Fin and Humpback whales have been recorded outside the bay (shallow). In July, August, September and October, tensioned seed ropes are removed, further reducing low (non-significant) entanglement risk. The proposed farms are not located over feeding grounds (hence not excluding mammals from feeding areas) and located in relatively shallow waters (10-15 m). In addition, the stable, tensioned infrastructure with clear channels will facilitate effective echolocation in these more common species in the region. As seasonal visitors, the whales are at less risk. Farm activities are lowest in July and August – when whales have been recorded in the region. In operational periods, operational profile rules will ensure disturbance is a low risk. Its noteworthy that the most vulnerable whale population (humpbacks) are unlikely to enter the part of the bay where the proposed farms are, due to depth profile (10-15 m).

12.0 Biome And Camel Fish: Good Practice

Biome has been safely operating farm sites in both Cornwall and Devon since 2020 four farming seasons). Scale has varied, operating on 10 and 100 Ha sized licenced sites. Camel Fish have over 50 years of experience in fishing (trawling, potting). Both applicants are experienced working at sea, within marine environments and working around marine mammals and the coast.

Defra launched their new marine and Coastal Wildlife Code. Of relevance to farming activities at the proposed seaweed farms are the following:

Policies around farm and vessel operations will ensure that there will be minimal noise, no approaching, crowding, chasing, feeding, moving or touching of marine mammals. Distance will be maintained from critical land-based habitats when accessing the Bay and when operating on farms (a minimum of 750 m away; DEFRA recommend 100 m away) from critical habitats – hauling site (Mouls) and the Mouls/Rump's channel area for example. This will be standard practice across the year, to include breeding seasons, winter and moulting. For seals, breeding is from June to January and moulting is between November and April and in August. Breeding seasons for cetaceans are summer months. Staff will be trained to this effect and to recognize signs that wildlife is disturbed (although avoidance is the primary goal). For example, through local training programs offered by conservation groups in Cornwall (SRT/Seaquest) and through the Wildlife Safe (WiSe) Scheme.

The same policies will be applied to mammal visitors to the physical farms when operations are being undertaken (line deployment, line maintenance, seeding and harvesting).

Seaweed farming and operations do not involve carrying or utilizing food sources that may attract marine mammals, which will reduce attraction of marine mammals during operations (Price et al. 2017). Advice will be followed and integrated into policies from the Give Seals Space campaign from the Seal Alliance. Farm and vessel operations will not involve shore/beach access. Advice will be followed and integrated into policies from the Whale and Dolphin Conservation guidance. There are strict policies around marine litter – to prevent litter (packaging, detritus, ropes) entering the marine ecosystem. Boat speeds in and around the Bay will not exceed 6 knots. It will be policy to widely circumnavigate sensitive coastal spots when accessing and leaving the Bay area. When operating on the farm, engines will be switched off for the majority of time as the vessel is attached to and moves along the headlines for work. Vessels will slow or stop in the presence of marine wildlife. When transitioning in and out of the Bay, vessels will maintain a steady speed and direction. Vessels will only access shore from within harbour areas. And vessels will be regularly maintained up to MCA code 3 and cat 3 standards – to ensure noise and pollution (e.g. diesel leaks) are avoided. Policies will apply to direct employees and operators of the farms and vessels, as well as third party contract suppliers. Staff will be trained in monitoring marine mammals and policy will be to report visual records of living, injured, distressed or dead animals to the appropriate authorities (e.g. CSIP) and local conservation groups (data and information sharing). This will include from the monitoring program discussed and procedures for contacting British Divers Marine Life Rescue (BDMLR) or the Marine Stranding Network (BDMLR: 01825 765546 (live) and MSN: 0345 201 2626 (dead). Marine species will never be blamed or persecuted because they become an inconvenient issue. The marine environment is there home. Any issues will be reported factually, openly and honestly. This will be linked to the marine monitoring program proposed.

Prevention of entanglement and disturbance is the primary directive of both farm applicants – with measures already in place as described throughout this report and evidenced as good practice in global reports to reduce the risk to a non-significant level. This is in combination with the global evidence which suggests risks from static, longline farms are low and assessments of site-specific risks.

However, as part of the monitoring program discussed below, passive transponders, alongside the presence of catch cams, sensors, marked equipment and GPS markers on main buoys will reduce entanglement risk further for both smaller and larger marine mammals as live feed data would indicate any possible incidents, if and as they occur. Although these are likely to be insignificant risks, one can never state entanglement would not 100% occur, so these additional safeguards enable quick responses to entanglement which should result in rescue scenarios rather than death. Response plans and policies would be similar to those indicated in the updated Navigational Risk Assessment (June 2024) for marine traffic/sea user entanglement in farms.

Lost gear has been indicated as a concern. Lost gear could have negative impacts on marine mammals. Discussions with active farmers working across Devon and Cornwall in a range of nearshore and offshore conditions indicates that with sound engineering and regular maintenance, core infrastructure (ropes) have not been lost.

The independent marine engineering report has reduced this risk for the applicants to fully avoidable through correct engineering, tensioning and regular rope maintenance. Of significance is the fact longlines comprise of individual weighted structures – not connected to each other. Both the main infrastructure of each longline and main marker buoys will be anchored using weights and ropes as indicated in the independent engineering report, to ensure longlines and main buoys will remain fully stable over 50-year storm conditions. This reduces the likelihood for lost gear. The operational profile indicates regular maintenance.

However, there are further measures both applicants can take to further ensure that should gear detach from the farm (for example buoys), it can be retrieved to avoid littering the marine environment. Measures include the use of GPS markers on the main buoys and labelling equipment with company name and contact details. Buoys should be lashed appropriately. And lashings regularly checked. If gear is lost, the applicants will follow MMO protocols and alert relevant authorities. Repairs will be conducted according to the response plans updated in the Navigational Risk Assessment (June 2024) and where possible within 24 hours of record. Lost gear can be advertised and traced through social media and contacting harbour authorities. Under the 'polluter pays' principle (DEFRA), responsibility for retrieving lost gear is with the site operators. The operators can support local clean-up charities by making a donation should any lost gear be retrieved by the charities, which clearly belongs to the farm operators. This will be in combination with the strict policies around marine litter (avoidance) when operating at sea.

Price et al .2017 (Table 12) describe a range of measures that can be applied to further reduce low risk negative interactions between marine mammals and static longline farms. Acoustic measures are listed. However, the applicants do not wish to deter the presence of marine mammals in the Bay and therefore will not be using any acoustic disrupters (see below for justification). Visual deterrents are listed as visible ropes (tensioned included) such as red or yellow on verticals if possible. Reflective tape is added to buoys as standard practice for visibility, alongside other measures. For the same reasons, not to deter mammal presence in the Bay, no scents or noxious baits will be used. No electromagnetic deterrents will be used. And all physical deterrents, beside weighting lines for tensioning purposes, will not be used. Both applicants will continue to explore improvements in in-built line release in the case of entanglement by marine mammals (escape), when this becomes technologically feasible and if it does not compromise the integrity of the infrastructure to remain absolutely static in all weather conditions over 50 years.

The seaweed farm will likely create a blue carbon sink, although scientific research is still underway to understand this potential against climate change and the impacts for marine mammals. Locally, this is likely to be a small impact but collectively, with other farms plays a more significant role in helping to combat climate change issues around carbon. In addition, the seaweed farmed is being used, in part, to produce biomaterials (alternatives to plastics). This is in an attempt to contribute to reducing the use of plastics over time and therefore reducing additions of plastics into the marine environment, inclusive of microplastics, which are a serious threat the marine mammals and marine life. Other uses include carbon mitigation through food security, feeds and bio-stimulants (fertilisers). All markets Biome and Camel Fish are targeting. Seaweed absorbs nutrients (N,P,K) from the water column, including additional N,P and K loading from sewage discharge which can reduce water quality and cause localized health issues (bacteria/algal blooms) if left unchecked. Seaweed has potential for bio-remediation, an ecosystem service, which can improve localized water quality. This would not only be beneficial for humans but also for marine mammals and marine life. Research into all these aspects will be on-going with legitimate and industry recognized partners.

In addition, applicants constantly assess new technologies available for farming, whether this is biodegradable infrastructure or the possible future use of hybrid/electric vessels (refer to www.biomealgae.co.uk; Seaweed Queen). This is fundamental to company ethos. New methods will be adopted as the industry evolves over time and viable options arise.

13.0 Monitoring Program

The applicants have consulted with AFBI (Northern Ireland), who already conduct research programs (with CEFAS) into entanglement and marine mammal interactions with static farms. As independents, the applicants would start a monitoring program in partnership with AFBI and potentially CEFAS. This would support MSc. And PhD candidates.

Monitoring to further inform risk and feed into scientific studies is imperative with transparent reporting throughout. This can be used to continually review and revise risk assessments and mitigation practices. Passive acoustics is a cost-effective technique that we could easily use on our moorings to gather continuous data on vocalizing marine mammals encountered around the farms.

For the work in AFBI, they use a combination of an automated click detector and a broadband recorder. These two devices deployed together provide a good overview of the soundscape and any vocalizing species. Harbour porpoise, which are likely the most commonly encountered species, are monitored with the automated click detectors which can be sourced in Cornwall. The broadband recorders used come from New Zealand although there are other comparable devices on the market and are good for detecting seals and baleen whales

Deploying in shallow waters 10-15m, can be tricky for acoustics as you get a lot of noise from the sediment on the seafloor and the surface from waves and rain etc. It's possible but just might take a bit of tweaking.

AFBI have trialed the live feed to acoustic devices in the Shannon estuary with Joanne O' Brien in Galway-Mayo IT and Michel Andre as part of Listen to the Deep (LIDO (listentothedeep.com)). It's a good example of how these types of monitoring programs can become accessible to the general public and provide an opportunity for outreach and education. The applicants would be able to share data and acoustics with local conservation groups (Cornwall Wildlife Trust (SeaQuest) and SRT. This would be in combination with observation records by farm operatives, who would undergo training to identify species correctly and record data accurately.

This will be in combination with a wider, independent monitoring program which is in conjunction with WWF and SAMS. This will monitor a large range of physiological and ecological parameters over three years – with a primary focus on biodiversity assessment, interactions of marine life with farms and other foci, including infrastructure monitoring and growth of seaweed on site across the season.

14.0 Additional Assessments

14.1 Noise

In December 2023, Biome conducted a noise assessment by request of a primary advisor, Natural

England. This was specific to the installation of screw anchors and noise effects on porpoise within the SAC. The information provided was as follows:

'Harbour porpoise hear across a range of 0-200 kHz. They are impacted by high sound pressure levels (SPL) – the most accurate measurement for assessing potential behavioural impact as a result of exposure to noise. SPL can be measured in decibels (dB) re 1µPa – to account for sound moving through water as opposed to air. Studies have established that behavioural change in porpoise can be observed between 111 to 140 dB re 1µPa. Harbour porpoise experience impacts to hearing at two levels: temporary threshold shift (TTS) or permanent threshold shift (PTS). TTS in harbour porpoise occurs at 140 dB re 1µPa and PTS at 215 dB re 1µPa, with those levels of noise being detected up to 5 km away (van den Akker, van der Veen 2013).

The screw anchors are drilled in. The drill noise is the equivalent of a concrete mixer. Screws are screwed in, not piled. Ear defenders are not required in air or water. The noise level is 64 dB re 1µPa with low horizontal sound propagation. The helical screw is 30 cm diameter, 4.5 m long. Installation of a single screw anchor requires 5 minutes. Two can be deployed within an hour period (10 mins of noise generation per 60-minute period – 1 5-minute period per 30 minutes). Based on an 8-hour operational day, 16 screw anchors can be deployed. For a 50 Ha farm site requiring 288 anchors, this will require 18 days total (32 days total for both sites). Noise will be generated for 80 minutes per day, but in intervals of well-spaced 5-minute periods. The 18 days of deployment is likely to take place over 2-3 seasons. The noise levels are below levels that indicate behavioural change, TTS or PTS.

In addition, we have considered JNCC Report No. 654 (see reference below). The report forms a guide for assessing the significance of noise disturbance against the conservation objectives of harbour porpoise SAC's. JNCC indicate that activities requiring noise management are:

- *Gas and oil exploration*
- *ADD's*
- *Pile driving for offshore wind turbines (not screwing into coarse sediment)*
- *Harbour construction*

They state that there should be proportionate and pragmatic leeway for small amounts of noise. In general – an activity is considered significant if it results in displacement from 20% of the SAC area per day (10% per season). The above works will not result in this. Therefore, full conservation objectives (FCO) will be maintained. JNCC also state that small, short-term reductions would not lead to reduced FCO.

A concern with noise levels that impact behaviour or hearing range is that harbour porpoise will experience a loss of foraging opportunities – as they have to feed regularly over 24-hour periods to maintain energy levels. In addition to identifying that noise levels from screw anchor installation will not impact behaviour or hearing – the sites are located over coarse sediment (primary sediment in the Bay) and therefore would not compromise foraging.

Finally, it should be noted that the SAC is based on winter porpoise population densities. Winter runs from October to March inclusive. Screw anchor installation will occur outside of this period. Therefore, according to the JNCC report, a noise management approach is not required as there will be no significant effect. Screw installation would be the noisiest aspect of farm operations.''

JNCC (2020). Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (England, Wales & Northern Ireland). JNCC Report No. 654, JNCC, Peterborough, ISSN 0963- 8091.

The independent marine engineering report has discounted the use of screw anchors and oil rig anchors with chains and identified that gravity-based anchors (eco-blocks) will be used, which do not penetrate the sediment. This significantly alters the noise assessment associated with deploying longlines. Please refer to the operational profiles.

Other aspects of noise during farm operations have been reduced for seeding, harvesting and maintenance (see operational profiles). Farm operations are at distances of 550 – 750 m from Mouls and the shore. Ensuring there is a low risk of excessive noise in turn ensures avoidable or low risk of noise disturbance of marine mammals (seals and cetaceans) in accordance with the SW Marine Spatial Plan and Bristol Channel SAC.

Future technologies, for example, hybrid and electric vessels, would further reduce these risks if these were feasible options to be considered.

14.2 Non-Use Of ADD's

McGarry et al. 2020 identified that on the market, there are currently 35 ADD's, with 9 specifically developed for aquaculture (fish farms). These ranged in capability, affecting different sound ranges and producing either a continuous or intermittent sound. Sound ranges were typically within the 1-5 KHZ range, 10-20 KHZ range, up to 30 KHZ and as high as 160 KHZ.

It has been established that the risk of entanglement of marine mammals in well maintained, static longline farming systems with clear escape channels and underwater clearance is low (not significant). The risk of using an ADD is higher risk, as it could lead to permanent threshold shifts for marine mammals or interfere with behaviour and activities with negative consequences. Neither applicant will be deploying ADD devices.

14.3 Port Isaac Bay Seaweed Farm

A licence to farm seaweed has been granted for a 100 Ha seaweed farm in Port Isaac Bay (Figure 8.0). The coordinates for L/2023/00619/1 are:

NE	50.63397	-4.81122
NW	50.63359	-4.8244
SE	50.62505	-4.81054
SW	50.62479	-4.82444

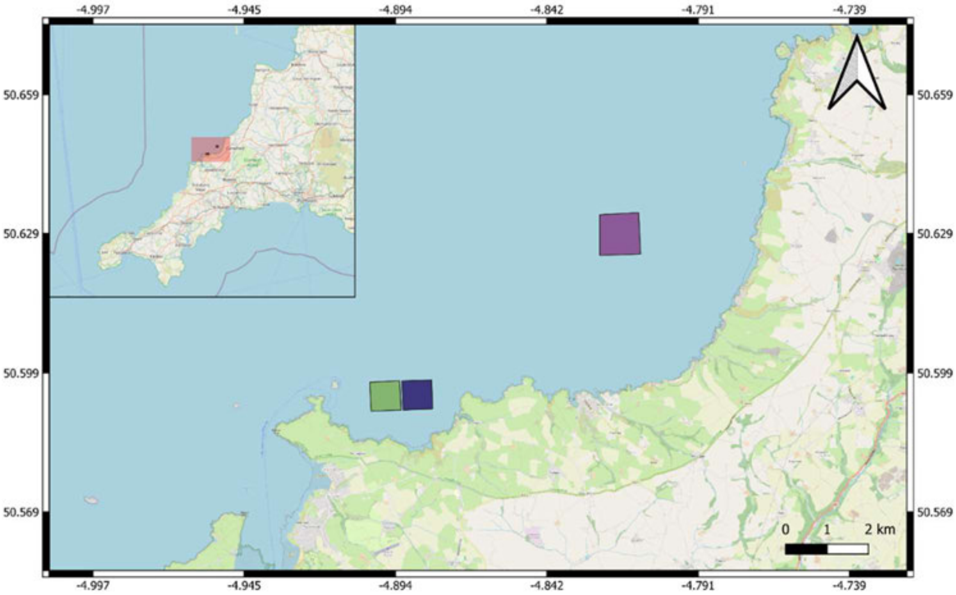


Figure 8.0: The Port Isaac Farm site in relation to the proposed Port Quin Bay farm sites.

This farm is 5 km North east of the proposed Port Quin farm sites. It was granted a licence by the MMO in 2023. The information available on the MMO public portal related to the operators plans and infrastructure are limited. At the time of writing this report (June 2024) as far as Biome and Camel Fish are aware, due diligence is still required by the Crown Estate, relating to Tenancy agreements and a Crown operational licence. However, this information is covered by the Data Protection Act. Biome and Camel Fish are not aware of the criteria used by the operators for site selection or how this relates to assessments conducted by the operators related to marine mammals, or the outcomes of these assessments. We assume they have been conducted before an MMO marine licence was issued. It is not clear whether the operators will farm the site. It has remained empty (not even marked by navigational safety markers or on Admiralty charts) for over a year.

The MMO require us to consider the cumulative effects of the Port Quin farms in combination with the Port Isaac farm although it is 5 km away. To do this, we would have to make a number of assumptions which include but are not limited to (1) the operators will use the same infrastructure design and engineering as Biome and Camel Fish, (2) the operators will farm sugar kelp, (3), the operators will use the same spacing between longlines, (4) the operators will employ the same standards of good practice as those proposed by Biome and Camel Fish, (5) the operators will farm identically to us over the course of a season and (6) they will operate in the full site.

In terms of the Bristol Channel SAC, which protects the range of harbour porpoises, 200.8 Ha of farm located within the SAC will occupy a total of 0.0032% of the SAC (full infrastructure). The proposed Port Quin farms occupy 0.0017%. Refer to the SPA HRA (chapter 9).

Given distance between farms (5 km +) and if the assumptions are correct or upheld, then all the facts presented within this report should apply and therefore although the risk of entanglement may increase slightly from a region perspective (north Cornwall), risk of entanglement should still remain non-significant (low). With a combined area of 200.8 Ha – this is of a similar scale to longline farming levels in St Austell Bay (200 ha + with 300 Ha + licenced) – all concentrated in one Bay area. We have established that despite the presence of these active farms since 2010, data shows the numbers of mammals (seals, dolphins, porpoises) recorded in the Bay remain fairly consistent, there is no evidence for or reported entanglement of marine mammals in longline equipment and anecdotal evidence has observed marine mammals positively interacting with the farms.

The Port Isaac marine licence has been granted over 100 Ha of sandy mud sediment which may be critical supportive habitat for marine mammals in terms of prey availability (for example sandeel habitat and spawning ground). However, Biome and Camel Fish have purposefully selected sites that are over coarse sediment to ensure we are not impacting critical supportive habitat for prey. The MMO marine licence granted means the Port Isaac site will likely have some impact on feeding in marine mammals – if they farm. However, the Port Quin farms do not add to this situation. There are no cumulative impacts related to feeding grounds as a result of adding the Port Quin farms.

15.0: Risk Assessment: Conclusions

The overall risk assessment for marine mammal entanglement within static longline farms and disturbance for the proposed Port Quin farms is **not significant** based on, but not limited to the following:

- Global studies which indicate limited evidence of entanglement in longline farms, even in areas with 22,000 Ha of longline farms in the nearshore environment.
- Global assessment that risk from longline farms is consistently low with good practice.
- Assessment of mammals present in the Bay region
- Less infrastructure used due to nearshore location in shallower water, particularly vertical lines.
- Good practice integrated into operational profiles by operators.
- Well-engineered longlines with clear maintenance protocols to reduce risk.
- Absolutely static farm systems which minimize lost gear and are fully tensioned.
- Lost gear retrieval plans.
- Operational profiles removing pressure at sensitive periods for breeding seals and other mammals.
- Maintaining distance from sensitive sites (shore-based).
- Site located over coarse sediment that does not support prey species for marine mammals.
- Site located outside of main migratory routes.
- Low cumulative site footprint in relation to the overall protected Bristol Channel SAC (porpoises).
- Clear channels within farms for navigation and a total maximum infrastructure footprint of 10% of the combined licenced site area (10.08/100.8 Ha).
- Monitoring programs proposed and real-time/on-site monitoring (alert systems) and rescue response plans in place.
- Employee training in marine mammals (ID, records, responses).
- Clear navigational routes around the periphery of the farms.
- Policies with regards to marine mammals and interactions/operations.

The overall risk assessment for noise and disturbance of marine mammals is **not significant** due to altering the anchorage system and mitigating noise across the operational profile of the farm, while maintaining distance and following DEFRA codes. In addition, the farms are located at distances from sensitive shore habitats for seals (550 to 750 m +). Farm activities are timed to have least impact on breeding seal colonies and on peak seasons for other mammals. In addition, entanglement risk is reduced by removing tensioned seed ropes for 1/3 of the year, during summer.

The overall risk to critical habitats is **not significant** as the sites are located on coarse sediment which is not a critical feeding habitat for local marine mammals and the sites are not within main migratory routes.

Monitoring programs in partnership with experts and independent research groups will enable transparent sharing of data and accurate monitoring of marine mammals in the Bay.

Chapter 8: Bird Impact Assessment, Pentire Peninsular SSSI

Preface

The following assessment is in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence application, as referenced above.

The assessment has been conducted with independent input from universities, prominent research groups (Cornwall, Devon, UK), marine engineers, and active farmers in the region. This represents a wide range of experts and leading, published scientists and certified experts in the field of ornithology and aquaculture. Contact details can be provided confidentially to the MMO and primary advisors for verification purposes.

In addition, we have utilised information provided by the Seal Research Trust, Cornwall.

The questions covered as per MMO FIR 2 were:

7.2 Lost Gear

It has been noted that given the highly exposed nature of this site, there is considerable potential for farm gear to be lost, given the currents and rough seas recorded in the area. The MMO ask that you give consideration to this risk and how this would be mitigated.

In response to this concern, we have assessed infrastructure stability using independent marine engineers and reviewed our assessments and have made sure to include considerations to lost gear and the mitigation of lost gear in our updates. This has been done cumulatively for both proposed seaweed farm sites. Refer to Chapters 7,8,9,10, 13,14 and 15.

7.3 Impacts on Ornithology

It has been noted that that the cliffs around Port Quin Bay are home to a number of seabirds with a significant colony of Puffin present on Moul's Island. This area also forms part of the

Pentire Peninsula Site of Special Scientific Interest (SSSI). The MMO ask that you give consideration to the impacts on species present within the SSSI and how the construction and operation of the project will impact these.

In response to this concern, we have assessed the potential impact of the proposed farms on birds in the area including Puffins. This assessment also specifically looks at the SSSI and gives considerations to the impacts on species present within the SSSI and if the construction and operation of the projects will significantly impact these. This has been done cumulatively for both proposed seaweed farm sites.

1.0 Objectives

- Assess the risks to protected birds within seaweed farms globally and within Port Quin.
- Assess the risk of noise and disturbance on protected birds from the proposed seaweed farming operations.
- Discuss a proposed monitoring program.

2.0 Overview

The purpose of this chapter is to primarily assesses whether there are **significant** risks for protected birds in relation to the proposed Port Quin seaweed farms under application numbers MLA/2023/00307 and MLA/2023/00308.

A thorough literature review was undertaken from a global and historical perspective. Data was collated for the region in question: Port Quin (where available). Infrastructure currently used for farming seaweed was assessed independently by marine engineers. Various lead research groups from around the UK offered their expertise and insights. Local, active farmers provided observations and experiences whilst operating. All seaweed farming practices detailed within the report are already undertaken by Biome and will be adopted by Camel Fish.

In addition, the chapter considers the operational profile of the proposed farm activities and assesses if protected birds are at **significant** risk from noise and loss of equipment.

A long-term monitoring program is proposed.

3.0 Legislative Protection For Protected Bird Species

Listed birds (priority species) are protected under the Wildlife and Countryside Act (WCA) 1981 (as amended) and under Section 41 of the 2006 Natural Environment and Rural Communities (NERC) Act. The former Act makes it illegal to damage or destroy nests, intentionally kill, injure or take birds. Other forms of protection include listed OSPAR species and lists for Priority Species under the UK Post-2010 Biodiversity Framework. Compliance with these legislative protections is important and risks must be identified and assessed. Where risks are identified, the proposed seaweed farms should avoid, minimize or mitigate the risk pathways.

Although the area is not designated as an SPA for birds, there is an SSSI. Within the Pentire Peninsular SSSI (SW937797, Figure 1.0), several listed (protected) bird species are found on Mouls Island (part of the SSSI which is designated up to the lowest part of the intertidal zone: spring tide low water mark). The proposed farm sites are located 600m + from the Pentire Peninsular SSSI. This places the farms outside of the Impacts Risk Zone (IRZ) for the SSSI. The SSSI is not part of a European Site. Coastal cliffs and foreshore exposure (Varisan and Devonian) form part of the designation and are in favourable condition (Natural England, 2019). It is designated for a range of vascular plants that will not be impacted by the proposed seaweed farms (nearshore).

The coastal margin is designated as open access with the South west coastal pathway running around the perimeter of the headland. Those colonies located on Mouls (offshore) are not at risk from disturbance via public land access (headland: walkers or climbers). Disturbance for cliff nesting birds is only considered a risk if the activity or project is within the vicinity of nesting sites (become sensitive to disturbance). The proposed farms are outside of the IRZ and will not directly impact the physical features of the SSSI.

Listed birds in the SSSI (including Mouls) include isolated bird colonies that interact with the marine environment (Natural England, 2019). Species include puffins (*Fratercula arctica*), Guillemots (*Uria aagle*), Fulmars (*Fulmarus glacialis*) and Razorbill (*Alca torda*). They are all breeding colonies. Table 1.0 summarizes conservation status. Puffins make burrows in soft soil on Mouls (offshore island). Guillemots are found on coastal cliffs and on rock stacks, as are Razorbill (Mouls). Fulmars occupy cliff ledges and faces. All are in favourable condition (Natural England, 2019). Early JNCC data sets (2015-2017) indicated the greatest bird populations were located on Mouls, 300 m offshore. As these are mobile species that interact with the marine environment, an assessment of the proposed farms, relative to these bird species is appropriate. Table

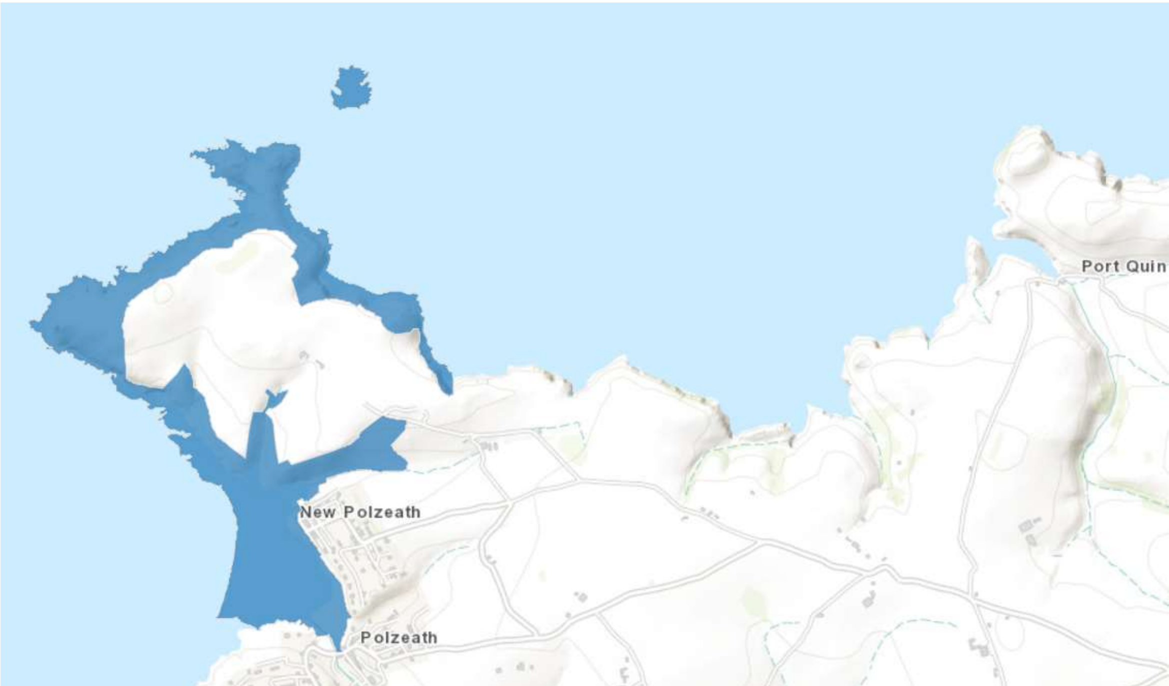


Figure 1.0: Pentire Peninsular SSSI including Mouls Island (Source: opendata.arcgis.com, June 2024).

Bird Species	UK List	IUCN Red List	Birds Directive Annex 1	Species of European Conservation Concern
Puffin	red list	vulnerable	X	endangered
Guillemot	amber list	least concern	X	least concern
Razorbill	amber list	near threatened	X	Least concern
Fulmar	amber list	least concern	X	vulnerable

Table 1.0: Conservation status of listed birds

4.0 Global Assessment Of Entanglement Risk

4.1 Shellfish Longlines As A Proxy

Please refer to Chapter 7 (4.1) for rationale; using shellfish longlines as proxies and Chapter 5 assessing farm infrastructure stability.

4.2 Historic Aquaculture-Related Entanglements And Interactions

Concerns have been raised around bird entanglement with longline farming systems (Roycroft et al. 2007a, Keeley et al. 2009). However, few studies report injury or mortality rates. In 2004, Roycroft et al. found no adverse effects on the abundance or species richness of seabirds at nearshore mussel farms in depths of 14-17m. Birds were present within farms, including gulls and cormorants. Suggestions made are that birds can perch on floats, feeding on epifauna growing on above water structures (buoys) which are similar for shellfish and seaweed lines.

In Bantry Bay, Northern Ireland, Roycroft et al (2007b) compared seabird energy budgets within three farming sites and three control sites. The presence of longlines had positive or neutral impacts on seabirds observed. Birds were perching and divers were observed foraging in the farm areas.

New Zealand has the richest data on bird interactions with longline farms. At the time of assessment, there were 1100 active shellfish farms covering 22,000 Ha (Price et al. 2017). Lloyd

2003 reported that to date, a total of 2 incidences of Bryde's whale entanglement in farms were evident, though one is disputed (Clement et al. 2013). No incidences of farm entanglement for dolphins, pinnipeds or seabirds have been reported (Lloyd 2003).

Sagar 2013 produced a comprehensive report on the issue of seabird interaction with aquaculture. The risk is acknowledged, but in the context of 22,000 ha of nearshore farms, there have been very few reports of seabird deaths as a result of entanglement in aquaculture facilities. Non-lethal effects to be considered are habitat exclusion and ingestion of marine litter but in combination with entanglement, they are considered non-significant. As for birds, tensioned lines further reduce non-significant risks.

Benefits have been identified as provision of roost sites (perches: buoys) closer to foraging areas, attraction of fish to farms (potential prey) (Sagar, 2013).

The foraging distribution and habitat use of king shag (*Leucocarbo carunculatus*) was studied in Admiralty Bay, New Zealand (Fisher and Boren, 2012). They were not using the extensive farm areas as foraging grounds, but as perches (roosting, resting, preening).

Shellfish farmers operating smaller farms have considered using exclusion nets to prevent species of birds eating farmed mussels, for example, wild sea ducks. Varennes et al. 2013 assessed a wide range of exclusion nets and noted that entanglement risk was low and at the surface. Net types were identified to avoid entanglement. Other deterrent methods include loud sounds, streamers, plastic predators and mirrors – with minimal effect (Richman, 2013).

Biome and Camel Fish will not be using exclusion nets or other methods to deter birds from interacting with the farms. Seabirds do not predate on seaweed. And the applicants have no intention of interfering with seabirds present in the Bay area through presence of infrastructure, operating on critical foraging habitat or through significant disturbance. Policies will be adhered to with regards to marine litter.

Hughes et al. 2014 observed a land-adjacent seaweed farm for 96 days using video observations. Birds avoided interactions with farm gear and no harmful interactions were recorded.

A clear distinction must be drawn between longline farms for shellfish and seaweed cultivation and marine fish farms. At fish farms, marine entanglement in cages or nets poses the biggest threat to seabirds, specifically divers (Belle and Nash 2008, Northridge et al. 2013). The birds will congregate near fish farms and predate on the farmed fish during transfer or harvest (Nash et al. 2005, Huntingdon et al. 2006, Rensel and Forster, 2007). In the case of fish farms, these should be located away from important seabird habitats (Borg et al. 2011).

When compared with death or injury to birds caused by ship collisions, plastics or fishing gear (lines and nets), there are few to no reported entanglement incidents collectively, over a long period of time, associated with longline farms. Considering studies over decades and globally extensive areas of aquaculture in coastal waters, entanglements with longline farms are rare if at all (Price et al. 2017). Expected entanglement impact is very low and in fact has been classed as **non-significant**, alongside other potential negative effects (Sagar, 2013).

4.3 Good Farming Practice

Although the risk of entanglement and negative effects for seabirds interacting with longline farms are consistently assessed as low or non-significant, the applicants note that good practice to help further reduce low risks to marine mammals (Chapter 7) are also good practice to ensure birds are not negatively impacted by the proposed farms.

Clement et al. 2013 assessed risks to marine cetaceans as significantly lower from longline shellfish (or seaweed comparative) systems compared to netted systems. They note loose ropes are more risky than thicker, tensioned lines. This is noted for birds too (Sagar et al .2013). Design, deployment and tensioning of the systems is integral in reducing entanglement risks to low levels (Lloyd 2003, Keeley et al. 2009, Clement et al 2013, Price et al. 2017).

Clement et al. 2013 suggest siting farms where there is little to no overlap with critical habitat (foraging). Site selection to minimize or avoid spatial overlap with species significant home ranges, critical breeding grounds and main migratory routes can help further reduce risks, alongside site and longline management and continuous monitoring of birds in the vicinity or general region of the farm.

Wilding et al. 2021 reported a general lack of evidence for seals and finfish entanglement with kelp farms, which reflects low incidence – similar to birds (Price et al. 2017). However, they note that ensuring no overlap with feeding grounds was important. WWF (2023) suggest use of monitoring equipment, alarms (sensors) or implementation of monitoring programs to further reduce low risks from longline aquaculture.

Clark et al. 2021 reported the importance of safeguarding marine life through regular maintenance of seaweed and shellfish longlines, retrieval of lost gear (if loss arises), reductions of noise during operations, clearance space below infrastructure, as well as ensuring policies regarding marine cetaceans are in place around farm operations.

4.4 Researcher Risk Assessment

Although entanglement and negative interactions of birds with longline farms cannot be ruled out 100%, reports and studies consistently show risks are low or non-significant (Sagar et al 2013, Price et al. 2017). In New Zealand, where some 22,000 Ha of coastline is covered by active longline farms, entanglement is considered low risk, if best management practices are followed (Price et al. 2017).

4.5 Conclusions

There is agreement across studies globally, that static, longline farms, when engineered and managed properly, **do not pose a significant risk** to seabirds. It is consistently assessed as low risk. And risk can be further reduced through farm design and best management practice implemented by operators.

5.0 Local Assessment Of Populations/Sightings

5.1 Sediment Type At Proposed Farm Sites

Please refer to Chapter 6.

5.2 Local Data And Information For Seabirds Within The Pentire Peninsular SSSI

5.2.1 Puffins (*Fratercula arctica*)

The Seals Research Trust (SRT), local sea safari companies and local bird conservation groups note the presence of black, white and orange billed puffins (Auks) during breeding season on Mouls Island which is within the Pentire Peninsular SSSI (Figure 1.0). This matches data provided by the JNCC, RSBC and the British Trust for Ornithology (BTO). This is the only population of puffins in North Cornwall (Figure 2.0). The puffins use the earth banks on the leeward side of uninhabited Mouls to make burrows for nesting (Figure 3.0). Mouls is the only island suitable for the puffins to breed on in the region. There are an estimated 6-7 pairs.

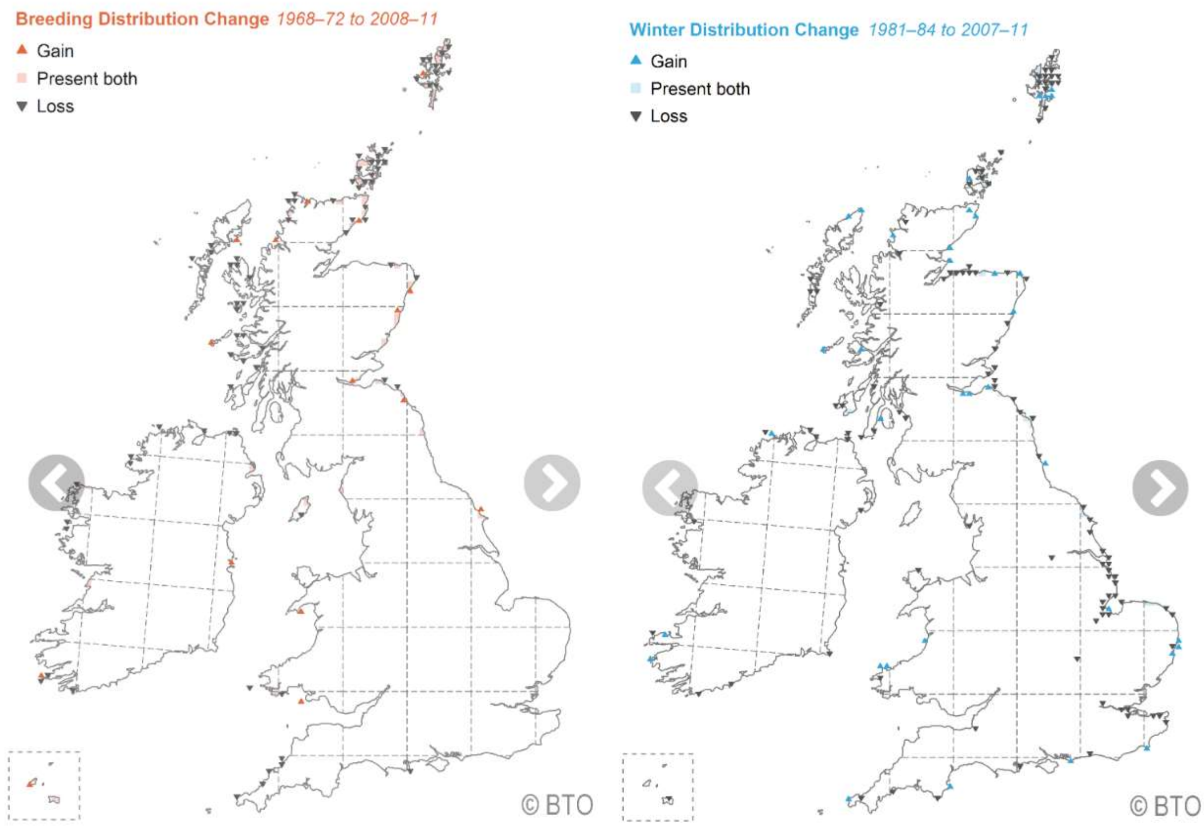


Figure 2.0: Distribution of breeding and wintering puffin colonies around the UK 1968-2011 (Source: British Trust for Ornithology, accessed June 2024).

Figure 3.0: Puffin with sandeels (Source: Sharp Photography)

Relatively small numbers of puffins are present in North Cornwall on a seasonal basis (to breed: 6-7 pairs have been reported). They are a UK red listed and vulnerable species (Table 1.0) and have had a 26.8% reduction (Source: BTO) in their overall UK distribution. There are 580k pairs of breeding puffins in the UK (BTO). Puffins overwinter offshore from August through to March annually. They overwinter in Atlantic, North Sea or Bay of Biscay (south). They arrive in North Cornwall for breeding season (April to July). When they first return to the area, they form sea flocks or rafts to the east of Mouls before moving onto the island. Each breeding season, a successful breeding pair will produce a single egg. Puffins live up to 20 years on average and can breed from the age of 5+. Once an egg is produced, parents take it in turns to protect the egg/chick or hunt for food. Food includes lesser sandeels (*Ammodytes sp.*), herrings and crustaceans. Puffins fly for their food (up to 88 km/hr, wings beating 400 x a minute) and equally fly under water when foraging. Adults weight between 320-450g (BTO).

Seabirds including puffins are generally showing vulnerability to climate change, overfishing, microplastics and viruses (avian flu). Seaweed farming has potential to combat climate change in-situ (pending research) and through seaweed-derived products that can reduce or avoid carbon production (examples: animal feed and bio-fertilizer). Seaweed's use as one alternative material to single use oil-based plastics is another benefit that may indirectly, but positively impact seabirds, as well as marine mammals, in the long-term, through gradual reduction in plastic pollution in the marine environment, over time.

Potential pathways to impact from the farms are; entanglement, changes to or displacement from critical foraging habitat, marine litter ingestion, vessel strikes, noise and physical disturbance. The results of significant impacts could be a reduction in the population and breeding success. Insignificant or low impact pathways should not impact population size, sex ratio or breeding success.

Entanglement of seabirds in nearshore, longline farms has been globally assessed as low or non-significant (section 4.0). This is further reduced by correct engineering and maintenance of longline infrastructure. Absolute stability has been established over a 50-year storm period and loss of equipment is a low risk, further reduced by regular maintenance (section 10.0). Independent marine engineers have indicated the use of non-penetrative eco-blocks on a heavily coarse sediment is unlikely to significantly alter sediment movement, as movement is limited in this type of sediment.

In terms of farm operations (section 12.0), puffins are present when the farms are active in April, May and June seasonally. Farm activity is significantly reduced in July as harvesting has ceased and the farms operate on a minimal level for maintenance only during July. The main farm activity to potentially impact the puffins is harvesting of the seaweed. In section 10.0, 11.0 and 12.0 (this chapter), operational procedures, training and policies are described to avoid or further reduce any impacts from harvesting on puffin populations.

During the breeding season, the parents will require enough food for themselves and the young.

Within the Bay, the majority of the sediment is very coarse sediment. There is a small area of sandy mud to the east of Mouls and west of the proposed farm sites which are located well within the coarse sediment seabed. It is likely the puffins utilize the sandy mud located outside of the proposed farms for foraging of sand eels, herring and crustaceans. And sandy mud sediment further east in Port Isaac Bay. Sand eels, herring and crustaceans are not found within coarse sediment – a fact attested to by a range of local fishermen including potters – as they all stated there is very little if anything to catch in that section of the Bay. The proposed farms are not located over critical feeding habitat and will not displace the birds from critical feeding habitat.

It's possible that the proposed farms will increase foraging options for local seabirds including puffins. The use of bioengineering eco-blocks will increase crustaceans and small fish in the farm locality, alongside an overall biodiversity increase, including commercial species (Appendix I). Corrigan et al. 2024 have established seaweed farms attract a range of fish, which feed and find shelter underneath the farm and within the eco-blocks. When harvested, the fish will disperse to the natural ecosystems within the Bay (kelp beds, sandy mud). Species that the seaweed farms have been demonstrated to positively support include lesser sand eels (*Ammodytes spp*.), greater sand eels (*Hyperoplus lancolatus*), grey mullet, juvenile fish species, pollack, mackerel, wrasse and nursehounds (Corrigan et al. 2024).

International research and observations of seabird interactions with farms indicate that the birds utilize the semi-submerged buoys as resting areas and viewing areas when foraging or feed on the epifauna (crustaceans) growing on the buoys. During harvest, vessels operate quietly on one longline at a time (engines off), minimizing disturbance. It is possible to plan work from the furthest (east) point of the farms from Mouls, gradually inwards across the months to avoid the most vulnerable times for eggs and chicks.

The farm structure (20 m open-ended channels) and infrastructure only occupying 10% maximum of the proposed farm footprints (10.08 Ha of 100.8 Ha), the majority of the licenced sites remain open sea for flocking and foraging.

The closest point of the proposed farm sites to Mouls is 750m + to the east of the island. The farms are located at least 500-600 m (ranges) from cliff sites in the SSSI. Access to the Bay can be achieved by circumnavigating Mouls periphery at distances to avoid disturbance and not accessing the Bay through the Rumps/Mouls channel. The farm operators will not be coming into contact with the birds or be operating in or transitioning near sensitive nesting sites within the SSSI. Farm vessels and operators will not enter or interact with the SSSI (including Mouls). Good practice, training, operating profiles and policies will be implemented to further reduce impact pathways to non-significant or low (section 10,11 and 12, this chapter).

5.2.2 Guillemots (*Uria aalge*)

The Seals Research Trust (SRT), local sea safari companies and local bird conservation groups note the presence of chocolate brown and white guillemots during breeding season on Mouls Island which is within the Pentire Peninsular SSSI (Figure 1.0). This matches data provided by the JNCC, RSBC and the British Trust for Ornithology (BTO). Distribution of guillemots in the UK is provided in Figure 4.0). Guillemots use cliff ledges on the south east side of uninhabited Mouls for breeding (Figure 5.0).

Colonies can be found around much of the UK coastline. Colonial breeding is typical in this species, with some numbering tens of thousands of individuals (BTO). During winter months, they are regularly found in offshore and coastal waters (BTO). There are 950k breeding pairs in the UK. However, there distributional range has decreased by 16.7% and they are on the UK amber list. (BTO). Adults typically weigh 891 g and live on average 23 years. Pairs will lay one egg per breeding season. They nurture the eggs on their feet, on the narrow cliff ledges, with eggs hatching after three weeks. At this point the young start diving with the father at sea. Food sources include fish (sandeels), crabs and mollluscs. The guillemots tend to form breeding colonies in March and April each year and leave the site for offshore in July and August. Therefore, they will be present for breeding during harvesting periods (April to June).

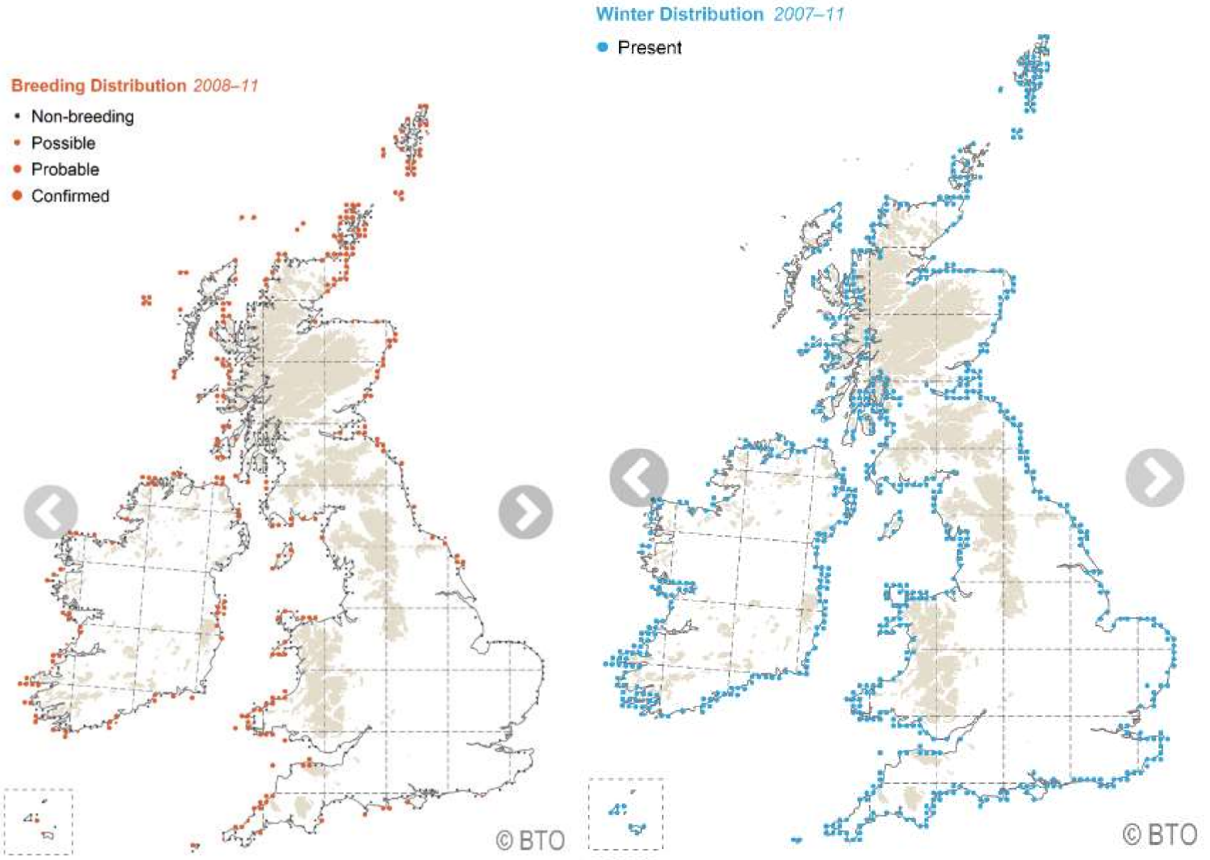


Figure 4.0: Distribution of breeding and wintering guillemot colonies around the UK 1968-2011 (Source: British Trust for Ornithology, accessed June 2024).

SRT have conducted quarterly systematic POLPIP boat survey transects between Trevose and North Cornwall between 2011-2022. This represents 115 km of coast and occurred in January, April, July and October of each year. There were 49 surveys in total and it is noted these are offshore (Figure 6.0).

Figure 5.0: Guillemots (Source RSPB)

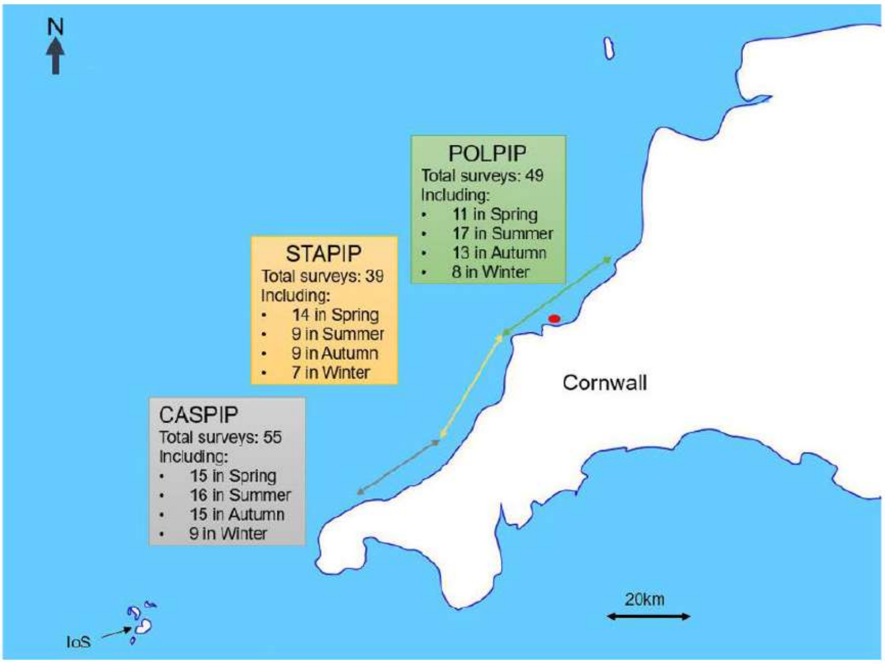


Figure 6.0: SRT POLPIP survey transects, 2011-2022.

SRT data indicates that across surveys, up to 1,094 birds were on nesting ledges with up to 1,176 further west (Figure 7.0). When SRT were collating data during the surveys, they kept the DEFRA wildlife code of 100 m minimum distance from the birds. Where possible, they maintained distances between 200 to 400 m.

POLPIP 2015-23 Bird Ledges

Ledge No.	Approximate location	Lat	Long	Species	26 11 2015 No. of Birds	25 02 2016 No. of birds	11 04 2016 No. of birds	08 06 2016 No. of birds	03 11 2016 No. of birds	13 04 2017 No. of birds	07 08 2017 No. of birds	02 11 2017 No. of birds	30 01 2018 No. of birds	02 04 2018 No. of birds	12 07 2018 No. of birds	24 10 2018 No. of birds	24 01 2019 No. of birds	09 04 2019 No. of birds	05 07 2019 No. of birds	30 04 2021 No. of birds	09 07 2021 No. of birds	21 01 2022 No. of birds	29 04 2022 No. of birds	13 07 2022 No. of birds	25 01 2023 No. of birds
1				Guillemot	0	141	0	108	0	117	0	26	80	0	36	0	106	115	48	157	104	153	143	0	176
				Razorbill	0	22	0	3	0	2	0	0	0	0	0	0	0	13	3	20	4	10	1	0	13
2				Guillemot	20	98	66	67	0	131	0	0	39	0	32	0	94	114	1	131	48	98	139	0	52*
				Razorbill	0	22	2	53	0	58	0	0	1	0	2	0	18	40	0	39	5	2	19	0	3*
				Kittiwake	0	309	512	846	0	251	254	0	54	8	298	0	160	182	117	409	221	4	291	0	0
				fulmar	16	23	71	45	0	47	11	0	11	5	18	1	60	27	22	13	21	20	1*	0	12*
3				Guillemot	NC	27	0	31	0	NC	0	0	28	0	0	0	NC	88	0	17	0	0	0	0	NC
				Razorbill	NC	0	0	0	0	NC	0	0	0	0	0	0	NC	4	0	6	0	0	0	0	NC
4				Guillemot	126	512	0	1176	0	NC	0	0	0	0	776	0	615	1025	40	942	750**	0	1059	0	0
	[redacted]			Razorbill	0	31	0	42	0	NC	0	0	0	1	1	0	9	109	0	31	53**	0	98	0	0
5				Guillemot	0	642	0	678	0	NC	0	0	0	0	0	0	725**	1000**	0	NC	0	0	1094	0	0
				Razorbill	0	6	0	16	0	NC	0	0	0	0	0	0	0	0	0	NC	0	0	16	0	0
6				Guillemot	0	0	0	NC	0	NC	0	0	0	0	0	0	0	0	0	6	17	0	0	0	NC
				Razorbill	0	0	0	NC	0	NC	0	0	0	0	0	0	0	0	0	6	8	0	0	0	NC

Figure 7.0: SRT data collated since 2015 (POLPIP survey transects); provided in response to the MMO.

Seabirds including guillemots are generally showing vulnerability to climate change, overfishing, microplastics and viruses (avian flu). Seaweed farming has potential to combat climate change in-situ (pending research) and through seaweed-derived products that can reduce or avoid carbon production (examples: animal feed and bio-fertilizer). Seaweed's use as one alternative material to single use oil-based plastics is another benefit that may indirectly, but positively impact seabirds, as well as marine mammals, in the long-term, through gradual reduction in plastic pollution in the marine environment, over time.

Potential pathways to impact from the farms are; entanglement, changes to or displacement from critical foraging habitat, marine litter ingestion, vessel strikes, noise and physical disturbance. The results of significant impacts could be a reduction in the population and breeding success. Insignificant or low impact pathways should not impact population size, sex ratio or breeding success.

Entanglement of seabirds in nearshore, longline farms has been globally assessed as low or non-significant (section 4.0, this chapter). This is further reduced by correct engineering and maintenance of longline infrastructure. Absolute stability has been established over a 50-year storm period and loss of equipment is a low risk, further reduced by regular maintenance. Independent marine engineers have indicated the use of non-penetrative eco-blocks on a heavily coarse sediment is unlikely to significantly alter sediment movement, as movement is limited in this type of sediment.

In terms of farm operations, guillemots are present when the farms are active in April, May and June seasonally. Farm activity is significantly reduced in July as harvesting has ceased and the farms operate on a minimal level for maintenance only during July and August. The main farm activity to potentially impact the guillemots is harvesting of the seaweed. In section 10.0, 11.0 and 12.0 (this chapter), operational procedures, training and policies are described to avoid or further reduce any impacts from harvesting on guillemot populations.

During the breeding season, the parents will require enough food for themselves and the young. Within the Bay, the majority of the sediment is very coarse sediment. There is a small area of sandy mud to the east of Mouls and west of the proposed farm sites which are located well within the coarse sediment seabed. It is likely the guillemots utilize the sandy mud located outside of the proposed farms for foraging of sand eels and crustaceans. And sandy mud sediment further east in Port Isaac Bay. Sand eels, herring and crustaceans are not found within coarse sediment – a fact attested to by a range of local fishermen including potters – as they all stated there is very little if anything to catch in that section of the Bay. The proposed farms are not located over critical feeding habitat and will not displace the birds from critical feeding habitat.

It's evidenced and therefore possible that the proposed farms will increase foraging options for local seabirds including guillemots. The use of bioengineering eco-blocks will increase crustaceans, molluscs and small fish in the farm locality, alongside an overall biodiversity increase, including commercial species (Arc Marine 2024). Corrigan et al. 2024 have established seaweed farms attract a range of fish, which feed and find shelter underneath the farm and within the eco-blocks. When harvested, the fish will disperse to the natural ecosystems within the Bay (kelp beds, sandy mud). Species that the seaweed farms have been demonstrated to positively support include lesser sand eels (*Ammodytes spp*.), greater sand eels (*Hyperoplus lancolatus*), grey mullet, juvenile fish species, pollack, mackerel, wrasse and nursehounds (Corrigan et al. 2024).

International research and observations of seabird interactions with farms indicate that the birds utilize the semi-submerged buoys as resting areas and viewing areas when diving, foraging or feeding on the epifauna (crustaceans/molluscs) growing on the buoys. During harvest, vessels operate quietly on one longline at a time (engines off), minimizing disturbance. It is possible to plan work from the furthest (east) point of the farms from Mouls, gradually inwards across the months to avoid the most vulnerable times for eggs and chicks.

The farm structure (20 m open-ended channels) and infrastructure only occupying 10% maximum of the proposed farm footprints (10.08 Ha of 100.8 Ha), the majority of the licenced sites remain open sea for flocking, foraging and diving – although quite a shallow site (10-15m).

The closest point of the proposed farm sites to Mouls is 700m + to the east of the island. The farms are located at least 500-600 m (ranges) from cliff sites in the SSSI. Access to the Bay can be achieved by circumnavigating Mouls periphery at distances to avoid disturbance and not accessing the Bay through the Rumps/Mouls channel. The farm operators will not be coming into contact with the birds or be operating in or transitioning near sensitive nesting sites within the SSSI. Farm vessels and operators will not enter or interact with the SSSI (including Mouls). Good practice, training, operating profiles and policies will be implemented to further reduce impact pathways to non-significant or low (section 10.0, 11.0 and 12.0, this chapter).

5.2.3 Razorbills (*Alca torda*)

Local sea safari companies and local bird conservation groups note the presence of black and white Razorbills (Auks) on Mouls Island which is within the Pentire Peninsular SSSI (Figure 1.0). This matches data provided by the JNCC, RSBC and the British Trust for Ornithology (BTO). Their UK distribution is illustrated in Figure 8.0. The Razorbills only come to shore to breed on cliff ledges and are far less exacting on nesting sites compared to guillemots or puffins. They are diving birds, diving up to 120 m when hunting for fish. They live on average for 13 years but overall population sizes are smaller than guillemots in the UK. They can be found year-round, with some staying over winter, but the majority migrating to the Northern Atlantic. There are between 130,000 and 165,000k breeding pairs in the UK, however, their distributional range has contracted by 16.7% (BTO). They produce 1 egg per year which hatches within 35-40 days. Food sources include sand eels, sprats and herrings. They are on the UK Amber list and the UK and Ireland are an important global breeding ground for this species.

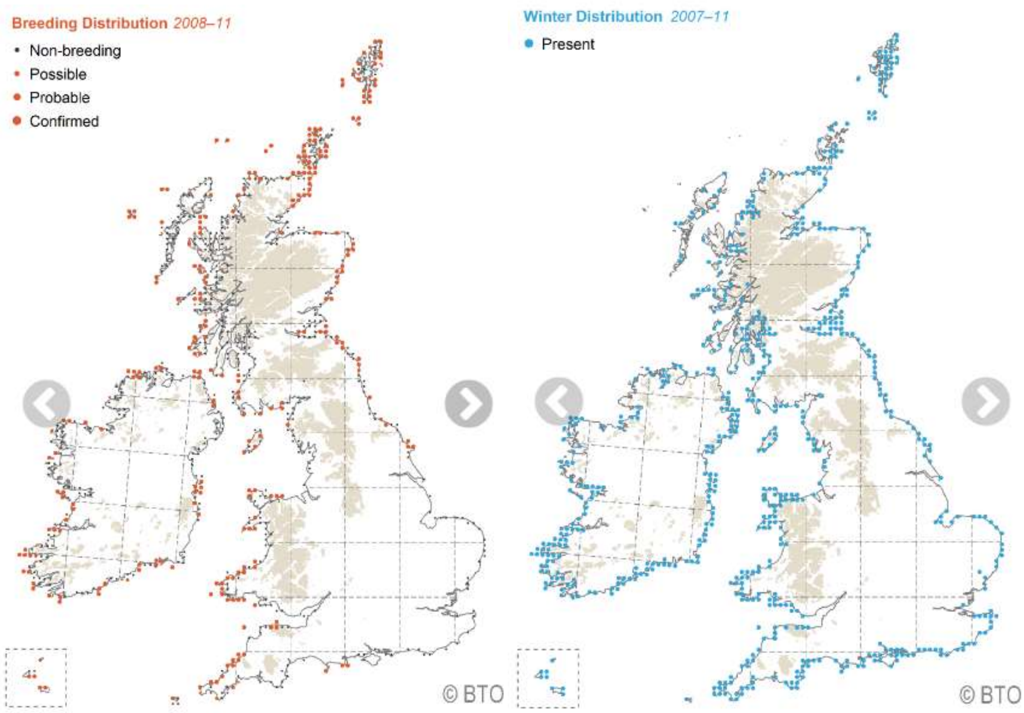


Figure 8.0: Distribution of razorbills in the UK (Source BTO).

They are on shore for breeding in April, May, June and July each year. Therefore, they are present for breeding during harvesting (April to June).

Seabirds including razorbills are generally showing vulnerability to climate change, overfishing, microplastics and viruses (avian flu). Seaweed farming has potential to combat climate change in-situ (pending research) and through seaweed-derived products that can reduce or avoid carbon production (examples: animal feed and bio-fertilizer). Seaweed's use as one alternative material to single use oil-based plastics is another benefit that may indirectly, but positively impact seabirds, as well as marine mammals, in the long-term, through gradual reduction in plastic pollution in the marine environment, over time.

Potential pathways to impact from the farms are; entanglement, changes to or displacement from critical foraging habitat, marine litter ingestion, vessel strikes, noise and physical disturbance. The results of significant impacts could be a reduction in the population and breeding success. Insignificant or low impact pathways should not impact population size, sex ratio or breeding success.

Entanglement of seabirds in nearshore, longline farms has been globally assessed as low or non-significant (section 4.0, this chapter). This is further reduced by correct engineering and maintenance of longline infrastructure. Absolute stability has been established over a 50-year storm period and loss of equipment is a low risk, further reduced by regular maintenance (section 10.0). Independent marine engineers have indicated the use of non-penetrative eco-blocks on a heavily coarse sediment is unlikely to significantly alter sediment movement, as movement is limited in this type of sediment.

In terms of farm operations, razorbills are present when the farms are active in April, May and June seasonally. Farm activity is significantly reduced in July as harvesting has ceased and the farms operate on a minimal level for maintenance only during July and August.

The main farm activity to potentially impact the guillemots is harvesting of the seaweed. In section 10.0, 11.0 and 12.0 (this chapter), operational procedures, training and policies are described to avoid or further reduce any impacts from harvesting on razorbill populations.

During the breeding season, the parents will require enough food for themselves and the young. Within the Bay, the majority of the sediment is very coarse sediment. There is a small area of sandy mud to the east of Mouls and west of the proposed farm sites which are located well within the coarse sediment seabed. It is likely the razorbills utilize the sandy mud located outside of the proposed farms for foraging of sand eels and sprat. And sandy mud sediment further east in Port Isaac Bay. Sand eels, sprat and herrings are not found within coarse sediment – a fact attested to by a range of local fishermen including potters – as they all stated there is very little if anything to catch in that section of the Bay. The proposed farms are not located over critical feeding habitat and will not displace the birds from critical feeding habitat.

It's possible that the proposed farms will increase foraging options for local seabirds including guillemots. The use of bioengineering eco-blocks will increase crustaceans, molluscs and small fish in the farm locality, alongside an overall biodiversity increase, including commercial species (Arc Marine 2024). Corrigan et al. 2024 have established seaweed farms attract a range of fish, which feed and find shelter underneath the farm and within the eco-blocks. When harvested, the fish will disperse to the natural ecosystems within the Bay (kelp beds, sandy mud). Species that the seaweed farms have been demonstrated to positively support include lesser sand eels (*Ammodytes spp*.), greater sand eels (*Hyperoplus lancolatus*), grey mullet, juvenile fish species, pollack, mackerel, wrasse and nursehounds (Corrigan et al. 2024).

International research and observations of seabird interactions with farms indicate that the birds utilize the semi-submerged buoys as resting areas and viewing areas when diving, foraging or feeding on the epifauna growing on the buoys. During harvest, vessels operate quietly on one longline at a time (engines off), minimizing disturbance. It is possible to plan work from the furthest (east) point of the farms from Mouls and cliffs, gradually inwards across the months to avoid the most vulnerable times for eggs and chicks.

The farm structure (20 m open-ended channels) and infrastructure only occupying 10% maximum of the proposed farm footprints (10.08 Ha of 100.8 Ha), the majority of the licenced sites remain open sea for flocking, foraging and diving – although quite a shallow site (10-15m).

The closest point of the proposed farm sites to Mouls is 750m + to the east of the island. The farms are located at least 500-600 m (ranges) from cliff sites in the SSSI. Access to the Bay can be achieved by circumnavigating Mouls periphery at distances to avoid disturbance and not accessing the Bay through the Rumps/Mouls channel. The farm operators will not be coming into contact with the birds or be operating in or transitioning near sensitive nesting sites within the SSSI. Farm vessels and operators will not enter or interact with the SSSI (including Mouls). Good practice, training, operating profiles and policies will be implemented to further reduce impact pathways to non-significant or low (section 10.0, 11.0 and 12.0, this chapter).

5.2.4 Fulmars (*Fulmaris glacialis*)

Local sea safari companies and local bird conservation groups note the presence of Fulmars on Mouls Island which is within the Pentire Peninsular SSSI (Figure 1.0). This matches data provided by the JNCC, RSBC and the British Trust for Ornithology – where they can be encountered in Wales, Scotland, Ireland, south west and north east of England (BTO). Their UK distribution is illustrated in Figure 9.0. Over the past 44 years, Fulmars have seen an expansion in their breeding colonies in the UK, although reasons for the expansion are unclear but recently it has experienced a 2.1% expansion (BTO).

They spend their first 4-5 years at sea, joining breeding colonies aged 5+ but not breeding until age 9. There are currently 350k breeding pairs in the UK (BTO). They lay one egg per breeding season and are on the UK Amber list. Similar to puffins, guillemots and razorbills, they are found inshore breeding in April, May, June, July and August. They move offshore overwinter. Therefore, the only active farming activity during their breeding season is harvesting.

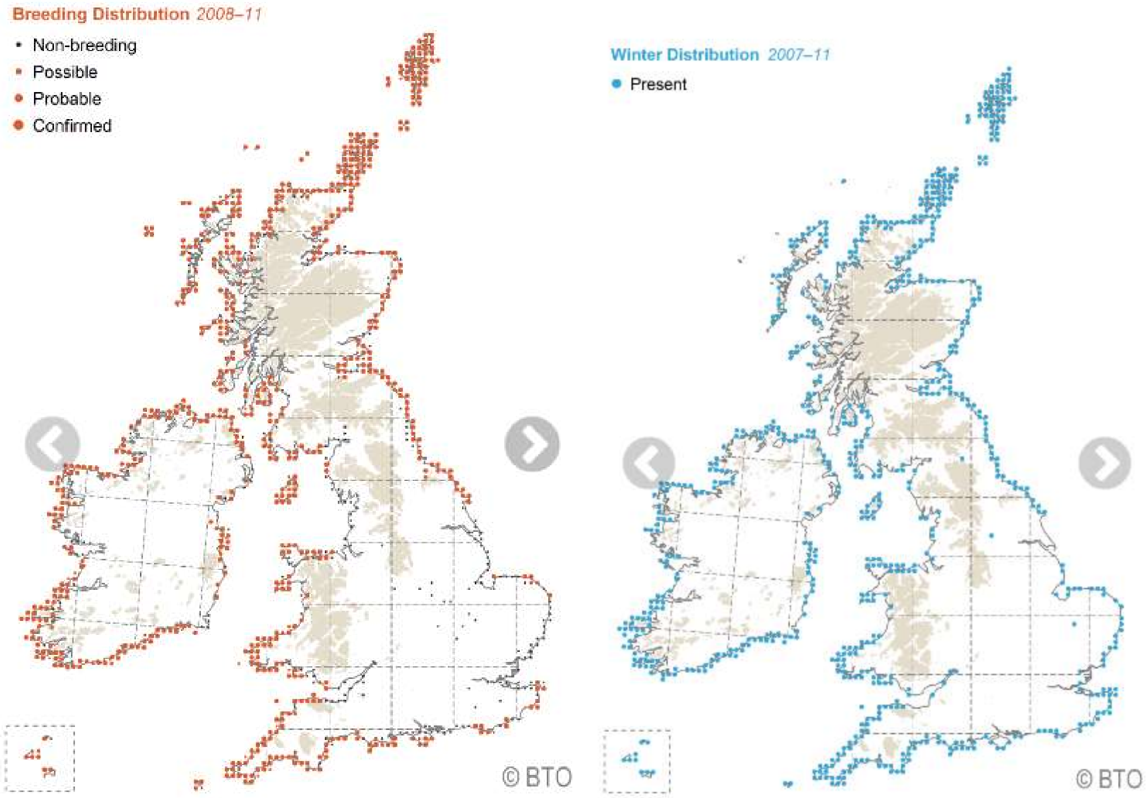


Figure 9.0: Distribution of Fulmar in the UK (Source BTO, accessed June 2024).

Food includes fish, squid and shrimp.

Seabirds including fulmars are generally showing vulnerability to climate change, overfishing, microplastics and viruses (avian flu). Seaweed farming has potential to combat climate change in-situ (pending research) and through seaweed-derived products that can reduce or avoid carbon production (examples: animal feed and bio-fertilizer). Seaweed's use as one alternative material to single use oil-based plastics is another benefit that may indirectly, but positively impact seabirds, as well as marine mammals, in the long-term, through gradual reduction in plastic pollution in the marine environment, over time.

Potential pathways to impact from the farms are; entanglement, changes to or displacement from critical foraging habitat, marine litter ingestion, vessel strikes, noise and physical disturbance. The results of significant impacts could be a reduction in the population and breeding success. Insignificant or low impact pathways should not impact population size, sex ratio or breeding success.

Entanglement of seabirds in nearshore, longline farms has been globally assessed as low or non-significant (section 4.0, this chapter). This is further reduced by correct engineering and maintenance of longline infrastructure. Absolute stability has been established over a 50-year storm period and loss of equipment is a low risk, further reduced by regular maintenance. Independent marine engineers have indicated the use of non-penetrative eco-blocks on a heavily coarse sediment is unlikely to significantly alter sediment movement, as movement is limited in this type of sediment.

In terms of farm operations, fulmars are present when the farms are active in April, May and June seasonally. Farm activity is significantly reduced in July as harvesting has ceased and the farms operate on a minimal level for maintenance only during July and August.
The main farm activity to potentially impact the guillemots is harvesting of the seaweed. In section 10.0, 11.0 and 12.0 (this chapter), operational procedures, training and policies are described to avoid or further reduce any impacts from harvesting on fulmar populations.

During the breeding season, the parents will require enough food for themselves and the young. Within the Bay, the majority of the sediment is very coarse sediment. There is a small area of sandy mud to the east of Mouls and west of the proposed farm sites which are located well within the coarse sediment seabed. It is likely the fulmars utilize the sandy mud located outside of the proposed farms for foraging of fish and squid or prawns. And sandy mud sediment further east in Port Isaac Bay. Fish are not found within coarse sediment – a fact attested to by a range of local fishermen including potters – as they all stated there is very little if anything to catch in that section of the Bay. The proposed farms are not located over critical feeding habitat and will not displace the birds from critical feeding habitat.

It's possible that the proposed farms will increase foraging options for local seabirds including fulmars. The use of bioengineering eco-blocks will increase crustaceans, molluscs and small fish in the farm locality, alongside an overall biodiversity increase, including commercial species (Arc

Marine 2024). Corrigan et al. 2024 have established seaweed farms attract a range of fish, which feed and find shelter underneath the farm and within the eco-blocks. When harvested, the fish will disperse to the natural ecosystems within the Bay (kelp beds, sandy mud). Species that the seaweed farms have been demonstrated to positively support include lesser sand eels (*Ammodytes spp*.), greater sand eels (*Hyperoplus lancolatus*), grey mullet, juvenile fish species, pollack, mackerel, wrasse and nursehounds (Corrigan et al. 2024).

International research and observations of seabird interactions with farms indicate that the birds utilize the semi-submerged buoys as resting areas and viewing areas when diving, foraging or feeding on the epifauna growing on the buoys. During harvest, vessels operate quietly on one longline at a time (engines off), minimizing disturbance. It is possible to plan work from the furthest (east) point of the farms from Mouls and cliffs, gradually inwards across the months to avoid the most vulnerable times for eggs and chicks.

The farm structure (20 m open-ended channels) and infrastructure only occupying 10% maximum of the proposed farm footprints (10.08 Ha of 100.8 Ha), the majority of the licenced sites remain open sea for flocking, foraging and diving – although quite a shallow site (10-15m).

The closest point of the proposed farm sites to Mouls is 700m + to the east of the island. The farms are located at least 500-600 m (ranges) from cliff sites in the SSSI. Access to the Bay can be achieved by circumnavigating Mouls periphery at distances to avoid disturbance and not accessing the Bay through the Rumps/Mouls channel. The farm operators will not be coming into contact with the birds or be operating in or transitioning near sensitive nesting sites within the SSSI. Farm vessels and operators will not enter or interact with the SSSI (including Mouls). Good practice, training, operating profiles and policies will be implemented to further reduce impact pathways to non-significant or low (section 10.0, 11.0 and 12.0 this chapter).

5.2.5 Other Notable Birds

Other birds of note in the region are Manx Shearwaters (*Puffinus puffinus*), Northern Gannets and

Cormorants.

SRT note the presence of Manx Shearwaters (Figure 10.0). SRT state they have been recorded resting and feeding within the Bay. They are a designated feature of the Skokholm, Skomer and Pembrokeshire SPA but are not designated for in the Bay. BTO describe them as skillful navigators of the ocean, rarely seen on land. They do not breed in the area (Figure 11.0). They can winter as far as the South Atlantic (Brazil, Argentina). There are 300k breeding pairs around the UK. They experienced an overall 31.4% distribution contraction (BTO) ad are on the UK Amber list.

Figure 10.0: Manx Shearwaters (Source: E-bird).

Figure 11.0: Breeding sites for Manx Shearwaters (Sourced BTO, accessed June 2022).

Northern gannets (*Morus bassanus*) and cormorants (*Phalacrocrax carbo*) are noted in the area. Both are diving birds. Northern gannets do not breed in the area. They dive for fish from heights of 30m and at 60 mph. They are large seabirds and are present all year, particularly on the Pembrokeshire coast, which is the nearest breeding colony (Figure 12.0). During the winter they move to the Bay of Biscay or coasts of west Africa (BTO). There are 295k nests in the UK and have experienced a 60% expansion in their distributional range, but are on the UK Amber list. They are mostly present between April and October. Therefore, farming activities that could impact them without controls are harvesting and deployment of longlines during the first few seasons as the farms are filled to maximal capacity.

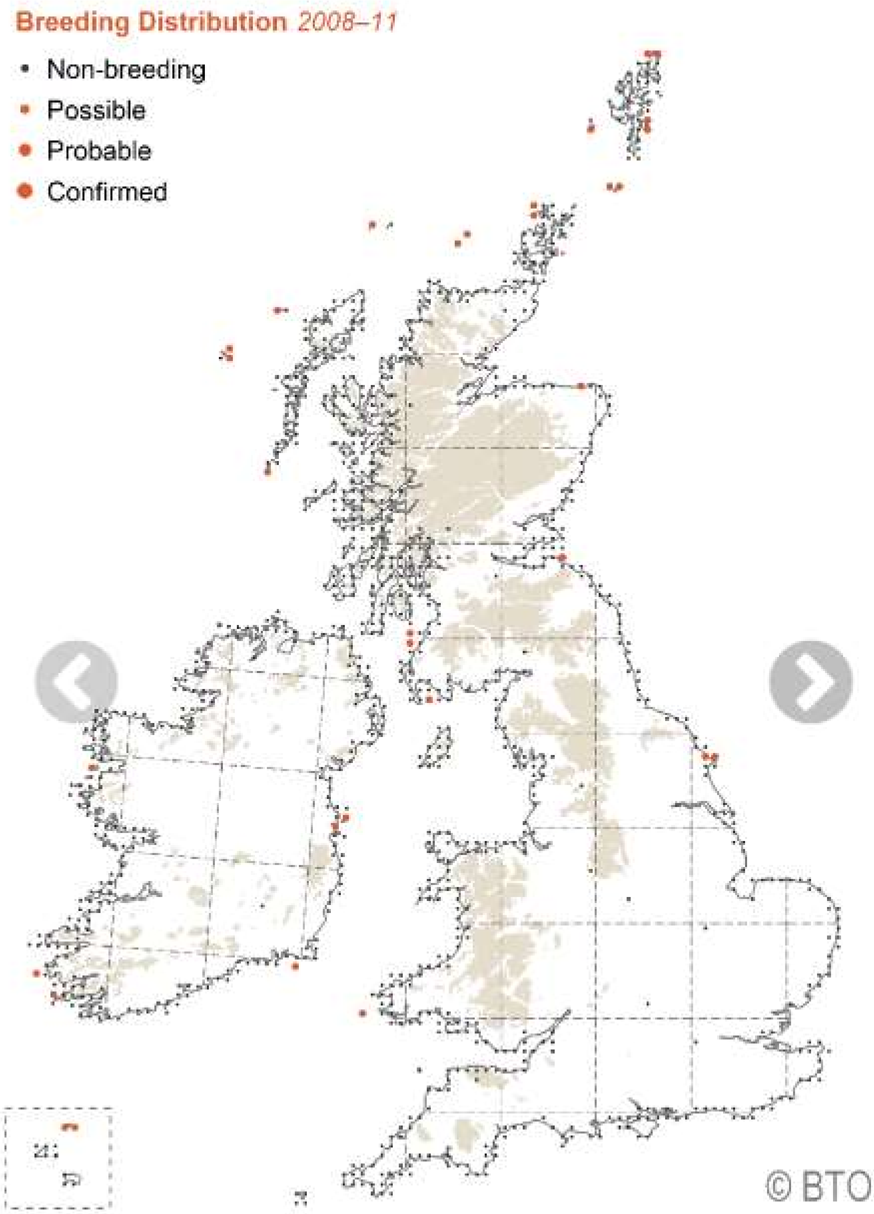


Figure 12.0: Breeding sites for northern gannets (Sourced BTO, accessed June 2022).

Cormorants dive from cliffs to feed and make use of regular roosting sites. They were exclusively in coastal habitats but have been noted as breeding inshore recently (BTO). There are 8,900 breeding pairs in the UK and they are on the UK Green list with a stable population. They live on average for 24 years and feed on fish. They are wintering birds (highest numbers) and lay 2-4 eggs requiring 1-months incubation. They do breed in the area with mid to late February being their main breeding period (Figure 13.0).

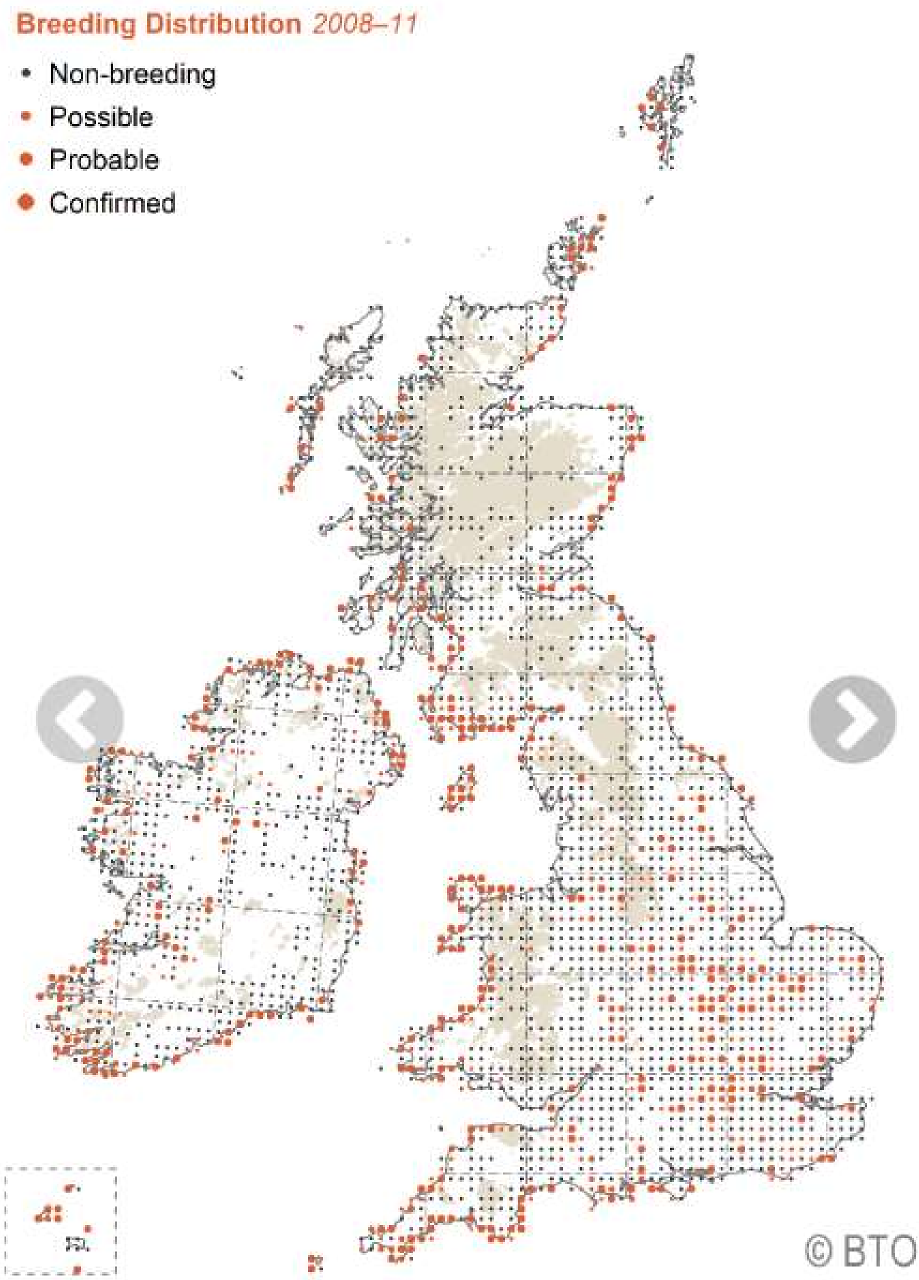


Figure 13.0: Breeding sites for cormorants (Sourced BTO, accessed June 2022).

These birds are assessed against the same pathways and criteria as Puffins, Guillemots, Razorbills and Fulmars. Impacts are assessed as non-significant (low) and can be reduced further or avoided through good farm practice, operational profile, policies and training. Through assessment of potential pathways of impact and actions that will be taken to reduce impacts further through operational profiles, policies and training, farms will not significantly impact interconnectivity to protected sites (SPA's) for Shearwater Manx.

6.0 Farming In Cornwall And Devon

Please refer to Chapter 2.

7.0 Evidence Of Interactions: Active Farmers

Biome discussed farming and bird interactions with several of farmers operating in both Devon and Cornwall. And were able to relate to our own farming interactions with birds from 2020 to 2024.

In Torbay, operators have noted birds in and around the farms.

Specific to Cornwall, St. Austell Bay represents the largest farming area in Cornwall (200 Ha + longlines), since 2010 and their presence does not appear to have impacted bird levels within the SPA. Birds are often noted within and outside of the farm and use the semi-submerged buoys for resting, perching and preening.

Although there are not specific count data or records, these anecdotal records match wider global observations of birds interacting with longline farms (Price et al. 2017).

Despite the presence of large, longline farms in both Cornwall and Devon, there have been no reported incidences of bird entanglement as a result of interactions with farms since 2010 (14 years).

There are no incidences of major equipment loss reported across the farms. Farmers in the different regions are exposed to a variety of different site conditions and weather patterns, but maintain engineered farms regularly to prevent equipment loss. In case of loss (only buoys infrequently), farmers mark equipment, can trace it using GPS marker technology and successfully retrieve them as a result within hours to a day or so.

8.0 Strandings And Entanglement In Cornwall

Another approach to assessing risks of farming structures and entanglement for seabird species within Cornwall, is to review past strandings data and causes for those events. In assessing this, reference was made to a 'Marine Strandings in Cornwall and the Isles of Scilly' report 2022 (Cornwall Wildlife Trust: MSCI).

MSCI work with the RSPB and British Divers Marine Life Rescue (BDMLR) to collate information on bird strandings. Data continues to be compiled. In 2022, there were 161 reports of dead seabirds involving 419 individuals. During this period (winter 2021/2022) there was an outbreak of Highly Pathogenic Avian Influenza and whereas usually bird deaths are under reported, there was an increased public awareness and therefore reporting during this period. Gannets and gulls were most impacted during this period.

The report does not specify causes of death. Besides avian flu, nets and fishing lines present the highest risk of entanglement to seabirds (Price et al. 2017). For the species identified in this report as potentially at risk from the proposed seaweed farms, dead birds were reported as follows:

- Cormorants (1 report, 1 dead)
- Gannets (87 reports, 289 dead)
- Guillemots (13 reports, 14 dead)
- Manx shearwaters (1 report, 1 dead)
- Puffins (1 report, 1 dead)
- Razorbills (2 reports, 2 dead).

Seaweed farming does not involve nets or fishing line. There are no reports of entanglement in active, static longline farms by operators (shellfish and seaweed) located in Cornwall, operational since 2010.

9.0 Infrastructure Assessment

Please refer to Chapter 5.

Using the eco-blocks will increase local biodiversity within the Bay, alongside the farm itself (refer to chapter 12). This is beneficial to seabirds. Overspill effects are discussed, which may provide additional food resources for birds, locally and within the natural eco-systems found within the Bay. Fish that have found food and shelter in the seaweed farm will disperse into and enhance the natural kelp bed environments found in the Bay which are close to sensitive bird breeding sites (Corrigan et al. 2024).

Fishing will be excluded from the farm footprint, due to the nature of the farm infrastructure and following surveys with local fishermen, levels of potting (crabs, lobsters, spider crabs) are unlikely to increase above current levels – which occur close to shore. Fish are not target species for the current fishery within the Bay area and this will continue to be the case with the presence of the farms and infrastructure, effectively acting as a *defacto* MPA. Prior to the farms, trawling or netting for fish was not practiced, as the fishers found the coarse sediment does not support commercial fish or shellfish populations. This has been updated within the Chapter 13 Fisheries Impact Assessment

The design of the longlines ensures that the weighted scissor lifts on the risers and seed lines will maintain tensioning in the system (for example on low and high tides), which is important in addition to a completely static system and secure channels in between lines, in ensuring a low risk to seabirds. Birds will be easily able to navigate within the tensioned, static, stable farm and its channels, as observed globally. The farm infrastructure does not comprise of strings. All components are substantive, tensioned ropes. Break strengths on all tensioned ropes used range from 28.9 kN or less (tensioned seed lines) up to 167 kN (for the strongest tensioned ropes).

In addition, the native seaweeds to be farmed are very robust and securely attached to the seed lines during the grow-out phase (average 1 m long). Generally, less than 10% natural loss of grown biomass can be expected over a season. And is naturally dispersed into the marine environment. Organic enrichment is not significant beneath farms (Corrigan et al. 2023). Organic assessments were carried out within and outside of farms, on sandy mud sediments. Evidence is presented within Chapter 12 Fisheries Assessment.

Biome has farmed varying tonnages of seaweed across different sites from 2020 to 2024. In that period there has been frequent and intense storm action. Data indicates there have been no significant losses of seaweed biomass and no incidences of significant amounts of farmed seaweed washing up in Bays or on shores (significantly less than 10%, dispersed to the wider marine environment). We maintain consistent growth along the seed lines. Sugar kelp, for example, remains connected to the seed lines in current speeds up to 1.5m/s. Maximal current speeds at the proposed site across 50 years, as reported by Arc Marine are 1.0m/s. Biome algae has provided test sites and data for assessments of these effects (see highlighted acknowledgements within peer-reviewed published studies) and has been instrumental in helping these assessments (biodiversity increase and lack of organic enrichment from seaweed drop-off; Corrigan et al. 2022, 2023, 2024). In addition, the farms may be trialing new technology which monitors growth rates of seaweed on longlines over time.

Additionally, native seaweeds are being farmed, sourced from local populations. Studies into biodiversity associated with seaweed farms indicate that populations of organisms found in seaweed farms reflect that of local natural populations (Corrigan et al. 2023, 2024). Combined with farming native seaweeds, this mitigates risks of disease introduction. Both operators have protocols related to invasive and non-native species that are followed by farm operators. Biome have had no significant impacts from farming at increasing scales over four seasons, in relation to disease or INNS.

Alongside other longline farmers, Biome continues to be part of various research programs that are building on these assessments, specifically for enhancement of fish populations (example: Ropes to Reefs research program). Conclusions are consistent.

In addition, the engineered infrastructure which will remain in-situ in all conditions across the life of the farm (with regular maintenance) ensures that pathways for impact within the MCZ, 350+ m to the west of the proposed farms, as a result of lost gear, is avoided or very low risk.

10.0: Port Quin Farms: Site Specific Considerations

Port Quin Bay covers an area approximately between 5.54 and 5.16 km^2. The proposed seaweed farms cumulatively occupy 1 km^2 of the nearshore centre of the Bay. This represents between 18-19.37% of the Bay area total. And is below the 32% level of coverage which could restrict essential habitat use for certain marine mammals and may be applicable to birds (Ribeiro et al. 2007). In addition, open sea channels between longlines mean the cumulative infrastructure occupies a total of 10% of the 1 km^2 (0.1 km^2 ad 1.8-1.9% of the Bay area total).

The 20m + channels between the longlines, absolutely static and tensioned longlines and ample navigational distances around the farms (550 m to 750 m from land) enable birds to navigate around or within the farms. These distances also ensure the farms and farm operations are at ample distance from sensitive breeding sites for birds. Disturbance of seabirds will be avoided or reduced to low risk through operational profiles and operational procedures upon accessing or working within farms. DEFRA recommends maintaining 100 m distances from sensitive sites. SRT discuss maintaining 100 and up to 400 m distances from sensitive sites. Maintaining distance will be policy, as it is in current farms operated by Biome.

Figure 14.0: Illustration of west channel distance between farms and Mouls Island (approx. 700 m). Vessel is the Jubilee Queen (passenger vessel) 25 m long x 8 m wide, for context.

Port Quin was selected as a site for a range of key reasons which are covered across the various chapters submitted and within the updated report in detail. This included (but is not limited to) proximity of natural kelp ecosystems, depths, currents, allocation as a strategic area for aquaculture by the MMO, land-based infrastructure to support farming (harbours) and levels of fishing in the Bay and agreement by fishers the farms will not negatively impact current fishing levels, which are very low. A very important factor in selecting the site was sediment type within the Bay (Figure 8.0). Coarse sediment is not a supporting habitat for birds in terms of prey. There are very little fish present. Sand eels will likely be present to the west of the proposed farms over the sandy-mud deposit, where they can also spawn – providing a food source for birds. The farms are located at distance from the sandy-mud deposit and there are no pathways for impact on this area of the seabed, given the engineering report provided and stability of the infrastructure to be deposited at sea. The farms will be located entirely over coarse sediment. Bird access to the sandy-mud deposit is not hindered by the presence of the farms. Shellfish are found closer to the shore (crabs, lobsters, spider crabs) – within natural kelp systems and reef areas which is where potting occurs. The farms do not interfere with the critical feeding habitats of birds in the locale of the Bay and will not reduce prey availability within the Bay (likely to increase it).

There has been discussion around the suitability of Port Quin Bay for farming seaweed. This was partially based on MMO spatial maps that indicate broadly areas suitable for seaweed farming. The area in question has been allocated by the MMO as a strategic site for aquaculture. However, when seaweed data is investigated on the same maps, they do not indicate that the Bay is a suitable area for farming sugar kelp or oarweed. Biome has had direct discussions with the CEFAS team. CEFAS prepared the maps. There was limited evidence and data available when compiling these maps. It was to act as an indicator and therefore worked within wide ranges and parameters as a starting point – which resulted in sites being excluded. The intention was then to build on these maps, updating them with real, ground-truth data from operators – who select sites based on their knowledge and expertise.

According to the current MMO interactive spatial maps, seaweed species cannot be farmed in St Austell Bay, Cornwall, Torbay – South Devon, Porthallow – South Cornwall or Bideford Bay in North

Devon. However, this is not the case. The criteria described above were applied to sites when farmers selected them, applying data, knowledge and expertise, as sites for seaweed cultivation. Successful cultivation has occurred at each of these sites. In 2020-21, 5 T sugar kelp was grown in St Austell Bay. This was followed in 2021-2022 by 40 T. In 2024, 20 T of sugar kelp was farmed in this region. In Torbay, 5 T of sugar kelp was farmed in 2022-23, followed by 40 T sugar kelp in 2023-24 and oarweed test lines. Sugar kelp has been successfully cultivated in Porthallow since 2019 and in Bideford Bay since 2022-23.

Following discussions with CEFAS, the aim is that current operators will update CEFAS with cultivation data and parameters, which will then be reflected in the MMO spatial maps. Refer to Chapter 1.

Based on best science, data, knowledge and expertise, alongside infrastructure engineering reports, Port Quin is a suitable site for seaweed cultivation.

11.0 Port Quin Farms: Operational Profiles

Please refer to Chapter 4.

Reducing disturbance to birds will be achieved through a combination of the operational profile rules and good practice by both farm operators (see below). Vessels will maintain safe distances from sensitive coastal sites for wildlife. Accessing/exiting the Bay (5 minutes to reach farms from point of Bay entry and vice versa) will circumvent Mouls Island and cliffs (breeding sites) and never cut through the Rumps channel (sensitive breeding sites). Distances will at least be 750 m +. In addition, vessels will be well maintained, to mitigate engine noise. The engines are fitted with silencers to reduce noise further. Work vessels operate at lower decibels to smaller recreational craft (speedboats and ribs). This is as the engine is undercover (integrated) within the vessel. In addition, when vessels arrive at farms and attach to the longlines (to seed or harvest or maintain), the main engines are turned off. Only auxiliary (low noise) engines are on to run hydraulics. Therefore, disturbance risk through noise is minimized.

Vessel noise in the future may well be further reduced by the use of hybrid and electric vessels, where operational profiles will enable them to access site without engine noise, recharge on site (auxiliary engine only) and exit the farm sites without engine noise. Operators will explore these options in due course should it be viable.

Removing the tensioned seed ropes over July, August, September and October (1/3 of the year) further reduces the risk of marine entanglement for birds (assessed as non-significant/low) during this period. These are recorded as peaks across many of the groups of birds assessed. This also occurs in Spring, but active harvesting of the lines will reduce the tensioned seed ropes over time. It is important to re-state that no global studies have found evidence of seabird entanglement in farms. This is captured in the anecdotal evidence of active farmers in the South west region too.

12.0 Biome And Camel Fish: Good Practice

Biome has been safely operating farm sites in both Cornwall and Devon since 2020 four farming seasons). Scale has varied, operating on 10 and 100 Ha sized licenced sites. Camel Fish have over 50 years of experience in fishing (trawling, potting). Both applicants are experienced working at sea, within marine environments and working around seabirds along the coast.

Defra launched their new Marine and Coastal Wildlife Code. Of relevance to farming activities at the proposed seaweed farms are the following:

Policies around farm and vessel operations will ensure that there will be minimal noise, no approaching, crowding, chasing, feeding, moving or touching of seabirds. Distance will be maintained from critical land-based habitats when accessing the Bay and when operating on farms (a minimum of 750 m away; DEFRA recommend 100 m away) from critical habitats – hauling site (Mouls) and the Mouls/Rump's channel area for example. This will be standard practice across the year, to include breeding seasons and across the year. Staff will be trained to recognize signs that wildlife is disturbed (although avoidance is the primary goal). For example, through local training programs offered by conservation groups in Cornwall (SRT/Seaquest) and through the Wildlife

Safe (WiSe) Scheme.

The same policies will be applied to bird visitors to the physical farms when operations are being undertaken (line deployment, line maintenance, seeding and harvesting).

Seaweed farming and operations do not involve carrying or utilizing food sources that may attract birds, which will reduce attraction of seabirds during operations (Price et al. 2017). Farm and vessel operations will not involve shore/beach access. There are strict policies around marine litter – to prevent litter (packaging, detritus, ropes) entering the marine ecosystem. Boat speeds in and around the Bay will not exceed 6 knots. It will be policy to widely circumnavigate sensitive coastal spots when accessing and leaving the Bay area. When operating on the farm, engines will be switched off for the majority of time as the vessel is attached to and moves along the headlines for work. Vessels will slow or stop in the presence of marine wildlife. When transitioning in and out of the Bay, vessels will maintain a steady speed and direction. Vessels will only access shore from within harbour areas. And vessels will be regularly maintained up to MCA code 3 and cat 3 standards – to ensure noise and pollution (e.g. diesel leaks) are avoided. Policies will apply to direct employees and operators of the farms and vessels, as well as third party contract suppliers. Staff will be trained in monitoring seabirds and policy will be to report visual records of living, injured, distressed or dead birds to the appropriate authorities (e.g. CSIP) and local conservation groups (data and information sharing). This will include from the monitoring program discussed and procedures for contacting British Divers Marine Life Rescue (BDMLR) or the Marine Stranding Network (BDMLR: 01825 765546 (live) and MSN: 0345 201 2626 (dead). Marine species will never be blamed or persecuted because they become an inconvenient issue. The marine environment is there home. Any issues will be reported factually, openly and honestly. This will be linked to the marine monitoring program proposed.

Prevention of entanglement and disturbance is the primary directive of both farm applicants – with measures already in place as described throughout this chapter and evidenced as good practice in global reports to reduce the risk to a non-significant level. This is in combination with the global evidence which suggests risks from static, longline farms are low and assessments of site-specific risks.

However, as part of the monitoring program discussed below, the presence of catch cams, sensors, marked equipment and GPS markers on main buoys will reduce entanglement risk further for seabirds as live feed data would indicate any possible incidents, if and as they occur. Although these are likely to be insignificant risks, one can never state entanglement would not 100% occur, so these additional safeguards enable quick responses to entanglement which should result in rescue scenarios rather than death. Response plans and policies would be similar to those indicated in the updated Navigational Risk Assessment (June 2024) for marine traffic/sea user entanglement in farms.

Lost gear has been indicated as a concern. Lost gear could have negative impacts on seabirds. Discussions with active farmers working across Devon and Cornwall in a range of nearshore and offshore conditions indicates that with sound engineering and regular maintenance, core infrastructure (ropes) have not been significantly lost.

The independent marine engineering report has reduced this risk for the applicants to fully avoidable through correct engineering, tensioning and regular rope maintenance. Of significance is the fact longlines comprise of individual weighted structures – not connected to each other. Both the main infrastructure of each longline and main marker buoys will be anchored using weights and ropes as indicated in the independent engineering report, to ensure longlines and main buoys will remain fully stable over 50-year storm conditions. This reduces the likelihood for lost gear. The operational profile indicates regular maintenance.

However, there are further measures both applicants can take to further ensure that should gear detach from the farm (for example buoys), it can be retrieved to avoid littering the marine environment. Measures include the use of GPS markers on the main buoys and labelling equipment with company name and contact details. Buoys should be lashed appropriately. And lashings regularly checked. If gear is lost, the applicants will follow MMO protocols and alert relevant authorities. Repairs will be conducted according to the response plans updated in the

Navigational Risk Assessment (June 2024) and where possible within 24 hours of record. Lost gear can be advertised and traced through social media and contacting harbour authorities. Under the 'polluter pays' principle (DEFRA), responsibility for retrieving lost gear is with the site operators. The operators can support local clean-up charities by making a donation should any lost gear be retrieved by the charities, which clearly belongs to the farm operators. This will be in combination with the strict policies around marine litter (avoidance) when operating at sea.

Price et al .2017 describe a range of measures that can be applied to further reduce low risk negative interactions between seabirds and static longline farms. Acoustic measures are listed. However, the applicants do not wish to deter the presence of seabirds in the Bay and therefore will not be using any acoustic disrupters (see below for justification). For the same reasons, not to deter seabird presence in the Bay, no scents or noxious baits will be used. No electromagnetic deterrents will be used. And all physical deterrents (such as nets), beside weighting lines for tensioning purposes, will not be used. Both applicants will continue to explore improvements in in-built line release in the case of entanglement by seabirds (escape), when this becomes technologically feasible and if it does not compromise the integrity of the infrastructure to remain absolutely static in all weather conditions over 50 years.

The seaweed farm will likely create a blue carbon sink, although scientific research and tangible data is still needed to understand this potential against climate change and the impacts for seabirds. Locally, this is likely to be a small impact but collectively, with other farms it may play a more significant role in helping to combat climate change issues around carbon. In addition, the seaweed farmed is being used, in part, to produce biomaterials (alternatives to plastics). This is in an attempt to contribute to reducing the use of plastics over time and therefore reducing additions of plastics into the marine environment, inclusive of microplastics, which are a serious threat to marine life. Other uses include carbon mitigation through food security, feeds and bio-stimulants (bio-fertilisers). All markets Biome and Camel Fish are targeting. Seaweed absorbs nutrients (N,P,K) from the water column, including additional N,P and K loading from sewage discharge which can reduce water quality and cause localized health issues (bacteria/algal blooms) if left unchecked. Seaweed has potential for bio-remediation, an ecosystem service, which can improve localized water quality. This would not only be beneficial for humans but also for marine life. Research into all these aspects will be on-going with legitimate and industry recognized partners.

In addition, applicants constantly assess new technologies available for farming, whether this is biodegradable infrastructure or the possible future use of hybrid/electric vessels (refer to www.biomealgae.co.uk; Seaweed Queen). This is fundamental to company ethos. New methods will be adopted as the industry evolves over time and viable options arise.

13.0 Monitoring Program

The applicants have consulted with AFBI (Northern Ireland), who already conduct research programs (with CEFAS) into entanglement and marine mammal interactions with static farms. As independents, the applicants would start a monitoring program in partnership with AFBI and potentially CEFAS or other legitimate organisations and research institutes. This could support MSc. And PhD candidates. A similar monitoring program for seabird interactions with farms can be proposed – noting species, numbers and behaviour.

Monitoring to further inform risk and feed into scientific studies is imperative with transparent reporting throughout. This can be used to continually review and revise risk assessments and mitigation practices. Catch cams is a cost-effective technique that we could easily use on our moorings to gather continuous data on seabirds encountered around the farms.

It's a good example of how these types of monitoring programs can become accessible to the general public and provide an opportunity for outreach and education. The applicants would be able to share data with local conservation groups (RSPB, BTO, Cornwall Wildlife Trust and SRT. This would be in combination with observation records by farm operatives, who would undergo training to identify species correctly and record data accurately.

This will be in combination with a wider, independent monitoring program which is in conjunction with WWF and SAMS. This will monitor a large range of physiological and ecological parameters over three years – with a primary focus on biodiversity assessment, interactions of marine life with farms and other foci, including infrastructure monitoring and growth of seaweed on site across the season.

14.0 Additional Assessments

14.1 Noise

In December 2023, Biome conducted a noise assessment by request of a primary advisor, Natural England. This was specific to the installation of screw anchors and noise effects on porpoise (not birds) within the SAC for screw anchor installation.

The independent marine engineering report has discounted the use of screw anchors and oil rig anchors with chains and identified that gravity-based anchors (eco-blocks) will be used, which do not penetrate the sediment. This significantly alters the noise assessment associated with deploying longlines. Please refer to the operational profiles.

Aspects of noise during farm operations have been reduced for seeding, harvesting and maintenance (see above). Farm operations are at distances of 550 –750 m from Mouls and the shore. Ensuring there is a low risk of excessive noise in turn ensures avoidable or low risk of noise disturbance of seabirds in accordance with the Wildlife and Countryside Act 1981 (as amended).

Future technologies, for example, hybrid and electric vessels, would further reduce these risks if these were feasible options to be considered.

14.2 Non-Use Of ADD's

McGarry et al. 2020 identified that on the market, there are currently 35 ADD's, with 9 specifically developed for aquaculture (fish farms). These ranged in capability, affecting different sound ranges and producing either a continuous or intermittent sound. Sound ranges were typically within the 1-5 KHZ range, 10-20 KHZ range, up to 30 KHZ and as high as 160 KHZ.

It has been established that the risk of entanglement of birds in well maintained, static longline farming systems with clear escape channels and underwater clearance is low (not significant). The risk of using an ADD is higher risk, as it could lead to permanent threshold shifts for birds or interfere with behaviour and activities with negative consequences. Neither applicant will be deploying ADD devices.

14.3 Port Isaac Bay Seaweed Farm

The Port Isaac Bay licenced farm is 5 km North east of the proposed Port Quin farm sites. It was granted a licence by the MMO in 2023. The information available on the MMO public portal related to the operators plans and infrastructure are limited. At the time of writing this chapter (June 2024) as far as Biome and Camel Fish are aware, due diligence is still required by the Crown Estate, relating to Tenancy agreements and a Crown operational licence. However, this information is covered by the Data Protection Act. Biome and Camel Fish are not aware of the criteria used by the operators for site selection or how this relates to assessments conducted by the operators related to birds, or the outcomes of these assessments. We assume they have been conducted before an MMO marine licence was issued. It is not clear whether the operators will farm the site. It has remained empty (not even marked by navigational safety markers or on Admiralty charts) for over a year.

The MMO require us to consider the cumulative effects of the Port Quin farms in combination with the Port Isaac farm although it is 5 km away. To do this, we would have to make a number of assumptions which include but are not limited to (1) the operators will use the same infrastructure design and engineering as Biome and Camel Fish, (2) the operators will farm sugar kelp, (3), the operators will use the same spacing between longlines, (4) the operators will employ the same standards of good practice as those proposed by Biome and Camel Fish, (5) the operators will farm identically to us over the course of a season and (6) they will operate in the full site.

Given distance between farms (5 km +) and if the assumptions are correct or upheld, then all the facts presented within this chapter should apply and therefore although the risk of entanglement may increase slightly from a region perspective (north Cornwall), risk of entanglement should still remain non-significant (low). With a combined area of 200.8 Ha – this is of a similar scale to longline farming levels in St Austell Bay (200 ha + with 300 Ha + licenced) – all concentrated in one Bay area. We have established that despite the presence of these active farms since 2010, there is no evidence for or reported entanglement of birds in longline equipment and anecdotal evidence has observed birds positively interacting with the farms.

The Port Isaac marine licence has been granted over 100 Ha of sandy mud sediment which may be critical supportive habitat for birds in terms of prey availability (for example sand eel habitat and spawning ground). However, Biome and Camel Fish have purposefully selected sites that are over coarse sediment to ensure we are not impacting critical supportive habitat for prey. The MMO marine licence granted means the Port Isaac site will likely have some impact on feeding in birds – if they farm – but this would include increased prey availability. However, the Port Quin farms do not add negatively to this situation. There are no significant additional cumulative impacts anticipated related to bird feeding grounds as a result of the Port Quin farms.

15.0: Risk Assessment: Conclusions

The overall risk assessment for bird entanglement within static longline farms and disturbance for the proposed Port Quin farms is **not significant** based on, but not limited to the following:

- Global studies which indicate limited evidence of entanglement in longline farms, even in areas with 22,000 Ha of longline farms in the nearshore environment.
- Global assessment that risk from longline farms is consistently low with good practice.
- Assessment of sensitive bird species present in the Bay region
- Less infrastructure used due to nearshore location in shallower water, particularly vertical lines.
- Good practice integrated into operational profiles by operators.
- Well-engineered longlines with clear maintenance protocols to reduce risk.
- Absolutely static farm systems which minimize lost gear and are fully tensioned.
- Lost gear retrieval plans.
- Operational profiles removing pressure at sensitive periods for breeding birds.

- Maintaining distance from sensitive sites (shore-based).
- Site located over coarse sediment that does not support prey species for seabirds but is likely to enhance food sources.
- Clear channels within farms for navigation and a total maximum infrastructure footprint of 10% of the combined licenced site area (10.08/100.8 Ha).
- Monitoring programs proposed.
- Employee training for seabirds (ID, records, responses).
- Clear navigational routes around the periphery of the farms.
- Policies with regards to seabirds and interactions/operations.

The overall risk assessment for noise and disturbance of seabirds is **not significant** due to altering the anchorage system and mitigating noise across the operational profile of the farm, while maintaining distance and following DEFRA codes. In addition, the farms are located at distances from sensitive shore habitats for birds (550 to 750 m +). Farm activities are timed to have least impact on breeding bird colonies and on peak seasons for other birds. In addition, entanglement risk is reduced by removing tensioned seed ropes for 1/3 of the year, during summer.

The overall risk to critical habitats is **not significant** as the sites are located on coarse sediment which is not a critical feeding habitat for the seabirds assessed.

Having assessed the baseline where possible, ongoing monitoring programs in partnership with experts and independent research groups will enable transparent sharing of data and accurate monitoring of seabirds in the Bay.

Chapter 9: Habitat Regulations Assessment: Special Area of Conversation

1.0 Objectives

- Conduct a project HRA within the context of the SAC designated to protect harbour porpoises, to determine if they or their supporting habitats and prey species will be significantly impacted by the proposed seaweed farms in Port Quin Bay.
- Determine if there are pathways to likely significant effects and if mitigation is required, proportionate to project size within the whole SAC.
- Consider biodiversity net gain and its likely effects on the prey species of the harbour porpoise and therefore, SAC conservation objectives.

2.0 Overview

The purpose of this chapter/HRA is to primarily assesses whether there are significant risks to harbour porpoise within the SAC in relation to the construction and operation of the proposed seaweed farms under application numbers MLA/2023/00307 and MLA/2023/00308.

The use of habitats, types of foraging grounds, dominant prey species, foraging patterns and behaviour of harbour porpoise (*Phocoena phocoena*) were researched, reviewed and the information is presented within this HRA. This HRA should be considered in conjunction with chapters 4, 5, 6 7 and 12, as well as Appendix I. Proposed construction activity related to the seaweed farms is presented. Alongside detailed assessments within the indicated chapters, evidence and expert input were collated and applied when assessing potential pathways to impact and whether any potential impacts identified will result in likely significant effect. Risks were assessed from high (significant), moderate, low/no impact (non-significant). Mitigation is not required.

3.0 Farm Sites

Please refer to Chapter 3.

4.0 The SAC And Harbour Porpoise

The proposed farm locations are in the Bristol Channel Approaches/Dynesfeydd Môr Hafren SAC, which covers an area of 5, 850km^2 (584, 994 Ha) and stretches along the north Cornish coast and across the Bristol Channel north towards Carmarthen Bay in Wales. It protects harbour porpoise (*Phocoena phocoena)* as the feature of the SAC. It was designated in February 2019. Both the harbour porpoise and habitats within the SAC are in favourable condition (JNCC,2019).

Globally, harbour porpoises are classified as being of 'Least Concern' on the IUCN Red List (Hammond *et al* 2008), meaning that the species is widespread and abundant, and that it is not considered to be threatened, near threatened or conservation dependent. The 2013 assessment of the conservation status of harbour porpoises in UK waters is considered to be favourable. Similar conclusions were reached for the European North Atlantic region (see http://bd.eionet.europa.eu/article17/reports2012/) (JNCC, 2019).

The conservation objectives and advice provided by JNCC relating to the SAC (JNCC, 2019) indicates the objective of the SAC is to achieve (or maintain in this case) Favourable Conservation Status (FCS) at the national and biogeographic level. When assessing a project and its potential impact, it needs to be determined if the project will adversely and significantly affect FCS. The key considerations within an HRA are will the proposed project prevent harbour porpoise using a significant part of the SAC, result in significant impact to supporting habitats in the SAC and significantly reduce prey availability across the SAC (JNCC, 2019). These considerations will be proportionate to the proposed project within the SAC; project footprints must be set within the context of the full protected site to assess significance (5, 850 km^2/584, 994 Ha) (JNCC, 2019). https://jncc.gov.uk/our-work/bristol-channel-approaches-mpa/ .

Details on legislation protecting harbour porpoise, their ecology and presence in the region of the proposed farms are presented and assessed in chapter 7. JNCC (2019) notes habitats within the SAC are coarse sediment, sandy sediment and sandy mud (see chapter 6). Coarse sediment is the dominant habitat type. It is important to understand how these habitats support the harbour porpoise when assessing pathways to likely significant effects (LSE).

Harbour porpoise travel over large areas and will be distributed throughout the entirety of the designated SAC. Their use of supporting habitats differs depending on their activities and foraging requirements and how that relates to their main prey species. Behaviour alternates between transversing across large areas of the sea bed using directional swimming (Stalder et al. 2020) to reach preferred feeding and foraging grounds and then spending time within areas of the SAC feeding and foraging on those favoured grounds using area restricted movements (Stalder et al. 2020).

The coarse sediment habitat which forms the seabed at the proposed location of the farms has been identified as very coarse, stable sediment (chapter 6 and Appendix I). Sand and fine sediment are not features within it, with the sediment closer to gravel and sitting on solid bedrock. There is an area of sandy sediment located west of the proposed sites at a distance of 400 m from the closest farm infrastructure. The farm infrastructure is not in and does not overshadow the sandy sediment and has been engineered to be stable in 50-year storms (chapter 5 and Appendix I). The anchoring eco-blocks will not move.

When feeding, harbour porpoises exhibit different behaviour. Studies indicate that feeding behaviour can be identified through changes in click pattern and in directional swimming (Stalder et al. 2020). One form of predation involves feeding grounds that are significantly sloped and where the depth profile changes with depths of 100 m being favoured (Lambert, 2020). This involves the porpoise herding fish species and pushing them up toward the surface for feeding, which attracts seabirds (JNCC, 2015). Another form of feeding is benthic foraging. This is where the porpoise favour sandy banks and sandy sediment and use echolocation to detect prey within the sand (JNCC, 2015). Maeda et al. 2021 concludes that 78% of harbour porpoise foraging occurs at depths of 25 m or more. Very coarse sediment is used for transitioning through the SAC area from one favoured feeding ground to another. The depths at the proposed farm site are between 10 to 17 m on a gradual slope outward to sea.

Several studies have identified that harbour porpoise are generalist predators but that their main diet comprises of four main species (Lambert, 2020; Maeda et al. 2021; JNCC 2015). These are sandeels, gobies, whiting and herring. They do feed on other fish (for example, cod) and crustaceans which forms 12.2% of the average diet (Lambert 2020, Fontaine et al. 2007, JNCC, 2015). The most abundant species consumed is sandeels, related to their high fat/lipid content, from an energy budget perspective. The main dietary fish are pelagic or are directly associated with sand banks and sandy sediment where they spawn and live and which act as nursery grounds. Herring lay eggs in coarse sand. Cod will increase positively in numbers where reef structures have been added to an area of the seabed, which increases prey availability. It is probable, given depth limitations and sediment types, that porpoise feeding in Port Quin Bay are foraging on the sandy sediment located 400 m away from the proposed farm sites. Therefore, access to these sites is not compromised and the porpoise will not be displaced from this potential feeding area. Refer to chapter 12.

In relation to the farm location and farm layout, there are areas of open sea circumnavigating the proposed farm areas that the porpoise can access the sandy sediment as a potential foraging ground. The infrastructure occupies a total of 10% of the combined farm sites (10 Ha/100 Ha). This is for navigational safety reasons as detailed and assessed in chapter 16 and Appendix V. And is standard layout for longline farm infrastructure to access and operate on the farm site at ALARP. The result is a farm layout with 20 m or more clear channels between longlines and no enclosed structures. Echolocators such as harbour porpoise will be able to traverse the farm site safely, as has been observed in other aquaculture facilities with identical and similar layouts. Entanglement risk has been assessed in depth in chapter 7, in combination with chapter 5 and Appendix I and was assessed as low through standard construction and operations (not a significant likely effect) for marine mammals, including harbour porpoise as a result of the static, tensioned farm infrastructure. Therefore, mitigation is not required. JNCC concerns related to entanglement risks are clearly addressed. Static, tensioned aquaculture longlines are not a high relevant risk (low), particularly in comparison to entanglement in nets (see table below) and potting or fishing line for example (see chapter 7). In JNCC, 2015, they note that between 2000 and 2010, there was no evidence of harbour porpoise being entangled in ropes and that this was not considered to be a pressure in UK waters. This is further supported by the updated assessments made in chapter 7 where impacts are assessed as low based on evidence. Of more concern was bycatch in nets, acoustic disturbance, chemical pollution, shipping and collisions with renewables (JNCC, 2015).

As part of standard operational practice, seed lines are removed during harvest and therefore do reduce entanglement further below the low assessment for marine mammal entanglement. However, this is not mitigation. Mitigation is not required at this low impact level (see chapter 7).

Non-penetrative, stable bio-engineering eco-blocks will be used to anchor the farm infrastructure. At the full farm footprint (288 lines occupying 10% of the combined 100 Ha/1km^2 site), this equates to 518.6 m^2 of recycled habitat blocks located on the surface of the very coarse sediment. This is the equivalent of 0.519 Ha (0.5% of the total farm area). The total farm area is 1 km^2 of the 5,850 km^2 allocated as the SAC. The total area that the eco-blocks will occupy of supporting habitat within the SAC is 0.00008%. This will not significantly impact FAC maintenance of the habitat features of the SAC or significantly compromise access and transitioning of the harbour porpoise through the coarse sediment area within the regional location of the proposed farms or wider SAC. In addition, it has been established the stable blocks will not significantly damage the coarse sediment occupied as they will not significantly move, even within 50-year storm conditions.

One type of eco-block is produced by a company called Arc Marine. Arc Marine have completed a number of marine restoration projects using forms the bio-engineering blocks around the UK, in partnership with the Crown Estate, CEFAS and the MMO. These projects have been impactful in improving local bio-diversity in the South West and a new project has commenced in Scotland – which is to enhance biodiversity around cable infrastructure installed for renewable energy.

Throughout the assessment produced for the proposed farms (see chapter 7 for example), it is evidenced that the eco-blocks and presence of seaweed will enhance prey (fish species). In addition, farming of seaweed is highly unlikely to lead to collision injury in echolocators (see chapter 7) and does not result in organic enrichment or nutrient enrichment, algal blooms or negatively impact water quality. Seaweed provides ecosystem services in the form of localised bioremediation of water quality (see Appendix II). Noise is assessed in section 5.0.

In terms of other works in SAC's designated for harbour porpoise (background contextual information), an appropriate assessment (AA) was considered appropriate at the screening stage and conducted in 2020, by the Secretary of State for BEIS and the MMO, in a UK SAC for harbour porpoise with the same conservation objectives as UK0030396 (Southern North Sea SAC, designated February 2019, UK0030395). The aim of the AA (BEIS 2020) was to assess for likely combined significant impacts from large-scale consented wind farms throughout the SAC, in combination with other activities (oil rigs for example). Possible pathways to LSE included a long list (*inter alia* seismic surveys, pile driving, use of ADD's, vessels, cable and infrastructure installation). In addition to and in combination with these pathways, habitat loss on sand, coarse sediment and gravel was considered. Habitat loss was on a scale of km^2 and over km distances for infrastructure and cables required respectively for each of the 9 wind farm developments. At these significant scales of habitat 'loss' combined with other impact pathways, mitigation was agreed between the advanced assessors, applicants and MMO pertaining to the mammals and noise. The overall conclusion by the advanced assessors, Secretary of State for BEIS and MMO was **no significant impact. Conclusions included** 1.7% or more of the porpoise population not being significantly impacted (injured/killed/excluded: CO1), habitat loss/processes not significant (CO2) and prey availability not significantly impacted (CO3). The HRA assessment did not proceed to step 3 or 4. Licences remained consented (BEIS 2020).

Through assessing potential pathways to significant likely effect (LSE) within the SAC HRA, as identified by JNCC (2019) the proposed farms in Port Quin Bay do not result in significant LSE's that will result in a significant reduction in FAC for the harbour porpoise or supporting habitats, in the context of the full extent of the SAC. Both will be maintained as favourable, with respect to the size, structure, stability and location of the proposed farms. In terms of prey availability, it is evident that the use of habitat engineering eco-blocks and the presence of seaweed will likely enhance prey availability in the region for porpoise. Even upon the removal of the seaweed during harvesting, fish (including prey species) supported by the farms and eco-blocks will remain within the bio-engineered reef area or disperse to local, natural populations (Corrigan et al. 2024), which includes the area of sandy sediment identified as a potential feeding ground. This is particularly true when considered in the context of BEIS 2020.

To summarise:

The screening HRA supplied by both applicants, pertinent to the current applications, related to habitat 'loss' clearly identifies no LSE's from the installation of the eco-blocks. This is based on the best available science.

The facts that can be clearly established at the screening stage are:

- The applicant level screening HRA is based on best available science.
- Depositing of the eco-blocks is not permanent (reversible).
- The habitat is a low-sensitivity habitat (coarse).
- The habitat is widely distributed throughout the SAC.
- The habitat is not permanently removed or damaged.
- The habitat loss is significantly below *de-minis* levels in line with the project scale and pathways to impact (proportionality) – CO2.
- The farms are located on non-foraging habitats for harbour porpoise.
- Case 3 (within same SAC) was not considered significant at an HRA screening level on sandy sediment (foraging grounds).
- The harbour porpoise as a feature is assessed as not significantly impacted by the installations (1.7% population highly likely to be directly or indirectly injured or killed or excluded: 255+ individuals – we assess very low (0+)) – CO1
- The bio-engineering eco-blocks are scientifically evidenced to create fish/shellfish habitat and will enhance prey availability and therefore, the conservation objective (CO3).

- Further or additional mitigation outside of using the standard eco-blocks and standard installation practices are not required.

5.0 Operational Profile And Construction

Please refer to Chapter 4.

Noise during construction will be emitted as follows:

(a) Mounted crane – low decibel vessel noise (engine silencers) when moving to deposit eco-blocks, engine off when depositing (longarm crane can reach several block locations in one spot). Localised noise source.

(b) Vessel running lines – low decibel vessel noise (engine silencers). Engine on only for running lines. Localised noise source.

(c) Eco-block lowered onto sea bed – low decibel crane noise above water, short, low-decibel sound underwater as the block is lowered slowly onto the bed, as it only compacts first 5-10 cm of course sediment as each block settles. No drilling or screwing required. Localised noise source.

Noise impact for marine mammals during construction and operations have been assessed in detail within chapter 7 and is assessed as temporary and low impact – and does not impact 10-20% of the SAC site (JNCC, 2019). It is not a pathway to a significant likely effect for the harbour porpoise within the SAC. Mitigation is not required as the normal/standard methods used and actions taken during farm construction and operations do not result in significant likely effects (highly likely).

6.0 Biodiversity Net Gain

Please refer to Chapter 10, section 8.

Please also refer to section 4.0 for information related to the proposed use of habitat bioengineering eco-blocks and their footprint within the proposed sites.

7.0 HRA

The HRA assessment is conducted using the framework provided as an annex to this chapter. This provides project details in Annex Table 1.0, screening for HRA in Annex Table 2.0, details of the N2K site in Annex Table 3.0, Likely Significant Effects (LSE) and avoidance or minimising through normal/standard practice in Annex Table 4.0, with a conclusion for LSE to end the assessment. Measures to protect harbour porpoises and supporting habitats during construction and operational works, if required, are listed in Annex Table 4.0 – these form normal/standard methods used and actions taken during farm construction and operations to avoid or minimize likely significant effects (LSE). All other pathways have been assessed in section 4.0. The full assessment does not result in a significant adverse effect on SAC site integrity (AEOSI). Mitigation is not required.

Annex Table 1.0: Proposed Plan Or Project Details

Title of project	Seaweed Farms, Port Quin Bay
Case reference	MLA/2023/00307 and MLA/2023/00308
Applicant name	Biome Algae and Camel Fish
Type of licensable activity	To deposit any substance or object within the UK Marine Licensing area, either in the sea or on or under the seabed, from any vehicle, vessel, aircraft or marine structure of Section 66 of the Marine and Coastal Access Act 2009.
Location of works	See Annex 1.
Description of proposed project	Farm construction: Applicants would like to licence two areas for the farming of seaweed sized of 50.4 Ha each (100.8 Ha total). Cumulatively, this would involve installing 288 longlines across both sites at full capacity, which occupies 10% of the total required footprint of the farms (see chapter 4 and 5). The longlines are 160 m long, secured using bioengineering, recycled eco-blocks. The sites would sustainably farm native seaweed. They are grown on seeded ropes. Seeds are sourced from local populations of native seaweed. Construction works will be completed over 3-4 years, requiring approximately 36 days total during that period. Once deposited, the eco-blocks will last the lifetime of the farm. Eco-blocks will be deployed from July to early November for the first 3-4 years only. Farms will operate across the as described in chapter 4.

Annex Table 2.0: Need For A Habitats Regulations Assessment (HRA)

2.1 - Is the proposal directly connected with, or necessary to the management of a N2K site for the purpose of conserving the habitats or species for which the site is designated?	The proposed farm locations are in the Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC, which covers an area of 5,850km2 and stretches along the north Cornish coast and across the Bristol Channel north towards Carmarthen Bay in Wales. It protects harbour porpoise (*Phocoena phocoena)*, and therefore supporting habitats within the SAC and prey availability.
2.2 - Is it necessary to carry out an HRA?	Yes – to assist with management of the SAC (and harbour porpoise within), to ensure the designated features are maintained in favourable condition (FAC).
For the reasons given in section 2.1 and 2.2, this proposal is considered to require an HRA.	

Annex Table 3.0: Details Of N2K Site Identified

Name of N2K site: Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC
Is a licensable activity taking place within or near a N2K site: It is located within the designated SAC, although no significant impact on the protected species Harbour porpoise (*Phocoena phocoena)* is expected. Please refer to Chapter 7.
Conservation advice package used: https://data.jncc.gov.uk/data/505b3bab-a974-41e5-991c-c29ef3e01c0a/BCA-ConsAdvice.pdf **Other documents/online sources of information pertaining to the SAC and its protected features have also been used, including reports. Chapter 7 and Appendix II should also be referred to in conjunction with this assessment.**
Date conservation advice was last accessed: 05/06/24
Conservation objective(s): The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring: • the extent and distribution of qualifying natural habitats and habitats of the qualifying species. • the structure and function (including typical species) of qualifying natural habitats. • the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely. • the distribution of qualifying species within the site.

Likely Significant Effect (LSE)

In formulating the LSE alone assessments, Natural England's Conservation Advice Package, as outlined in Table 3, have been consulted and the following principles applied:

- The Advice on Operations (AoO) category of marine activity used is **Seaweed aquaculture: suspended rope/net culture**
- Where available, the 'Advice on Operations' (AoO) matrix to determine pressures associated with the proposed activity[ies] that may potentially harm the qualifying habitat features and/ or species of the site has been used.
- Low risk pressures, unless there is evidence or site-specific factors that increase the risk, or uncertainty on the level of pressure on a receptor, this pressure generally does not occur at a level of concern and should not require consideration as part of the assessment.
- Features deemed sensitive to pressures (medium and high risk) for both direct and indirect pathways are taken forward into the LSE assessment.
- The individual pressure/ feature interactions categorised as 'Not Sensitive' at the benchmark are not taken forward into the LSE assessment. The MMO considers that the impacts on these features as a result of the activities will be less than the benchmarks specified for these pressure/ feature interactions.
- For pressure/ feature interactions categorised as 'Not Relevant' these are not taken forward into the LSE assessment. The MMO considers that there is no interaction of concern between the pressure/ feature or the activity and the feature could not interact.
- Features deemed sensitive to pressures (medium and high risk) for both direct and indirect pathways are taken forward into the LSE assessment.
- Pressure/ feature interactions categorised as either 'Insufficient Evidence' or 'Not Assessed' have been taken forward into the LSE assessment in accordance with the precautionary principle.

Table 1: Key activities (operations) and the relative level of risk of impact on harbour porpoise in UK waters. Those pressures ranked 'high' are known to have the greatest impact relative to other pressures on the population of UK harbour porpoises. Activities which currently pose a low risk are not shown.

Operations	Pressures	Impacts	Current relative level of risk of impact
Commercial fisheries with bycatch of harbour porpoise (predominantly static nets)	**Removal of non-target species**	• Mortality through entanglement/bycatch	High
Discharge/run-off from land-fill, terrestrial and offshore industries	**Contaminants**	• Effects on water and prey quality • Bioaccumulation through contaminated prey ingestion • Health issues (e.g. on reproduction)	High
Shipping, drilling, dredging and disposal, aggregate extraction, pile driving, acoustic surveys, underwater explosion, military activity, acoustic deterrent devices and recreational boating activity	**Anthropogenic underwater sound**	• Mortality • Internal injury • Disturbance leading to physical and acoustic behavioural changes (potentially impacting foraging, navigation, breeding, socialising) • Habitat change/loss	Medium
Shipping, recreational boating, tidal energy installations	**Death or injury by collision**	• Mortality • Injury	Medium/Low
Commercial fisheries (reduction in prey resources)	**Removal of target species**	• Reduction in food availability • Increased competition from other species • Displacement from natural range	Medium

Table 2: An overview of activities (operations) occurring within or in proximity to the Bristol Channel Approaches / Dynesfeydd Môr Hafren site to which the harbour porpoise has a current perceived level of impact risk of high or medium at UK level (Table 1) and therefore may require further consideration concerning options for management. Additional factors are assessed in section 4.0 and 5.0 including reduction in prey resources and displacement and entanglement.

Operations	Pressure	Management considerations set by conservation advice package	Level of activity	LSE?
Eco-blocks	Anthropogenic underwater sound	Placement of bio-engineering eco-blocks as anchors are not mentioned as a potential risk to harbour porpoise. However, this has been assessed in detail in section 4.0. Construction and operational noise are not an LSE pathway (see section 4.0 and 5.0).	Staged deployment within the first 3-4 years of the farm life. Total 36 hours total over a 3 to 4-year period. Noise associated with staged depositing of the eco-blocks is assessed as low.	**No**
Shipping	Anthropogenic underwater sound	This does not apply to the proposed project directly as shipping is not involved in the project construction or operations). Workboats (size appropriate vessels) will be used to construct and operate the farms and relevant information and assessment can be found in chapter 4, 5, 7, 16 and Appendix I and V as well as in section 4 and 5. Harbour porpoise use echolocation for feeding, foraging, navigation and communication. Underwater noise therefore has the potential to interrupt or affect these behaviours as well as cause hearing damage, particularly at short distances. The peak frequency of echolocation pulses produced by harbour porpoise is 120– 130 kHz, corresponding to their peak hearing sensitivity although	Based on the short periods that operators will be using vessels at sea (chapter 4) and standard practices (chapter 7 for example); negative impacts on the SAC features from noise pollution, associated with vessels, is assessed as low.	**No**

		hearing occurs throughout the range of ~1 and 180 kHz (Southall et al 2007). The underwater sounds created by large ships are unlikely to cause physical trauma, but could make preferred habitats less attractive as a result of disturbance (habitat displacement, area avoidance). However, additional management is highly unlikely to be required based on current levels of vessel activity within the site which is not significant.		
Shipping	Death or injury by collision	Post mortem investigations of stranded harbour porpoise (Deaville and Jepson, 2011; Deaville 2011:2017) have revealed some deaths caused by trauma (potentially linked with vessel strikes). However, this is not a significant risk related to vessel use in farm construction and operations (see assessments in chapter 4 and 7 for example) and additional management is highly likely to be unrequired.	Risk is when vessels are active on site. There is low risk of collision due to the size, number and cruising speed of vessels moving to and from the harbour to the site and operations within the site (see assessments). In combination with active days required.	**No**

Part 1 -

Bristol Channel SAC			
Pressure	**Qualifying feature or species (include sub- features and supporting habitats)**	**LSE?**	**Justification**
Abrasion/disturbance of the substrate on the surface of the seabed	Harbour porpoise (*Phocoena phocoena)* and placement of non-penetrating, stable, bio-engineering eco-blocks within the site on very coarse sediment – habitat within the SAC.	NO	At the full farm footprint (288 lines occupying 10% of the combined 100 Ha/1km^2 site), this equates to 518.6 m^2 of recycled habitat blocks located on the surface of the very coarse sediment. This is the equivalent of 0.519 Ha (0.5% of the total farm area). The total farm area is 1 km^2 of the 5,850 km^2 allocated as the SAC. The total area that the eco-blocks will occupy of supporting habitat within the SAC is 0.00008%. This will not significantly impact FAC maintenance of the habitat features of the SAC or significantly compromise access and transitioning of the harbour porpoise through the coarse sediment area within the regional location of the proposed farms or wider SAC. It has been established the stable blocks will not significantly damage the coarse sediment occupied as they will not significantly move, even within 50-year storm conditions. Refer to section 4.0, chapter 4, 5 and Appendix I.

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Deoxygenation	Harbour porpoise (*Phocoena phocoena)* and habitats within the SAC, including sandy sediment supporting prey species.	NO	Farming seaweed does not require fresh water, feed or fertilisers. It does not produce waste. Spacing between longlines of 20 m + (10% of the proposed footprint of the farms) prevents deoxygenation, as well as the depth of site (10-17m). Seaweed produces oxygen. The site selected is high energy and mixing profiles will prevent deoxygenation or organic enrichment. Organic enrichment of sediment has not been detected within scientific studies. Seaweed drop-off is low during farming. It has been established current speeds are optimal to retain the seaweed on lines (1m/s). the seaweeds farmed are robust enough to stay on the lines (kelp) used to high energy systems and able to tolerate 1.5 m/s currents and the wave profile over 50 years with the correct engineering. Natural seaweed drop-off is dispersed into the high energy, open systems. Refer to chapters 5, 7 and 14 for example and Appendix I.

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Genetic modification & translocation of indigenous species	Harbour porpoise (*Phocoena phocoena)* and habitats within the SAC	NO	All seaweeds farmed are native and fertile material is stocked from local genetic and phenotypic populations. Kelp beds are present within the locale of the proposed seaweed farms (see chapter 3). The material is native and not genetically modified. Translocation is not involved.

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Introduction of microbial pathogens	Harbour porpoise (*Phocoena phocoena)* and habitats.	NO	The seaweed species being farmed are native UK species, with native associated microbial pathogens (if present) that naturally exist within the system and natural seaweed communities. The seaweed species to be farmed are found naturally within the Bay (kelp beds) and are sourced from genetic populations within the local area (1-25 km). The small amounts of fertile material required to provide the seeded material each year are collected from local native seaweed populations when required. The material is not genetically modified. Our seaweed is tested by independent laboratories annually to establish no pathogens (harmful biological microflora) as it is a requirement of supplying the seaweed for food, feed and bio-stimulant purposes. Refer to chapter 3 and Appendix III.

Pressure	Qualifying feature or species (include sub-features and supporting habitats)	LSE?	Justification
Introduction or spread of invasive non-indigenous species (INIS)	Harbour porpoise (*Phocoena phocoena)* and habitats.	NO	The seaweed species being farmed are native UK species. The seaweed species to be farmed are found naturally within the Bay, UK and Europe – the natural biogeographic region and are sourced from genetic populations within the locale. Operators follow a biosecurity protocol (Appendix III) and they are advised by a published specialist in the field (CEO/CSO) and research institutes leading in the field. Applicants are working with/will continue to work with the research institutes (specialists) to monitor and record the presence of invasive species. INNS will be removed if encountered and recorded. Data will be shared with appropriate institutes. Protocols will be reviewed and updated accordingly on an annual basis in response to data collected (INNS detection and responses). For example, removal and safe disposal. To date, since operations in 2020, no significant INNS presence has been recorded. Impacts are assessed as low and can be avoided.

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Organic enrichment	Harbour porpoise (*Phocoena phocoena)* and habitats.	NO	Farming seaweed does not require fresh water, feed or fertilisers. It does not produce waste. Spacing between longlines of 20 m + (10% of the proposed footprint of the farms) prevents deoxygenation, as well as the depth of site (10-17m). Seaweed produces oxygen. The site selected is high energy and mixing profiles will prevent deoxygenation or organic enrichment. Organic enrichment of sediment has not been significantly detected within scientific studies on seaweed farms. Seaweed drop-off is low during farming. It has been established current speeds are optimal to retain the seaweed on lines (1m/s). the seaweeds farmed are robust enough to stay on the lines (kelp) used to high energy systems and able to tolerate 1.5 m/s currents and the wave profile over 50 years with the correct engineering. Natural seaweed drop-off is dispersed into the high energy, open systems. Refer to chapters 5, 7 and 14 for example and Appendix I.

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Harbour porpoise (*Phocoena phocoena)* and habitats.	NO	The anchoring system does not significantly penetrate the sediment/sea bed (eco-blocks). This impact is very low. Refer to section 4.0, chapter 5 and Appendix I.

Pressure	**Qualifying feature or species (include sub-features and supporting habitats)**	**LSE?**	**Justification**
Smothering and siltation rate changes (Light)	Harbour porpoise (*Phocoena phocoena)* and habitats.	NO	Farming seaweed does not require fresh water, feed or fertilisers. It does not produce waste which contributes additional siltation (such as shellfish farming and excretion). The site selected is high energy and mixing profiles will prevent deoxygenation or organic enrichment. Organic enrichment of sediment has not been significantly detected within scientific studies on seaweed farms. Seaweed drop-off is low during farming. It has been established current speeds are optimal to retain the seaweed on lines (1m/s). the seaweeds farmed are robust enough to stay on the lines (kelp) used to high energy systems and able to tolerate 1.5 m/s currents and the wave profile over 50 years with the correct engineering. Natural seaweed drop-off is dispersed into the high energy, open systems. Refer to chapters 5, 7 and 14 for example and Appendix I. Light reduction is avoided through the farm design with 20 m + open channels in between lines. The farm infrastructure occupies 10% cumulatively of the proposed farm sites.

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Visual disturbance	Harbour porpoise (*Phocoena phocoena)*.	NO	All farm structures are submerged except buoys which are horizontally profiled and grey against the seascape (to reduce visibility). At night, four legally required navigational marker buoys will be present and emit light during the night per site for navigational safety purposes. Please refer to Chapter 14 (visual impact assessment). Harbour porpoise mainly rely on echolocation to navigate. Impacts are assessed as low.

Likely Significant Effect Conclusion

Based on data, evidence, expert independent input and assessments, there are no likely significant effects (LSE) from the proposed projects and FAC will remain maintained for the conservation objectives of the SAC.

Direct and indirect pathways that could pose a risk have been assessed. The use of bio-engineering eco-blocks and presence of seaweed on a farm will enhance prey availability – an important conservation objective. The main risk pathways identified by the JNCC are, in order; (1) bycatch in nets, (2) acoustic disturbance (piling), (3) chemical pollution, (4) ADD's and shipping noise, (5) collisions with renewable energy and (6) collisions with vessels. The proposed project does not involve 1-5 and through standard operational practice, vessel collisions are highly unlikely. The eco-blocks will occupy a very small percentage of the seabed habitats within the total SAC, do not penetrate the sediment, are stable and located on very coarse sediment used by porpoise for non-feeding purposes at depth of 10-17 m maximum and at distance from sandy sediment supporting prey species.

Note: Operators will continue to work with and facilitate scientists, research institutes, organisations and regulatory bodies to monitor the effects of farms on marine life, the marine environment and their role in habitat restoration and regeneration. Farms will be monitored through independent and expert-led monitoring programs (see overall assessment document).

Chapter 10: Habitat Regulations Assessment: Marine Conservation Zone and Pink Sea Fan

Preface

The following assessment is in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence application, as referenced above. It is in response to the requirement for an HRA related to featured habitats found within an MCZ, the eastern boundary of which is within proximity of the proposed seaweed farms (350m +) and specifically, risks to pink sea fans which are one of the listed features within the MCZ.

The assessment has been conducted with independent input from universities, research groups, marine engineers and active fishers in the region. And has utilised peer-reviewed, published research from within scientific journals, in combination with other literature.

1.0 Objectives

- Conduct a HRA for the habitats that are designated features of an MCZ, the eastern boundary of which is 350m + distance away from the proposed seaweed farms at Port Quin Bay.
- Detail the operational profile of the proposed farms and infrastructure stability assessments, in relation to identified direct or indirect pathways that might impact the designated habitats and pink sea fans present within the MCZ.
- Consider and assess other appropriate direct and indirect pathways to habitat impacts.
- Consider the value-add of the proposed seaweed farms in terms of biodiversity net gain.

2.0 Overview

The purpose of this chapter is to primarily assesses whether there is a significant risk to designated features (habitats and species) found within an MCZ located 350m + to the west of the proposed seaweed farms in Port Quin Bay under application numbers MLA/2023/00307 and MLA/2023/00308.

The Padstow Bay and Surrounds MCZ and associated habitat features, including pink sea fans were researched, reviewed and the information presented within the chapter. Evidence was collated and presented related to the seaweed farms, operational profiles, infrastructure integrity and biodiversity net gain. An assessment of likely significant impact was made (high (significant) or low to moderate (non-significant). Mitigation is detailed, if required.

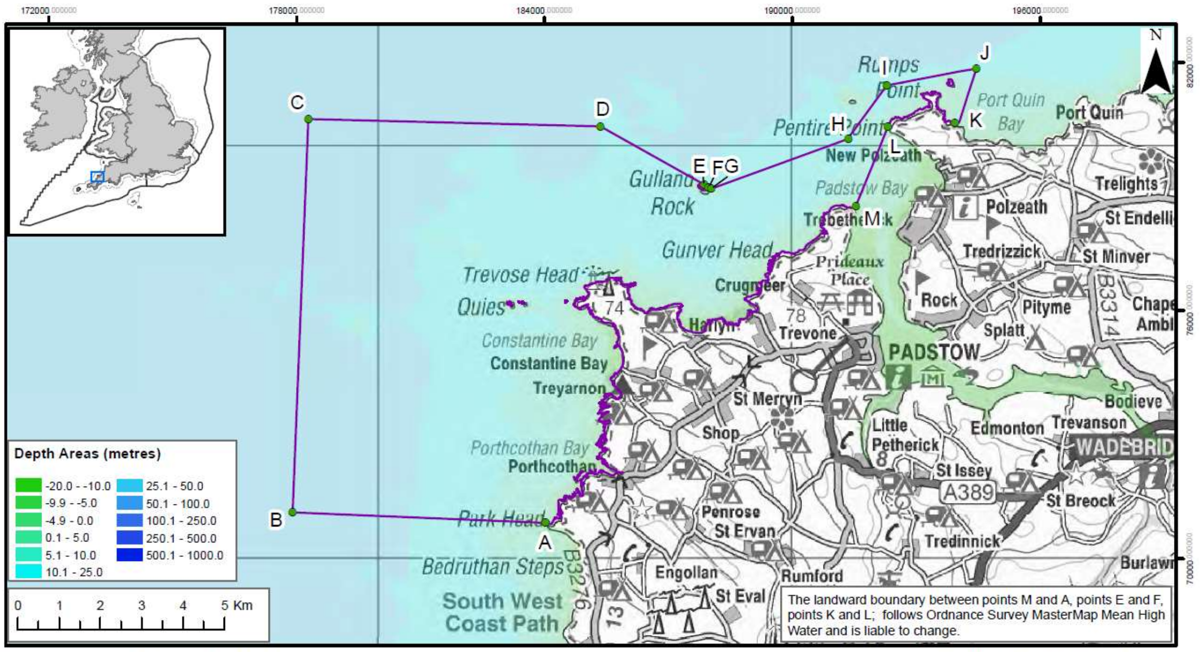
3.0 Farm Sites

Please refer to Chapter 3.

4.0 Padstow Bay And Surrounds MCZ

Padstow Bay and Surrounds MCZ is an inshore site located on the Cornish coast. The boundary extends from Park Head near Trenance to Com Head, just east of Pentire Point and The Rumps (Figure 1.0). The area protected is 90 km^2. It covers a range of sea bed types including intertidal habitats found on the shoreline to circalittoral habitats at a depth of up to 50 metres.

The coast is characterised by exposed cliffs, rocky shores and sandy wave exposed Bays. Part of Port Quin Bay is within the MCZ (western end of the Bay). The Camel Estuary is within the MCZ. The site protects extensive rocky outcrops and reefs, supporting rich underwater communities and a range of habitats rich in seafloor-dwelling species.



Padstow Bay and Surrounds MCZ Boundary

- Marine Conservation Zone
- MCZ boundary co-ordinates
- 12nM Territorial Seas Limit
- Land

Point	Lat	Long	Point	Lat	Long
A	50°29' 51.654" N	5°2' 48.141" W	H	50°35' 1.761" N	4°56' 55.089" W
B	50°29' 51.650" N	5°7' 58.784" W	I	50°35' 44.588" N	4°56' 10.579" W
C	50°34' 59.927" N	5°7' 59.883" W	J	50°36' 0.574" N	4°54' 21.224" W
D	50°35' 3.443" N	5°2' 0.630" W	K	50°35' 17.355" N	4°54' 45.141" W
E	50°34' 21.140" N	4°59' 50.430" W	L	50°35' 12.096" N	4°56' 7.388" W
F	50°34' 19.312" N	4°59' 44.808" W	M	50°34' 9.008" N	4°56' 42.862" W
G	50°34' 18.179" N	4°59' 41.323" W			

Reference: Theme ID: 1477660
Map Projection: British National Grid

Figure 1.0: Padstow Bay and Surrounds MCZ (J-K boundary in Port Quin Bay).

The MCZ (MCZ039) was designated in 2013 and protects seven different types of seabed habitats and two marine species. Shorelines are exposed to strong waves and tidal currents. As such, the MCZ is dominated by kelps (the same native species as Biome and Camel Fish aim to farm). This is because they are adapted to these energetic, higher-energy conditions and can withstand powerful water surges (MCZ039 government fact sheet). Small red seaweeds also thrive. Marine animals dominate at the deeper sites where light does not penetrate. This includes the pink sea fan which is protected within the MCZ.

The designated features are:

- Intertidal coarse sediment
- Intertidal sand and muddy sand
- Moderate energy intertidal rock
- Moderate energy infralittoral rock
- High energy intertidal rock

- High energy infralittoral rock
- High energy circalittoral rock
- Pink sea fan (*Eunicella verrucosa*)
- Spiny lobster (*Palinurus elephas*)

The general management approach for each feature is to maintain it in a favourable condition, apart from spiny lobster where the goal is to recover to a favourable condition.

Management of sites is currently being prioritised nationally according to the potential or actual adverse impacts of activities on the features designated (habitats and species) in relation to fishing activities and will be refined at a local level.

The proposed seaweed farms are not related to the fishing of spiny lobster. The main impact pathway from the seaweed farms in Port Quin Bay is damage of the MCZ designated habitats and pink sea fan.

5.0 MCZ Designated Feature: Pink Sea Fans

Pink sea fans (*Eunicella verrucosa,* Figure 2.0) are a protected species within the Padstow Bay and Surrounds MCZ. Sea fans are erect colonial gorgonians (Cnidarians) that vary from white to deep pink in colour (MarLIN, accessed June 2024). They are branched and protuberances containing anemone-like polyps. Colonies may be up to 50 cm high (25 cm average) and are orientated at right angles to the prevailing water current, on exposed bedrock between 4-50 m. They grow 1cm/year and are sessile (permanently attached).

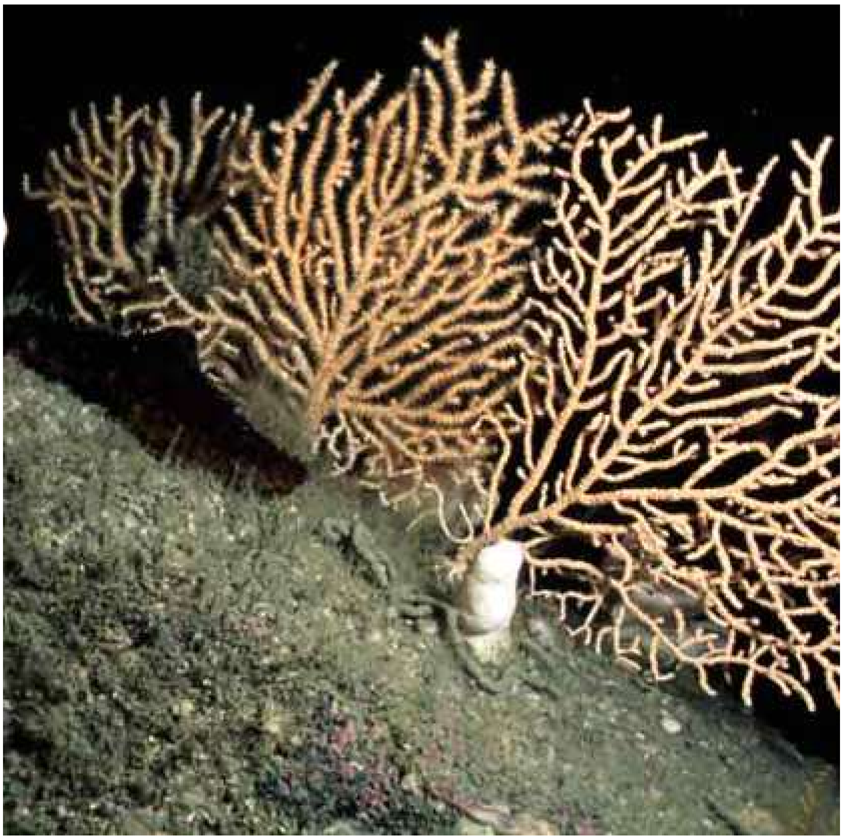


Figure 2.0: Pink sea fan (Source: MARLIN)

They can be found on the south and west coasts of Britian and Ireland.

6.0 Operational Profile And Construction

Please refer to Chapter 4.

7.0 Farm Infrastructure

Please refer to Chapter 5 and Appendix I.

8.0 Biodiversity Net Gain

Biome has farmed varying tonnages of seaweed across different sites from 2020 to 2024 which provides habitat for a range of species. In that period there has been frequent and intense storm action. There have been no significant losses of seaweed biomass and no incidences of significant amounts of farmed seaweed washing up in Bays or on shores. We maintain consistent growth along the seed lines. Sugar kelp, for example, remains connected to the seed lines in current speeds up to 1.5m/s (CEFAS data). Maximal current speeds at the proposed site across 50 years, as reported by Arc Marine are 1.0m/s. This is well within growth parameters. Any natural seaweed drop-off tends to get dispersed (particularly in energetic waters such as Port Quin Bay) or can provide a food source for fish and shellfish.

Additionally, native seaweeds are being farmed, sourced from local populations. Studies into biodiversity associated with seaweed farms indicate that populations of organisms found in seaweed farms reflect that of local natural populations (Corrigan et al. 2023, 2024). Combined with farming native seaweeds, this mitigates risks of disease introduction. Both operators have protocols related to invasive and non-native species that are followed by farm operators. Biome have had no significant impacts from farming at increasing scales over four seasons, in relation to disease or INNS.

Several studies conducted at Biome seaweed farm sites have shown positive net biodiversity gain at farm sites (including fish) and this is associated with the eco-blocks used to anchor the farms and the seaweed canopy. We assume the same positive effects for all three sites.

Biome Algae has provided test sites and data for assessments to assess biodiversity net gain at seaweed farming sites from 2020 to 2024 inclusive (see highlighted acknowledgements within peer-reviewed published studies: examples: Corrigan et al. 2023,2024) and has been instrumental in helping fish and shellfish assessments associated with farms, including on the Ropes to Reefs program (using transponders to detect tagged fish). Positive impacts reported in publications on biodiversity are as follows;

(a) Corrigan et al. 2024 (a) have established seaweed farms attract a range of fish, which feed and find shelter underneath the farm and within the eco-blocks. When harvested, the fish will disperse to the natural ecosystems within the Bay (kelp beds, sandy mud). Species that the seaweed farms have been demonstrated to positively support include lesser sand eels (*Ammodytes spp*.), greater sand eels (*Hyperoplus lancolatus*), grey mullet, juvenile fish species, pollack, mackerel, wrasse and nursehounds.

(b) Corrigan et al. 2024 (b) establishes the potential for seaweed farms for habitat provisioning, similar to natural kelp forests. The study compared epibiont assemblages within cultivated farms and natural kelp populations. Kelp farms supported 217 times the epibionts living in wild systems (which are a food source for fish). This was mainly amphipods.

(c) Corrigan et al. 2023 (b) provided statistical analysis to show that epibionts increased significantly over time on farmed kelp and can support assemblages in natural habitats.

(d) Habitat provisioning underpins biodiversity, ecosystem structure, functioning, ecosystem service provision and can enhance commercial fish stocks (Corrigan et al. 2022).

Hickling et al. 2023 investigated the potential for biodiversity enhancement through using eco-blocks as nature Inclusive Design (NID) for anchoring aquaculture farms or forming reef areas. They assessed benthic biodiversity near and within reef cubes in Torbay, Devon – with the goal of establishing if biodiversity was enhanced – as evidenced by environmental DNA (e DNA) analysis. They assessed the eDNA (using metabarcoding) for taxonomic richness, taxonomic diversity and genetic diversity. In all cases, benthic biodiversity was significantly increased. With threefold increases observed for benthic epifauna, suspension feeders and carnivores. 108 species were identified, dominated by mussels, barnacles, anemones, hydrozoans and copepods. Using eco-blocks on seaweed farms has huge potential for biodiversity net gain – which will in turn support local fisheries.

Based on scientific research and evidence, it is highly likely that the proposed seaweed farms (100.8 Ha) will contribute positively to fisheries and biodiversity in the Port Quin Bay area which may positively overspill into the MCZ.

9.0 HRA

The HRA assessment is conducted using the framework provided as an annex to this chapter. This provides project details in Annex Table 1.0, screening for HRA in Annex Table 2.0, details of the N2K site in Annex Table 3.0, Likely Significant Effects (LSE) and avoidance or mitigation in Annex Table 4.0, with a conclusion for LSE to end the assessment. Protective measures, to protect featured habitats and vulnerable species (pink sea fan) during construction and farm operations are listed in Annex Table 4.

Annex Table 1.0: Proposed Plan Or Project Details

Title of project	Seaweed Farms, Port Quin Bay
Case reference	MLA/2023/00307 and MLA/2023/00308
Applicant name	Camel Fish and Biome Algae
Type of licensable activity	To deposit any substance or object within the UK Marine licensing area, in the sea and on the seabed, from any vehicle, vessel or marine structure of Section 66 of the Marine and Coastal Access Act 2009.
Location of works	See section 3.0 Farm sites
Description of proposed project	Farm construction: Applicants would like to licence two areas for the farming of seaweed sized of 50.4 Ha each (100.8 Ha total). Cumulatively, this would involve installing 288 longlines across both sites at full capacity, which occupies 10% of the total required footprint of the farms (see section 8.0). The longlines are 160 m long, secured using 100% recycled eco-blocks. The sites would sustainably farm native seaweed. They are grown on seeded ropes. Seeds are sourced from local populations of native seaweed. Construction works will be completed over 3-4 years, requiring approximately 36 days total during that period. Once deposited, the eco-blocks will last the lifetime of the farm. Eco-blocks will be deployed September, October, November (latest) for the first 3-4 years only. July and August are possibilities. Farms will operate across the year (seed deployment in November/December, weekly maintenance February to March and harvesting seaweed In April May and June).

Annex Table 2.0: Need For A Habitats Regulations Assessment (HRA)

2.1 - Is the proposal directly connected with, or necessary to the management of a N2K site for the purpose of conserving the habitats or species for which the site is designated?	The proposed farms are located outside of the Padstow Bay and Surrounds MCZ, with the closest point of the farms (west) located approximately 350m + from the eastern MCZ boundary. However, given the features protected within the MCZ (habitats and species; pink sea fans), it is important to assess how construction of the farm, farm operations and infrastructural stability might directly or indirectly impact the designated features and where potential pathways to impact can be managed, avoided, minimised and mitigated.
2.2 - Is it necessary to carry out an HRA?	Yes – to assist with management of the MCZ (and pink sea fans within), to ensure the designated features are maintained in favourable condition.
For the reasons given in section 2.1 and 2.2, this proposal is **considered to require an HRA.**	

Annex Table 3.0: Details Of N2K Site Identified

Name of N2K site: Padstow Bay and Surrounds MCZ
Is a licensable activity taking place within or near a N2K site: It is located near the Padstow Bay and Surrounds MCZ (350m + west of proposed sites).
Conservation advice package used: https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0012&SiteName=Padstow%20Bay&SiteNameDisplay=Padstow%20Bay%20and%20Surrounds%20MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=1&HasCA=1 **Other documents/online sources of information pertaining to the MCZ and its protected features have also been used, including reports. Appendix II should also be referred to in conjunction with this assessment.**
Date conservation advice was last accessed: 10/06/2024
Conservation objective(s): Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring; The extent and distribution of the habitats of the qualifying features The structure and function of the habitats of the qualifying features The supporting processes on which the habitats of the qualifying features rely The population of each of the qualifying features, and, The distribution of the qualifying features within the site. This includes pink sea fan.

Likely Significant Effect (LSE)

In formulating the LSE alone assessments, Natural England's Conservation Advice Package, as outlined in Table 3, have been consulted and the following principles applied:

- The Advice on Operations (AoO) category of marine activity used is **Seaweed aquaculture: suspended rope culture**

- Where available, the 'Advice on Operations' (AoO) matrix to determine pressures associated with the proposed activity[ies] that may potentially harm the qualifying habitat features and/ or species of the site has been used.
- Low risk pressures, unless there is evidence or site-specific factors that increase the risk, or uncertainty on the level of pressure on a receptor, this pressure generally does not occur at a level of concern and should not require consideration as part of the assessment.

- Features deemed sensitive to pressures (medium and high risk) for both direct and indirect pathways are taken forward into the LSE assessment.

- The individual pressure/ feature interactions categorised as 'Not Sensitive' at the benchmark are not taken forward into the LSE assessment. The MMO considers that the impacts on these features as a result of the activities will be less than the benchmarks specified for these pressure/ feature interactions.

- For pressure/ feature interactions categorised as 'Not Relevant' these are not taken forward into the LSE assessment. The MMO considers that there is no interaction of concern between the pressure/ feature or the activity and the feature could not interact.

- Features deemed sensitive to pressures (medium and high risk) for both direct and indirect pathways are taken forward into the LSE assessment.

- Pressure/ feature interactions categorised as either ‘Insufficient Evidence’ or ‘Not Assessed’ have been taken forward into the LSE assessment in accordance with the precautionary principle.

Assessment: Padstow Bay and Surrounds MCZ			
Pressure	**Qualifying feature or species (include sub- features and supporting habitats)**	**LSE?**	**Justification**
Damage to the designated features (habitats and species: pink sea fan) in the Padstow Bay and Surrounds MCZ: During the first few years of operations, the proposed seaweed farms will need to deposit eco-blocks and infrastructure at sea, as the farms are constructed. Over the lifetime of the farm, the main farm infrastructure (eco	Protected habitat features and species: • Intertidal coarse sediment • Intertidal sand and muddy sand • Moderate energy intertidal rock • Moderate energy infralittoral rock • High energy intertidal rock • High energy infralittoral rock • High energy circalittoral rock • Pink sea fan (*Eunicella verrucosa*) • Spiny lobster (*Palinurus elephas*) All direct and indirect pathways to risk considered are: (a) whether construction of the farm will impact the designated habitats or species	(a) No to low (unlikely)	(a) the main body of the assessment identifies the materials to be used for the eco-blocks can be deposited without impacting the designated habitats and species (pink sea fan) within the MCZ. <u>Safe, controlled operations</u> The eco-blocks are heavy and will be deposited using a long-arm crane. This is unlikely to have a significant effect on any migrating salmon in the proximity of the farms as; (i) echolocator/bathymetric devices/fish finders are used alongside GPS co-ordinates to slowly and carefully guide the blocks down to the sea bed. (ii) HSE procedures are followed. Blocks are securely lowered in accordance with safety and security protocols. (iii) The loading on the crane will be appropriate. (iv) depositing actions will be slow and controlled, enabling fish to move away from the immediate works area and ensuring construction is maintained within the proposed farm licenced sites and not

blocks and main suspended rope system) stability will be important.	(pink sea fan) (b) whether the infrastructure will be unstable and impact migration routes	(b) low (unlikely)	damage designated habitats or species within the MCZ or even outside the MCZ on the reefs located to the north of the proposed sites. The main body of the chapter indicates that noise from construction works will be low. Eco-blocks will only require depositing in the first 3-4 years whilst the farms are constructed. They last the life time of the farm (besides repairs or maintenance). They are deposited as described above and sit on the coarse seabed (do not penetrate it but embed 5-10 cm deep). Underwater noise from depositing the blocks will be short and low decibel. Vessels used have silencers on the internal engines and only run engines when necessary. In total, approximately 36 days will be required over the 3 to 4-year period to deposit the eco-blocks. The infrastructure has been marine engineered (see main body of the chapter) and will be absolutely stable (with maintenance) across 50-year storm periods within Port quin Bay. Habitats and migratory routes will not be impacted by movement or loss of major infrastructure (eco-blocks or ropes).

Annex Table 4.0 Likely Significant Effects

Padstow Bay and Surrounds MCZ			
Pressure	**Qualifying feature or species (include sub- features and supporting habitats)**	**LSE?**	**Justification**
Abrasion/disturbance of the substrate on the surface of the seabed	High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal sand and muddy sand Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan *(Eunicella verrucosa)* Spiny lobster *(Palinurus elephas)*	No	The proposed seaweed farms are outside of the MCZ and its designated habitats and species (pink sea fan): 350m + There will be very little abrasion or disturbance of the sea bed involved in the construction of the farm (coarse sediment) and operations will be according to Annex Table 4.0. Disturbance will be localised and for a restricted time period. Positioned on coarse sediment, the eco-blocks are unlikely to alter sediment movement as the heavily coarse sediment and pebbles are unlikely to significantly move (pers comm. marine engineers). There will be no direct or indirect impacts on the habitats listed. The construction period and methods will not significantly impact pink sea fans within the MCZ.

Deoxygenation	High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal sand and muddy sand Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan *(Eunicella verrucosa)* Spiny lobster *(Palinurus elephas)*	No	The proposed seaweed farms are outside of the MCZ and its designated habitats and species (pink sea fan): 350m + Spacing between longlines (10% of the proposed footprint of the farms: 10.8 Ha) prevents deoxygenation as well as the depth of site (10-15m). Operating within healthy communities, seaweed produces oxygen. The site selected is high energy and mixing profiles will prevent deoxygenation or organic enrichment. Seaweed drop-off is low during farming, the seaweed robust enough to stay on the lines (kelp) used to high energy systems and able to tolerate 1.5 m/s currents and the wave profile over 50 years with the correct engineering (pers. comment marine engineers and experience of Biome farming over 4 seasons between 2020 and 2024). Natural seaweed drop-off is dispersed into the high energy, open systems. Research work has not detected significant levels of organic enrichment within sediments below farms (PhD thesis, Corrigan. S, Exeter University 2023).

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Genetic modification & translocation of indigenous species	High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal sand and muddy sand Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan *(Eunicella verrucosa)* Spiny lobster *(Palinurus elephas)*	No	The proposed seaweed farms are outside of the MCZ and its designated habitats and species (pink sea fan): 350m + All seaweeds farmed are native and fertile material is stocked from local genetic and phenotypic populations. Kelp beds are present within the locale of the proposed seaweed farms. The material is native and not genetically modified. Translocation is not involved.

Pressure	Qualifying feature or species (include sub-features and supporting habitats)	LSE?	Justification
Introduction of microbial pathogens	High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal sand and muddy sand Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan *(Eunicella verrucosa)* Spiny lobster *(Palinurus elephas)*	No	The proposed seaweed farms are outside of the MCZ and its designated habitats and species (pink sea fan): 350m + The small amounts of fertile material required to provide the seeded material each year are infrequently collected in small amounts from local populations. The material is not genetically modified. Our seaweed is tested by independent labs annually to establish no pathogens (harmful microbiota) as it is a requirement of supplying the seaweed for food, feed and fertiliser purpose. Research indicates that wild kelp communities and farmed kelp communities reflect each other (Corrigan et al. 2023, 2024)

Pressure	Qualifying feature or species (include sub-features and supporting habitats)	LSE?	Justification
Introduction or spread of invasive non-indigenous species (INIS)	High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal sand and muddy sand Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan *(Eunicella verrucosa)* Spiny lobster *(Palinurus elephas)*	No	The proposed seaweed farms are outside of the MCZ and its designated habitats and species (pink sea fan): 350m + The seaweed species being farmed are native UK species, with native associated microbial pathogens (if present) that naturally exist within the system and natural seaweed communities. The seaweed species to be farmed are found naturally within the Bay and are sourced from genetic populations within the locale. Biome and Camel Fish operates a strict biosecurity protocol (See Appendix III) and they are advised by a leading, published specialist in the field who is the CEO/CSO. Applicants will work with research institutes (specialists) to monitor and record the presence of invasive species. INNS will be removed if encountered and recorded. Data will be shared with appropriate institutes. Protocols and policies can be reviewed and updated regularly in response to INNS detection and responses. The stocking density on the seeded ropes prevents establishment of INNS.

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Organic enrichment	High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal sand and muddy sand Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan *(Eunicella verrucosa)* Spiny lobster *(Palinurus elephas)*	No	The proposed seaweed farms are outside of the MCZ and its designated habitats and species (pink sea fan): 350m + Spacing between longlines (10% of the proposed footprint of the farms: 10.8 Ha) prevents deoxygenation as well as the depth of site (10-15m). Operating within healthy communities, seaweed produces oxygen. The site selected is high energy and mixing profiles will prevent deoxygenation or organic enrichment. Seaweed drop-off is low during farming, the seaweed robust enough to stay on the lines (kelp) used to high energy systems and able to tolerate 1.5 m/s currents and the wave profile over 50 years with the correct engineering (pers. comment marine engineers and experience of Biome farming over 4 seasons between 2020 and 2024). Natural seaweed drop-off is dispersed into the high energy, open systems.

			Research work has not detected significant levels of organic enrichment within sediments below farms (PhD thesis, Corrigan. S, Exeter University 2023).

Pressure	Qualifying feature or species (include sub- features and supporting habitats)	LSE?	Justification
Penetration and/or disturbance of the substratum below the surface of the seabed.	High energy circalittoral rock High energy infralittoral rock High energy intertidal rock Intertidal coarse sediment Intertidal sand and muddy sand Moderate energy infralittoral rock Moderate energy intertidal rock Pink sea-fan *(Eunicella verrucosa)* Spiny lobster *(Palinurus elephas)*	No	The proposed seaweed farms are outside of the MCZ and its designated habitats and species (pink sea fan): 350m + The anchoring system does not penetrate the sediment/sea bed (eco-blocks).

Likely Significant Effect Conclusion

Direct and indirect pathways that could pose a risk for the MCZ and its protected features have been assessed. With avoidance, minimisation and mitigation where possible, likely significant effects were assessed as non-significant (no, low or unlikely). The proposed farms will not significantly impact the MCZ located 350m + away from the proposed farms, through damaging its designated habitats or species (including pink sea fan).

Chapter 11: Habitat Regulations Assessment: Salmonids

Preface

The following assessment is in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence application, as referenced above. It is in response to the following FIR:

'3.16 Impacts on Salmonids: Migratory salmonid species and their migratory routes are protected under the Salmon and Freshwater Fisheries Act. Salmonids are sensitive to noise, and this can act as a deterrent to their migratory pathways. The River Camel |Special Area of Conservation (SAC) and the River Camel Valley and Tributaries Site of Special Scientific Interest (SSSI) have Salmonids in the citations and given the location of the proposal in the Bristol Channel, many other rivers may *have migrating fish moving directly through, or in proximity to, this location and therefore be impacted by the construction stage. The MMO requests that the impacts on Salmonids be considered within an impact assessment, this must include details of the construction of the proposed development (including timing of works, methods, and materials to be used), consideration of the impacts of the construction method on the protected species and habitats, and details on how migratory salmonids are to be protected during construction works.'*

The assessment has been conducted with independent input from universities, expert research groups, marine engineers and active fishers in the region. Evidence is based on peer-reviewed, published research from within scientific journals, in combination with other literature.

1.0 Objectives

- Conduct a HRA for Atlantic salmon, to determine if they may be migrating within the vicinity or through the proposed seaweed farms at Port Quin Bay.
- Detail the construction phase for the proposed farms.
- Determine if there are pathways to likely significant effects and mitigation required if needed.

2.0 Overview

The purpose of this chapter is to primarily assesses whether there is a significant risk to migrating Atlantic salmon in relation to the construction of the proposed seaweed farms under application numbers MLA/2023/00307 and MLA/2023/00308.

Atlantic salmon (*Salmo salar*) and their migratory patterns, the River Camel Special Area of Conservation (SAC) and the river Camel Valley and Tributaries Site of Special Scientific Interest (SSSI) were researched, reviewed and the information is presented within this HRA. Proposed construction activity related to the seaweed farms is presented. Evidence was collated and applied when assessing potential pathways to impact and whether any potential impacts identified will result in a likely significant effect. Risks were assessed from high (significant), moderate, low/no impact (non-significant). Mitigation is detailed, if required. Atlantic salmon are protected through legislation (see section 7.0).

3.0 Farm Sites

Please refer to Chapter 3.

4.0 Atlantic Salmon

Atlantic salmon (*Salmo salar*) are found on the east and west coasts of the North Atlantic across a wide range. Within this range are three distinct groups. In the UK, the European group of Atlantic Salmon are present. Atlantic salmon are members of the family Salmonidae, sub family Salmoninae, being one of two species within the genus. Generally, salmon can be anadromous (migratory) or non-anadromous (land-locked). Of the migratory groups found in a given region, they can be divided between those that migrate from freshwater to the estuary and those that migrate from freshwater to the wider marine environment beyond the estuary mouth. This is age and population specific. However, the Atlantic Salmon found in South West England are all migratory once they reach maturity (Counter, 2012).

Sexually mature parr will migrate from the open ocean into freshwater systems to spawn. Spawning occurs on the gravel beds of rivers (freshwater) and therefore spawning and spawn (roe) is not impacted by construction of the proposed seaweed farms. Spawning occurs in approximately November to December annually, with eggs overwintering and hatching in spring (Moran and Perez-Figueroa 2011). Newly hatched fish (alevins) will feed on the yolk sac for several weeks and juveniles will feed in the river until smoltification (physiological, morphological and behavioural changes prior to life at sea) which can take from 1-5 years (Counter, 2012).

Based on their life-cycle, mature salmon will be spawning in November and December and therefore migrating into the rivers and tributaries around this time (September, October, November). 90-95% of adults die after spawning, although some return to the sea (kelts) which guide young post-smolts that are ready to migrate out to sea (late spring/early summer).

Migration into rivers does coincide partly with the period when longlines and eco-blocks would be deployed over the first 3-4 years of farm operations. When they are migrating out to sea, harvesting ends and the farms are mostly inactive over summer (maintenance only).

Atlantic salmon have been declining in numbers for decades (Ribeiro et al. 2008). Threats include climate change (temperature sensitive) and human factors (dams, hydroelectric stations and land-based farming for example within rivers). Much of the land in Cornwall has been historically used for agriculture or mining (Counter, 2012).

In 1988, Reddin reported that a range of tagging studies indicated that Atlantic salmon (*Salmo salar*) migrate over great distances from their rivers and can be found in the North Atlantic, feeding in the Irminger Sea, Norwegian Sea and Greenland (feeding grounds).

Atlantic salmon exhibit iteroparity between freshwater and marine environments (Hayes and Kocik 2014). Recent studies have identified clear migratory patterns in smolt/post-smolt Atlantic salmon as they move upriver into estuarine environments, enter open sea to migrate for 2-5 years (Hayes and Kocik 2014) to travel to these feeding grounds and eventually return to the same river to reproduce. Salmon use estuarine habitats as short-temporal migration corridors, then follow vertical migration pathways or highways which are narrow bands along the coastal shelf, where they then cross the Atlantic (Hayes ad Kocik 2014).

The use of tags across several studies has established that immature salmon (pre-smolts) will swim up river, into the estuary and remain mainly in the estuary. Environmental clues are linked to currents, diurnal patterns and salinity levels. Some salmon will move further out to sea within the estuary mouth over tidal periods and then swim back (change orientation) into the estuary when the tide changes (Hedger et al. 2009). They do not exceed the estuary mouth. Some exhibit similar behaviour to post smolts, making a direct, strongly orientated traverse across the estuary and into the open sea before returning to the estuary (Hedger et al. 2009). They are practicing.

Several studies have identified behaviour and migration patterns of post-smolt Atlantic salmon that are mature enough to enter into annual migration events, migrating to feeding grounds for cycles of up to five years before returning to their natal rivers to reproduce. These patterns have been assessed in different global regions and within the UK – showing strong similarities in behaviour. For example, in Canada, post-smolts exhibited few upstream movements, took a more direct route to the ocean and reached the open ocean rapidly (Halfyard et al. 2012).

Commonalities in migratory patterns have been identified. The salmon use similar environmental cues to those utilised whilst younger, swimming within the estuary. There is a greater reliance on salinity as a cue, as the salinity gradient increases from estuarine levels to open sea levels (33 parts per million). They rely to some degree on currents to navigate towards established migration routes offshore (passive) but will also actively swim against currents to reach the routes (Newton et al. 2021). They will swim in groups in the daytime for predator protection and are more active at night for the same reason. They cover great distances in short periods of time. For example, swimming at rates of 1.2 body lengths per second (Newton et al. 2021). Rodgers at al. 2024 recorded distances of 575 km over 100-day periods. This is indicative of an active process over a direct trajectory.

Tagging programs, such as acoustic telemetry (Newton et al. 2021), have established the routes the salmon take from the estuary, across the coastal zone, to the established migration routes in open marine areas and then once the salmon enter the main migration routes for years. Migrating is an energy consuming activity (newton et al. 2021) and therefore, the salmon use the most direct routes across the coastal zone to enter the main offshore migration route. They swim directly offshore (not dispersing randomly within the unrestricted coastal zone, Newton et al 2021) covering the shortest distance (horizontally or vertically), bypassing bays. It has been noted they may not take the shortest route to their ultimate destination once within the main offshore migratory routes, for example following 44^{o} north not 70^{o} north trajectories (Newton et al. 2021).

A study in 2024 by Rodgers et al. tagged 1914 post-smolts from 25 rivers located in four countries (Scotland, England, Northern Ireland and Ireland). Over 39% were detected during migration. Due to the distances covered (575 km in 100 days), migratory pathways are described as the shortest distance between detections, although salmon from different rivers use different migratory pathways, determined by the location of the river (Figure 1.0). It is clear routes are direct and not via bays along the coastline.

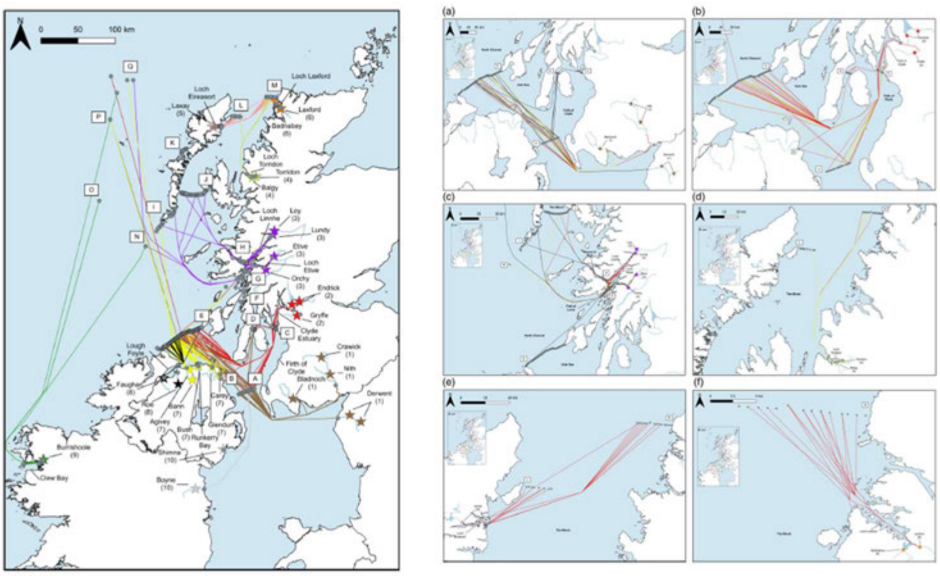


Figure 1.0: Migratory routes of Atlantic salmon from 25 rivers located in four countries

(Rodgers et al. 2024).

Once they enter the offshore migratory routes, which are narrow, concentrated channels, they enter and remain in these channels, following them over several years in regular patterns – often being transported in oceanic gyre systems (Dadswell et al. 2010).

In terms of Port Quin Bay, it is located 7.22km from the Camel River and Estuary mouth (see section 5.0). And the bay itself does not have any significant rivers or tributaries. The bay area will be bypassed by the salmon.

Based on the evidence, Port Quin Bay is not a migratory route for Atlantic Salmon. They will take the shortest, direct route offshore from the Camel estuary mouth to meet the main, established migratory channels located offshore. As is the case for other rivers containing Atlantic salmon in the south west and wider UK.

This is further supported by researchers who communicated directly with the applicants. They note that in several studies conducted in a range of south west shellfish and seaweed farms across seasons and years and in proximity to rivers and tributaries, Atlantic salmon have not been detected within the farms (for example, Corrigan et al. 2024). In addition to this, a range of fishers that have historically fished the bay for decades have not observed Atlantic salmon in the Port Quin Bay area.

Therefore, the salmon are highly unlikely to/will not be impacted by construction of farm infrastructure (see section 7.0) or presence of the proposed farm sites in Port Quin Bay and there are no likely significant risk pathways. As a result of this, no mitigation measures are required during construction or operations of the proposed farms with regards to migrating Atlantic salmon as impacts are avoided due to the location of the proposed farm sites.

5.0 SAC And SSSI

The River Camel Special Area of Conservation (SAC) and River Camel Valley and Tributaries Site of Special Scientific Interest (SSSI) both have Salmonids in the citations (Figure 2.0). The proposed seaweed farms do not impact the SAC or SSSI directly, being located at sea (marine environment) and in Port Quin Bay, outside of the estuary mouth (distance: 7.22 km away). However, Atlantic Salmon migrate into and out of the River Camel and associated tributaries to spawn and may therefore, pass through or in proximity to the proposed seaweed farms.

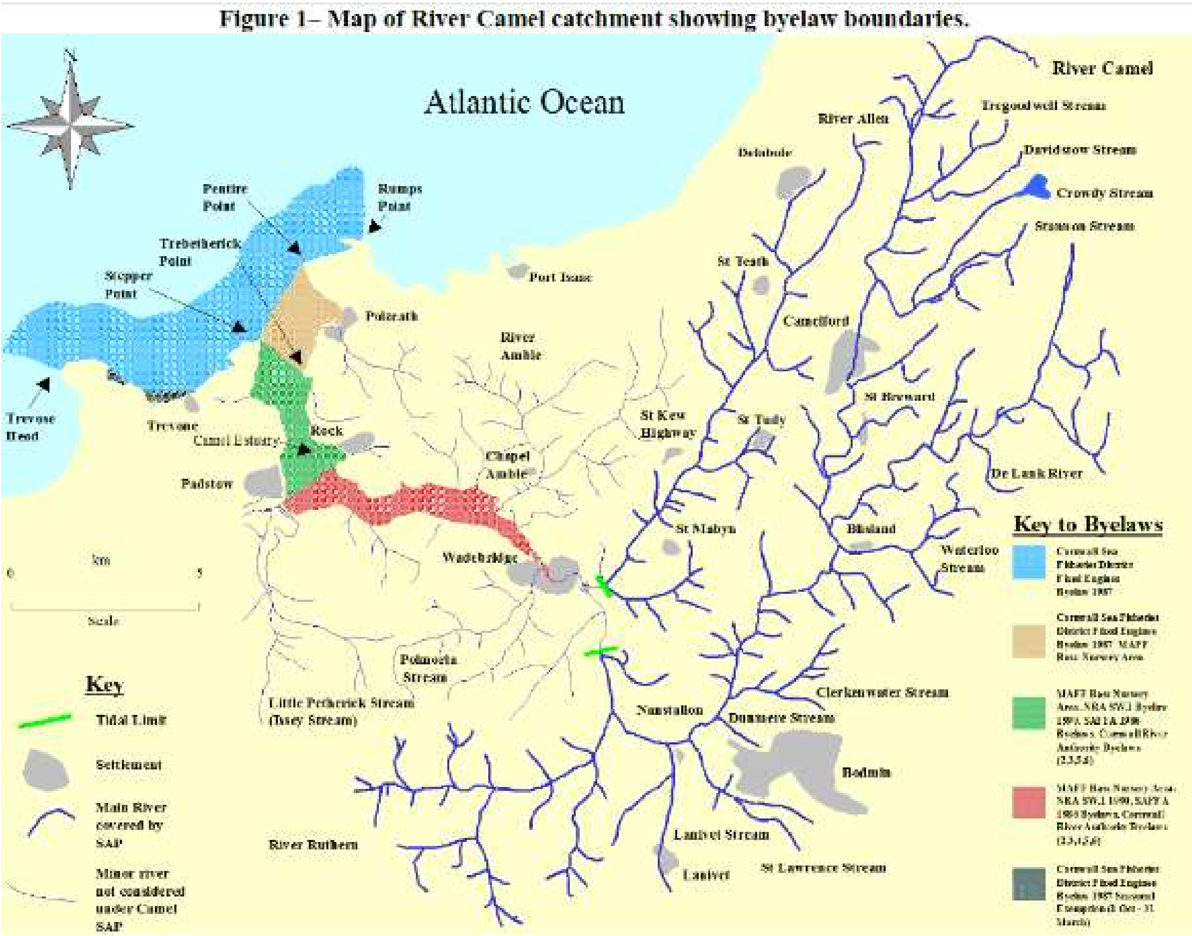


Figure 2.0: Location of the SAC and SSSI having Salmonids in their citations.

Information on the River Camel was accessed through JNCC (http://sac.jncc.gov.uk/site/UK0030056). The SAC EU code is UK0030056. The area is 604.7 Ha total. It includes tidal rivers, Estuaries, Mud flats, sand flats and inland water bodies. *Salmo salar* is an Annex II species present as a qualifying feature, but not a primary reason for site selection.

6.0 Salmonids And Wider Legislation

Migratory Salmonid species and their migratory routes are protected under the Salmon and Freshwater Fisheries Act 1975 (as amended). Fisheries offences related to Salmonids were accessed in June 2024, related to SAFFA:

(https://www.gov.uk/government/publications/offence-response-options-environment-agency/fisheries-offences)

These were updated on 21st February 2024. Of relevance to the proposed seaweed farms is that SAFFA applies to marine waters (migratory routes) up to the 6 nm range. The fundamentals are that Salmonids (including roe, spawning fish or unclean fish) should not be knowingly taken, killed or injured using explosives, poisons or electrical devices. Liquids or solid matter that is poisonous or injurious to fish or spawning fish should not enter the environment with intent to destroy the fish and fish passes, free gaps and dams should be treated with respect and maintained, not blocked or damaged.

Given the proposed farms are fully located within the marine environment (Port Quin Bay), that fishing is not an associated activity, that we are located away from passes and dams (freshwater features), that salmon spawn in freshwater and that we will be constructing in the open marine environment, then in relation to SAFFA; during construction of the farm, we need to consider whether we are adding liquids or solid matter that is poisonous or injurious to fish. This is not the case.

7.0 Operational Profile And Construction

Please refer to Chapter 4.

Noise during construction will be emitted as follows:

(a) Mounted crane – low decibel vessel noise (engine silencers) when moving to deposit eco-blocks, engine off when depositing (longarm crane can reach several block locations in one spot). Localised noise source.

(b) Vessel running lines – low decibel vessel noise (engine silencers). Engine on only for running lines. Localised noise source.

(c) Eco-block lowered onto sea bed – low decibel crane noise above water, short, low-decibel sound underwater as the block is lowered slowly onto the bed, as it only compacts first 5-10 cm of course sediment as each block settles. No drilling or screwing required. Localised noise source.

As construction of the proposed farm sites is not located in a migratory pathway for Atlantic salmon, there is no impact pathway for the salmon when migrating (see section 4.0).

8.0 Biodiversity Net Gain

Please refer to Chapter 10, section 8.0.

9.0 HRA

The HRA assessment is conducted using the framework provided as an annex to this chapter. This provides project details in Annex Table 1.0, screening for HRA in Annex Table 2.0, details of the N2K site in Annex Table 3.0, Likely Significant Effects (LSE) and avoidance or mitigation in Annex Table 4.0, with a conclusion for LSE to end the assessment. Protective measures, to protect migratory salmonids during construction works, if required, are listed in Annex Table 4.0

Annex Table 1.0: Proposed Plan Or Project Details

Title of project	Seaweed Farms, Port Quin Bay
Case reference	MLA/2023/00307 and MLA/2023/00308
Applicant name	Camel Fish and Biome Algae
Type of licensable activity	To deposit any substance or object within the UK Marine licensing area, in the sea and on the seabed, from any vehicle, vessel or marine structure of Section 66 of the Marine and Coastal Access Act 2009.
Location of works	See section 3.0 Farm sites
Description of proposed project	Farm construction: Applicants would like to licence two areas for the farming of seaweed sized of 50.4 Ha each (100.8 Ha total). Cumulatively, this would involve installing 288 longlines across both sites at full capacity, which occupies 10% of the total required footprint of the farms (see chapter 3 and 5). The longlines are 160 m long, secured using habitat-providing recycled eco-blocks. The sites would sustainably farm native seaweeds. They are grown on seeded ropes. Seeds are sourced from local populations of native seaweed. Construction works will be completed over 3-4 years, requiring approximately 36 days total during that 4-year period. Once deposited, the eco-blocks will last the lifetime of the farm. Eco-blocks can be deployed in July, August, September, October and early November.

Annex Table 2.0: Need For A Habitats Regulations Assessment (HRA)

2.1 - Is the proposal directly connected with, or necessary to the management of a N2K site for the purpose of conserving the habitats or species for which the site is designated?	The proposed sites are located approximately 7.22 km from the River Camel SAC (Estuary mouth and Camel River) – a designated area (UK0030056). The site is designated for habitats (Annex 1) not species. However, there is a permanent population (common) of Atlantic salmon (*Salmo salar,* S1106) – an Annex II species under Article 4 Directive 2009/147/EC and Directive 92/43/EEC. This is a non-isolated population. The SAC is non-marine (0%), covers 604.7 Ha and is 69 km long (long -4.735277778, lat 50.50416667). Atlantic salmon are a qualifying feature of the SAC but not a primary reason for site designation. Although they are a migratory species (see section 4.0), further evidence and expert input indicates they will not migrate through or within the vicinity of the farm. Therefore, the location of the proposed farms avoids pathways to likely significant effects/impacts. However, an HRA has been conducted to clearly establish this.
2.2 - Is it necessary to carry out an HRA?	Given that Atlantic salmon have been in decline due to a number of anthropogenic and environmental pressures, as well as proximity of the proposed farms to the SAC (7.22 km) (and Associated SSSI) – it is important to assess if construction of the farm in the first few years of operation will impact migrating salmon. This is to ensure there is no significant risk to migratory salmon or their migratory route.
For the reasons given in section 2.1 and 2.2, this proposal is **considered to require an HRA.**	

Annex Table 3.0: Details Of N2K Site Identified

Name of N2K site: River Camel
Is a licensable activity taking place within or near a N2K site: No. This is a non-marine SAC (with associated SSSI) and is designated for its Annex I habitats. Atlantic salmon (*Salmo salar*) – an Annex II species (S1106) has a population (common) found within the SAC. The proposed seaweed farm is located 7.22 km from the SAC and the estuary mouth which facilitates the salmon migrating into and out of the SAC (River Camel/tributaries).
Conservation advice package used: http://publications.naturalengland.org.uk/category/6490068894089216 **Other documents/online sources of information pertaining to the SAC and its protected features have also been used, including reports.** River Camel Citation and European Site Conservation Objectives for River Camel Special Area of Conservation Site Code: UK0030056, EA River Camel Salmon Action Plan.
Date conservation advice was last accessed: 10/06/2024
Conservation objective(s): Ensure that the integrity of the site is maintained or restored as appropriate: ¬ The extent and distribution of qualifying natural habitats and habitats of qualifying species ¬ The structure and function (including typical species) of qualifying natural habitats ¬ The structure and function of the habitats of qualifying species ¬ The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely ¬ **The populations of qualifying species,** and, ¬ **The distribution of qualifying species within the site (Atlantic Salmon).**

Likely Significant Effect (LSE)

In formulating the LSE alone assessments, Natural England's Conservation Advice Package, as outlined in Table 3, have been consulted and the following principles applied:

- The Advice on Operations (AoO) category of marine activity used is **Seaweed aquaculture: suspended rope culture**

- Where available, the 'Advice on Operations' (AoO) matrix to determine pressures associated with the proposed activity[ies] that may potentially harm the qualifying habitat features and/ or species of the site has been used.
- Low risk pressures, unless there is evidence or site-specific factors that increase the risk, or uncertainty on the level of pressure on a receptor, this pressure generally does not occur at a level of concern and should not require consideration as part of the assessment.

- Features deemed sensitive to pressures (medium and high risk) for both direct and indirect pathways are taken forward into the LSE assessment.

- The individual pressure/ feature interactions categorised as 'Not Sensitive' at the benchmark are not taken forward into the LSE assessment. The MMO considers that the impacts on these features as a result of the activities will be less than the benchmarks specified for these pressure/ feature interactions.

- For pressure/ feature interactions categorised as 'Not Relevant' these are not taken forward into the LSE assessment. The MMO considers that there is no interaction of concern between the pressure/ feature or the activity and the feature could not interact.

- Features deemed sensitive to pressures (medium and high risk) for both direct and indirect pathways are taken forward into the LSE assessment.

- Pressure/ feature interactions categorised as either ‘Insufficient Evidence’ or ‘Not Assessed’ have been taken forward into the LSE assessment in accordance with the precautionary principle.

Annex Table 4.0 Likely Significant Effects

Assessment: Migratory Salmonids (Atlantic Salmon, *Salmo salar*) and migratory habitats (site of construction for proposed seaweed farms).			
Pressure	**Qualifying feature or species (include sub- features and supporting habitats)**	**LSE?**	**Justification**
Prevention of *Salmo salar* (Atlantic Salmon) from being able to migrate into and out of the River Camel SAC and associated SSSI: During the first 3-4 years of operations, the proposed seaweed farms will deposit eco-blocks and infrastructure in the bay, as the farms are constructed.	Atlantic Salmon (*Salmo salar*) and wider migratory route at sea as adults enter the River Camel to spawn and smolts enter the sea for mass migration. Evidence presented in section 4.0 and expert input indicates they will not be present seasonally in the Port Quin Bay area. All direct and indirect pathways to risk considered are: (a) whether anything poisonous or injurious is being deposited (b) whether there will be significant underwater noise from farm construction during sensitive migration spawning events for the salmon, hindering migration routes	(a) No (unlikely)	(a) the main body of the assessment identifies the materials to be used for the eco-blocks and infrastructure as not poisonous. Given Port Quin Bay is evidenced as not a migratory route for the Atlantic salmon (see section 4.0), injuries to migrating salmon are avoided. <u>Safe, controlled operations</u> The eco-blocks are heavy and will be deposited using a long-arm crane. This will not have a likely significant effect on any migrating salmon as they will not be within the proximity of the proposed farms. However as normal/standard construction practice (although not relevant to the Atlantic salmon): (i) HSE procedures are followed. Blocks are securely lowered in accordance with safety and security protocols. (ii) The loading on the crane will be appropriate.

Annually (April to June) seaweed will be harvested.	(c) whether the infrastructure will be unstable and impact migration routes (d) whether salmon will be able to move through the constructed farm and (e) whether they may be caught as bycatch during harvesting periods.	(b) no/low (unlikely)	(iii) depositing actions will be slow and controlled, enabling fish species that are present to move away from the immediate works area. The depositing works are conducted during the first four years of the farm's life. Depositing works are at significant distance from the migratory routes of the post-smolt salmon moving out of the Camel estuary mouth and northward, directly into migration channels offshore using strong environmental cues (see section 4.0). There are no significant migratory rivers or estuaries within Port Quin Bay. Noise from construction works will not be a pathway to significant likely effect or would be insignificant (low). Eco-blocks will only require depositing regionally in the first 3-4 years whilst the farms are constructed. They last the life time of the farm and generate habitat provisioning. They are deposited as described above and sit on the coarse (gravel) seabed (do not significantly penetrate it but embed 5-10 cm deep). Underwater noise from depositing the blocks is short and low decibel (pers. comment: marine engineers: Arc Marine). Vessels used have silencers on the internal engines and only run engines when necessary. In total, approximately a total of 36 days will be required over the 3 to 4-year period to

			deposit the eco-blocks. Noise levels will be less than that of high-speed recreational craft.
		(c) no/low (unlikely)	The infrastructure has been marine engineered (see chapter 5 and Appendix I) and will be stable across 50-year storm periods within Port Quin Bay. Habitats and migratory routes will not be impacted by movement or loss of major infrastructure. The infrastructure is not located within or in the vicinity of migration routes.
		(d) no (unlikely)	Academic reports, publications and research programs using transponders (in-situ) on seaweed farms show fish easily move within and around the farms – often attracted to food sources (epibionts) living in the kelp (Corrigan et al. 2024, Ropes to Reefs). However, as the proposed farms are located outside of migratory routes, this applies to other fish species, not Atlantic salmon.
		(e) no (unlikely)	Smolts migrating out to sea will not be in the vicinity of the farms during harvesting as the farms are not within their migratory routes. Therefore, they will not and are unlikely to be caught as bycatch during harvesting. However as normal/standard operational practice with regards to fish that are not Atlantic salmon: Operators have adapted gear (star wheels) that do not damage marine life, seaweed or ropes during harvesting. All seaweed is

			washed with seawater in-situ during harvesting, removing any bycatch.

Likely Significant Effect Conclusion

Evidence and expert input indicate that the proposed farms are not located within the migratory paths of Atlantic salmon. Therefore, the location of the proposed farms **avoids** direct and indirect impacts that could provide a pathway to significant likely effects. Direct and indirect pathways that could pose a risk have been considered. Avoidance of LSE is indicated for each (assessed as no/low and unlikely). The farms will not significantly impact migrating Atlantic salmon.

Chapter 12: Fisheries Assessment

Preface

The following assessment is in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence application, as referenced above. It is in response to the following FIR:

5 (5.1): Within section 3 of the assessment, shellfish species are not included, the MMO ask that you include commercially important shellfish species within this section of the document. Upon review of the document, there is no section on cumulative impact for fisheries, this is particularly relevant given the two seaweed farm MLA's for Port Quin Bay (MLA/2023/00307 and MLA/2023/00308), and the consented seaweed farm in Port Isaac Bay (case reference: MLA/2022/00180 and licence reference: L/2023/00169/1). The MMO would like to see a cumulative assessment for fisheries.

The assessment has been conducted with independent input from universities, research groups, marine engineers and active fishers in the region. And has utilised peer-reviewed, published research from within scientific journals, in combination with other literature.

The assessment incorporates previous assessments conducted, where relevant and submitted to the MMO, to ensure all the information is accessible in one document.

1.0 Objectives

- Assess fisheries in Port Quin Bay and Port Isaac Bay, relative to the sediment type within the Bays.
- Assess the risk of the proposed seaweed farm operations in Port Quin, cumulatively with the licenced 100 Ha farm in Port Isaac, on fisheries.
- Discuss a proposed monitoring program.

2.0 Overview

The purpose of this chapter is to primarily assesses whether there is a significant risk to fisheries in relation to the proposed seaweed farms under application numbers MLA/2023/00307 and MLA/2023/00308 and cumulatively with the licenced seaweed farm L/2023/00169/1).

Fisheries present in the bays were researched, reviewed and the information presented within the chapter. This is in reference to sediment typologies found within the bay and survey data. Shellfish were assessed using local fisher's knowledge of the Bay and fishing activity in Port Quin and Port Isaac. Evidence was collated and presented related to seaweed farms and biodiversity net gain (including fish). An assessment of impact was made (high (significant) or low to moderate (non-significant).

In addition, the chapter considers the operational profile of the proposed farm activities and assesses if fish are at **significant** risk from loss of equipment.

A monitoring program is proposed in partnership with leading research groups (independents) within the UK.

3.0 Farm Sites

3.1 Port Quin Bay Proposed Sites

Please refer to chapter 3.

3.2 Port Isaac Bay Seaweed Farm

A licence to farm seaweed has been granted for a 100 Ha seaweed farm in Port Isaac Bay (Figure 1.0). The coordinates for L/2023/00619/1 are:

NE	50.63397	-4.81122
NW	50.63359	-4.8244
SE	50.62505	-4.81054
SW	50.62479	-4.82444

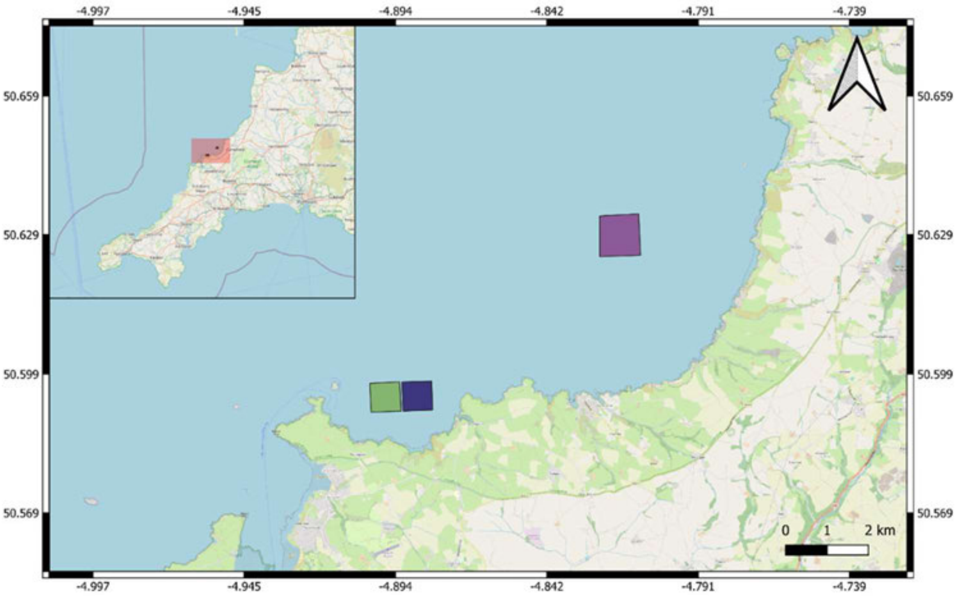


Figure 1.0: The Port Isaac Farm site in relation to the proposed Port Quin Bay farm sites.

This farm is 5 km North east of the proposed Port Quin farm sites. It was granted a licence by the MMO in 2023. The information available on the MMO public portal related to the operators plans and infrastructure are limited. At the time of writing this chapter (June 2024) as far as Biome and Camel Fish are aware, due diligence is still required by the Crown Estate, relating to Tenancy agreements and a Crown operational licence. However, this information is covered by the Data Protection Act. Biome and Camel Fish are not aware of the criteria used by the operators for site selection or how this relates to assessments conducted by the operators related to fisheries. We assume they have been conducted before an MMO marine licence was issued but have had to assess them in our own capacity. It is not clear whether the operators will farm the site. It has remained empty (not even marked by navigational safety markers or on Admiralty charts) for over a year.

The MMO require us to consider the cumulative effects of the Port Quin farms in combination with the Port Isaac farm. To do this, we would have to make a number of assumptions which include but are not limited to (1) the operators will use the same infrastructure design and engineering as Biome and Camel Fish, (2) the operators will farm sugar kelp, (3), the operators will use the same number of and spacing between longlines, (4) the operators will employ the same standards of good practice as those proposed by Biome and Camel Fish, (5) the operators will farm identically to us over the course of a season and (6) they will operate in the full site.

4.0 Sediment Typologies

4.1 Sediment Type At Proposed Farm Sites (Port Quin Bay)

Please refer to Chapter 6.

4.2 Sediment Type At Licenced Farm Site (Port Isaac Bay)

The licenced farm is located over lower sensitivity soft subtidal sediment (A5.2, A5.3 and A5.4 sand/muddy sand: Figure 2.0). The proposed farms are not located within rocky reef regions (north of sites) or areas of lower sensitivity coarse sediment (A5.1).

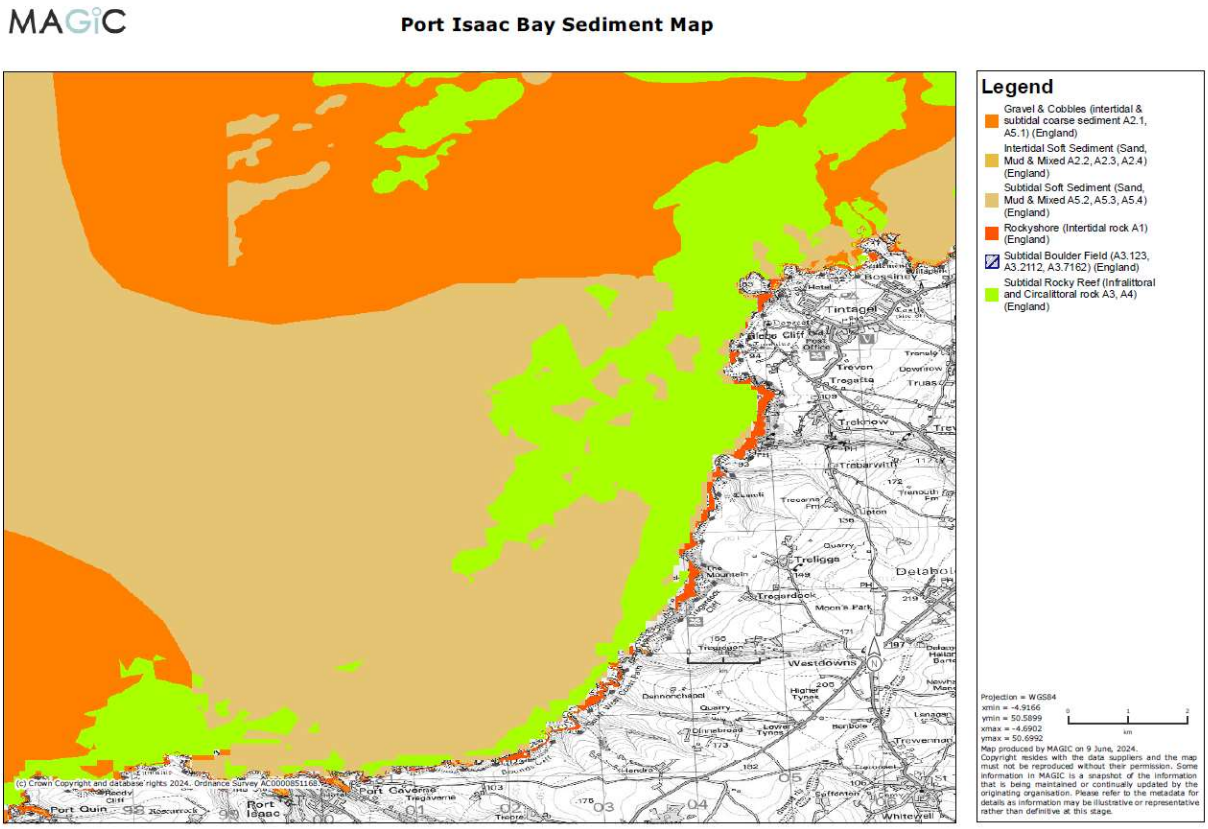


Figure 2.0: Sediment type within Port Isaac Bay and surrounds (DEFRA MAGIC Map).

5.0 Fisheries Assessment

5.1 Proposed Farms (Port Quin Bay)

The following species were assessed for nursery and spawning grounds relative to the proposed Port Quin Bay farm areas (using Coull et al. 1998 and Ellis et al. 2012 as source evidence):

- Sole (*Solea solea*)
- Cod (*Gadus morhua*)
- Thornback ray (*Raja clavata*)
- Spotted ray (*Raja montagui*)
- Tope Shark (*Galeorhinus galeus*)
- Sandeel (*Ammodytidae spp.)*
- Plaice (*Pleuronectes platessa*)
- Whiting (*Merlangius merlangus*)

- Anglerfish (*Lophius piscatorius*)
- Sprat (*Sprattus sprattus*)
- Horse Mackerel (*Trachurus trachurus)*
- Mackerel *(Scomber scombrus)*

The migration of *Salmo salar* (Atlantic salmon) was considered with respect to movement through infrastructure. Please refer to Chapter 11.

Species	Spawning Ground	Spawning Dates	Nursery Ground
Sole	High intensity	March-May (peak April)	Low Intensity
Cod	Low - High intensity	January-April (peak February-March)	NO
Thornback ray	N/A	N/A	Low Intensity
Spotted ray	N/A	N/A	Low Intensity
Tope Shark	N/A	N/A	Low Intensity
Sandeel	High Intensity	November-February	NO
Plaice	Low – High Intensity	December - March	Low Intensity
Whiting	Low Intensity	February - June	Low Intensity
Anglerfish	NO	N/A	Low- High Intensity
Sprat	Low intensity	May - August	NO
Horse Mackerel	Low Intensity	N/A	NO
Mackerel	Low Intensity	May – August (peaking May – July)	Low-High Intensity

Table 1.0. Assessment of the spawning and nursery grounds of fish in Port Quin Bay.

To summarise, sole, thornback ray, spotted ray, tope shark, plaice, whiting, anglerfish and mackerel all have nursery grounds within the wider Port Quin Bay area. Sole, cod, sandeel, plaice, whiting, sprat, horse mackerel and mackerel have spawning grounds within the wider Port Quin Bay area. Both nursery and spawning grounds are classified across a scale of low to high intensity in Ellis et al. 2012.

Low intensity spawners include mackerel, sprat, whiting and plaice. They spawn and will then recruit to nurseries where nurseries are present from May to August, May to August, February to June and December to March respectively.

High intensity spawners include sandeels, sole and cod. They spawn and will then recruit to nurseries where nurseries are present from November to February, March to May and January to April respectively.

Spawning and nursery grounds are located in the sandy muddy sediment to the west of the proposed farms or closer to the reef areas or natural kelp bed systems found adjacent to the shore (intertidal) or to the north of the proposed farm sites. The proposed farms are located on very coarse sediment with no other subtidal features. This sediment type does not support spawning grounds and in its current state would not support nursery grounds.

The 100.8 Ha proposed farms for Port Quin Bay are not likely to directly impact spawning and nursery grounds. However, this will be assessed further.

5.2 Licenced Farm (Port Isaac Bay)

The following species were assessed for nursery and spawning grounds relative to the proposed Port Isaac Bay farm areas (using Coull et al. 1998 and Ellis et al. 2012 as source evidence):

- Sole (*Solea solea*)
- Cod (*Gadus morhua*)
- Thornback ray (*Raja clavata*)
- Spotted ray (*Raja montagui*)
- Tope Shark (*Galeorhinus galeus*)
- Sandeel (*Ammodytidae spp.)*
- Plaice (*Pleuronectes platessa*)
- Whiting (*Merlangius merlangus*)
- Anglerfish (*Lophius piscatorius*)
- Sprat (*Sprattus sprattus*)
- Horse Mackerel (*Trachurus trachurus)*
- Mackerel *(Scomber scombrus*)

Species	Spawning Ground	Spawning Dates	Nursery Ground
Sole	High intensity	March-May (peak April)	Low Intensity
Cod	Low - High intensity	January-April (peak February-March)	NO
Thornback ray	N/A	N/A	Low Intensity
Spotted ray	N/A	N/A	Low Intensity
Tope Shark	N/A	N/A	Low Intensity
Sandeel	High Intensity	November-February	NO
Plaice	Low – High Intensity	December - March	Low Intensity
Whiting	Low Intensity	February - June	Low Intensity
Anglerfish	NO	N/A	Low- High Intensity
Sprat	Low intensity	May - August	NO
Horse Mackerel	Low Intensity	N/A	NO
Mackerel	Low Intensity	May – August (peaking May – July)	Low-High Intensity

Table 2.0. Assessment of the spawning and nursery grounds of fish in Port Quin Bay.

To summarise, sole, thornback ray, spotted ray, tope shark, plaice, whiting, anglerfish and mackerel all have nursery grounds within the wider Port Isaac Bay area. Sole, cod, sandeel, plaice, whiting, sprat, horse mackerel and mackerel have spawning grounds within the wider Port Isaac Bay area. Both nursery and spawning grounds are classified across a scale of low to high intensity in Ellis et al. 2012.

Low intensity spawners include mackerel, sprat, whiting and plaice. They spawn and will then recruit to nurseries where nurseries are present from May to August, May to August, February to June and December to March respectively.

High intensity spawners include sandeels, sole and cod. They spawn and will then recruit to nurseries where nurseries are present from November to February, March to May and January to April respectively.

Spawning and nursery grounds are located in the sandy muddy sediment or closer to the reef areas or natural kelp bed systems found adjacent to the shore (intertidal) or to the north of the proposed farm sites. The coarse sediment type does not support spawning grounds and in its current state would not support nursery grounds. However, the licenced farm is located on sandy mud. The 100 Ha licenced farm for Port Isaac Bay may directly impact spawning and nursery grounds. This requires assessing further.

5.3 Shellfish In The Bays

Discussions with a range of fishers operating in the Bays were held in December 2023 and May 2024 (see 'Fishers Survey and Interview Data' June 2024). Between 15 and 17 operators were surveyed, operating vessels over and under 12 m (at least 15 vessels were under 12 m). Many were potters or static/line fishers. None of the fishers interviewed which represents operators in Port Quin Bay and Port Isaac Bay were opposed to the proposed Port Quin Bay sites for seaweed farming. There was opposition to the licenced Port Isaac farm.

The main reason the fishers are not opposed to the Port Quin Farms are because the farms, located on coarse sediment, do not overlap or interfere with their fishing activities in the Bay. Plaice used to be fished in Port Quin Bay historically, but stopped 15 to 20 years ago. The last time it was fished (two years ago) a trawl vessel fished for two hours and caught two plaice and one sole. Shellfish present in both Bay areas include brown crabs (reefs), lobsters (reefs and kelp habitats close to shore) and seasonally, spider crabs (sandy mud). Therefore, potting activities are associated with these habitats and not coarse sediment. There is overlap with the Port Isaac Bay licenced farm – for spider crab fishing in Spring (and fish species). Potting levels are described by fishers as low in Port Quin Bay.

The potential overspill for shellfish from potential seaweed farm sites would be of benefit to fishers, as they would bolster natural stocks in the area, substantiated in Corrigan et al.2024 (a).

It was indicated that the licenced Port Isaac farm may interfere with fishing activity in the area, although levels of impact were indicated as low. This has been assessed within their licence application – which was subsequently approved by the MMO and therefore, we assume was not assessed as significant – although we do not have access to that information.

6.0 Port Quin Farms: Operational Profiles

6.1 Operational Profiles

Please refer to Chapter 4.

6.1.1 Port Quin Farms

Please refer to Chapter 4.

6.1.2 Port Isaac farm

Biome and Camel Fish assume Port Isaac Operators will operate in a similar manner. Given the farm is 100 Ha, over a typical season, outside of longline deployment, we assume vessel days active will be approximately 120 out of 365 days, concentrated in November/December and April, May and June. When longline deployment is required (we assume first few seasons), we assume deployment will be aimed for October/November each season where possible.

6.2 Fisheries And Farm Impacts

To assess the negative potential of the proposed Port Quin seaweed farms (100.8 Ha) and the licenced Port Isaac Bay farm, the patterns of spawning, which will be followed by recruitment to nurseries (where present) should be assessed against the operational profile of the farms across a farming season (year).

The proposed farms in Port quin are located over coarse sediment (does not support spawning grounds and nurseries) and the licenced farm in Port Isaac is located over sandy muddy sediment (which does support spawning grounds and nurseries).

In terms of installing anchorage (and assuming that all operators anchor with eco-blocks identically to those assessed for Port Quin within this chapter;

(a) The Port Quin farms are not removing any spawning or nursery ground from Port Quin Bay through coverage by eco-blocks on the sediment surface because coarse sediment does not support spawning or nursery grounds.
(b) The Port Isaac farm is removing a small percentage of spawning or nursery ground from Port Isaac Bay through coverage by eco-blocks on the sediment surface (screw anchors would be significantly less). The maximum area to be covered is 1.14% of the farm footprint of 100 Ha. The Bay area is significantly larger than 100 Ha.
(c) Cumulatively, all three farms impact 0.57% of the 200.8 ha footprint. The Bay areas are larger than 100 Ha.

In terms of deployment of anchorage (and suspended infrastructure), assuming all three operators follow the same operational profile, deployment would happen annually in August, September (most typical) and October. This is outside of all spawning and recruitment periods for the fish present in both Bays, which span November to June. Therefore, no impacts are anticipated from all three farm sites.

In terms of seeding, assuming all three operators follow the same operational profile, seeding would happen annually in November and December. This only occurs on suspended infrastructure and does not disturb the sediment. Moreover, it is adding seeds to the infrastructure, not removing anything from the water. Plaice and sand eels are spawning at this time (December to March and November to February respectively). Seeding overlaps with the very start of the spawning seasons;

(a) Significant impacts are not expected for the Port Quin Bay farms as they are located on coarse sediment, are within 10-15 m waters, away from sediment, do not disturb the sediment and are not removing biomass from the water during seeding.
(b) Significant impacts are not expected for the Port Isaac Bay farms as they are located on soft sediment but are within 22m + waters, away from sediment, do not disturb the soft

sediment and are not removing biomass from the water during seeding.

In terms of harvesting, assuming all three operators follow the same operational profile, harvesting would happen annually in April, May and June. This only occurs on suspended infrastructure and does not disturb the sediment. However, it is removing seaweed biomass from the marine environment. A number of fish are spawning during this period. Harvesting overlaps with spawning periods. All operators would wash the seaweed with seawater when harvesting which removes all bycatch including fish (Biome has had no bycatch in four seasons of operations). In addition, an adapted star wheel is used for harvesting the seaweed which ensures that the seaweed, ropes and any marine life are unharmed (Figure 6.0). These precautions are taken as fish will occupy the farms when seaweed is present.

Figure 3.0: Adapted star wheel

A study by Corrigan et al. 2024, indicates seaweed farms attract a range of fish. They feed and find shelter underneath the farm and within the eco-blocks. When harvested, the fish will disperse to the natural ecosystems within the Bay (kelp beds, sandy mud). Whilst harvesting they can be seen feeding in the water column. Species that the seaweed farms have been demonstrated to positively support include lesser sand eels (*Ammodytes spp*.), greater sand eels (*Hyperoplus lancolatus*), grey mullet, juvenile fish species, pollack, mackerel, wrasse and nursehounds. We can anticipate sand eels and mackerel under the farms – as identified within the Bays. Sand eels will not be spawning (ends February). Mackerel will be spawning (May to August).

Given the precautions taken to avoid bycatch and that harvest ceases in June, cumulative impacts on spawning mackerel are likely to be low from all three operating sites.

The proposed Port Quin farm operations (over coarse sediment) will not be located near kelp beds or rocky reefs (lobsters or brown crab) and will not be located over sandy mud (spider crabs in Spring). Therefore, these farms will not impact these fisheries directly and potters can still fish for shellfish. The 100.8 Ha will act as a de facto MPA and the eco-blocks may attract crab species into the blocks (reefs) as they have done on the Torbay farm in Devon operated by Biome, which were colonized in 10 weeks.

The Port Isaac farm would likely have similar effects, although located over muddy sand means they do prevent potting in a 100 Ha area (for spider crab seasonally (Spring)). However, potters could experience overspill effects to areas outside of all three farm sites – as the spider crabs would find shelter within the farm (*defacto* MPA).

7.0 Farm Infrastructure

7.1 Longline Structure (Assumed For All Sites)

Please refer to Chapter 5 and Appendix I.

7.2: Infrastructure Assessment (Assumed For All Sites)

Please refer to Chapter 5 and Appendix I.

8.0: Biodiversity Net Gain

Please refer to Chapter 10, section 8.0.

9.0 Monitoring Program

The applicants (Biome) have worked with various research groups from 2020 to 2024 (four farming seasons) inclusive and continue to do so. We have worked on research programs linked to Exeter University, CEFAS, MBA, Plymouth University and many other regulatory bodies. Research has resulted in peer-reviewed published articles (highest quality), has supported or is supporting MSc. and PhD students and supplies a range of data to assess biodiversity associated with farms, monitor benthic habitats and assess fish interactions with the farms (using transponders and tags). It is anticipated these programs will continue and both Biome and Camel Fish will be a part of the programs. Which will monitor the farms over time and as they scale.

Monitoring to further inform risk and feed into scientific studies is imperative with transparent reporting throughout. This can be used to continually review and revise risk assessments and mitigation practices. Passive acoustics is a cost-effective technique that we could easily use on our moorings to gather continuous data on fish within the farms, in parallel with ROV surveys and the use of BRUV cameras on site.

The monitoring programs are usually managed, regulated and reported on by the independent institutions acting as project leads. Farm operators are usually project partners.

10.0: Risk Assessment: Conclusions

The overall risk assessment to fisheries from the proposed seaweed farms in Port Quin Bay and licenced farm site in Port Isaac Bay is **not significant** based on, but not limited to the following:

- Sediment types associated with the Port Quin farms
- Farm operational profiles
- Fish spawning or nursery grounds present and timings in relation to operational profiles
- Locations of shellfish and static fishing
- Stability of the farm infrastructure anchor system
- Lack of damage to and limited cover of supporting natural habitats
- Precautions taken by operators
- Biodiversity net gain as a result of the eco-blocks and seaweed canopy
- Proposed monitoring program to build on existing programs Biome is involved in currently.

Chapter 13: Fisheries Impact Assessment

Preface

The following assessment has been rewritten in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence application, as referenced above.

The assessment has been conducted with resources taken from the MMO, CIFCA, AIS and VMS data, MarineTraffic, EMODnet, local coastguard data, Electronic Navigation Charts, DEFRA, research papers, and independent input from fishers and relevant fisheries stakeholders that operate within the area of the proposed farm sites.

This assessment should be read in conjunction with all assessments submitted as part of the licence application process, including new and updated assessments (May, June, September 2024). It is in response to the following FIR's:

3.1 The data used incorporates data from the MMO, IFCAs, EMODnet, Marine Traffic and the National Coastwatch Institute. This encompasses information on vessels and fishing vessels which have automatic identification system (AIS) and Vessel monitoring system (VMS) and are predominantly over 12 metres (m) in length. Although it will likely capture data from vessels of less than 12 m to a lesser extent. The fisheries impact assessment has referenced the aforementioned data sources throughout, however, the area which relates directly to the data is not consistently defined and is therefore unclear. The MMO would ask that the spatial extent is clarified throughout the application.

The spatial extent of the data provided with the applications is an area that encompasses Port Quin Bay, Padstow, Port Isaac and their surrounds. ALL EMODnet, Marine Traffic, AIS, and VMS data in the MLA applications are taken from within the catchment area of the ICES Rectangles area ICES30E5. This will be clarified throughout the assessment where relevant. EMODnet data can also be referred to as coming from C-Square 7500:104:459:3. IFCA data used in the Fisheries Impact Assessment covers the whole spatial area of Cornwall's coastline however, we specifically use the data from within the ICES Rectangle area ICES30E5 as this is representative of the spatial area the two proposed farms are located within. MMO Landings data cannot be defined as sourced from one area in particular, refer to section 3.2, and as such is spatially defined as the port of landing.

3.2 Fishing Activity in Port Quin Bay

The MMO note that the MMO landings data presented in Table 1 and Table 2 and would outline that although the fish/ shellfish are landed into Port Isaac, it does not necessarily follow that they are sourced from the area encompassed by the proposed location of the MLA. Please update the impact assessment to reflect this.

This has been added as a note under Table 1 and Table 2.

3.3 Static Gear Fisheries

This static gear fisheries section of the environmental reports state that the seaweed farm "…is located in an area where static gear fishing contributed to all of the landed catch for the area", this doesn't relate to a timeframe or have a defined spatial reference, (e.g. International Council for the Exploration of the Sea (ICES) rectangle), it is therefore unclear where this information has come from and exactly what defined area it refers to. Can you please clarify the timeframe and spatial extent.

In the section on Static Gear Fishing, as submitted in the December 2023 updates, this statement was changed to 'located in an area where static gear fishing contributed to **almost** all of the landed catch in the area'. This is based on the data from table 1 and table 2, MMO Landings data 2022-Provisional_Dataset_UK_and_Foreign_Vessels landings_by_UK_port_and_UK_vessel_landings_abroad_2022__year_to_date_. Referring to section 3.2 above, this data comes from landing data for Port Isaac, the closest port to the sites, and can be inferred as a reference for contributed catch in the area. However, as we have agreed that the landing data does not necessarily follow that they are sourced from the area encompassed by the proposed location of the MLA's we also used EMODnet data (provided in the December 2023 update request) to strengthen this statement with recorded fishing activity of over 12 m fishing vessels. This data highlights that there is no fishing activity other than static within the proposed farm locations. The timeframe of the MMO data is the 12 months during the year 2022, please refer to section 3.2 regarding the spatial extent. The EMODnet data was taken from the most up to date data at the time; this being averages taken from the years 2017-2020, a 3-year period. This data was compiled in 2021 (the overview year) but **does not** include 2021. The ICES rectangle this data is taken from is ICES30E5 and the C-Square is 7500:104:459:3. Furthermore, we have conducted two surveys with fishers and businesses that actively work within ICES30E5. Please refer to Appendix VIII, this supporting evidence covers two separate surveys/interviews conducted with fishers that unanimously further supports that static gear fishing contributes to almost all of the landed catch in the area. As well as this, this survey data illustrates that active fishers and operators that use vessels that are under 12m support the applications and the locations of the proposed works and that the seaweed farms will not affect their activities. This also fills the data gap of vessels under 12m's that EMODnet, AIS, and VMS data does not capture.

3.4 The Cornwall IFCA data encompassing up to and including the year 2021 can be found here: https://secure.toolkitfiles.co.uk/clients/17099/sitedata/Research_Reports/21-Summary-StatisticsL.pdf. Cornwall IFCA can be contacted if you have any questions or wish to discuss the data. The MMO request that the most up to date information should be used within the application, namely the 2021 Summary Statistics.

The Cornwall IFCA data has been updated accordingly to the 2021 Summary Statistics in the assessment. All statements below have been added to the Fisheries Impact Assessment in a new section, 2.3, and made relevant to the proposed area of works.

3.5 In relation to the Cornwall IFCA summary statistics data between 2017 – 2021, please see the below points of relevance:

a. This illustrates a slight decrease in the annual average potting effort along the north coast, between 2017 – 2021, within band A (inshore 0 – 3nm), which encompasses Port Quin Bay.

Agreed, this has been noted in section 2.1 and specifically refers to the spatial area of ICES rectangle ICES30E5.

b. The average annual potting effort (Ph/km2) along the north coast of Cornwall indicates some variation between 2016 – 2021 (inclusive), with a small increase noted between 2020 – 2021. There is also clear seasonal variation shown during the year 2021 within band A, which appears to correspond with the majority of the five-year average (2016 – 2020 inclusive).

Noted in the assessment and responded to in regards to the ICES30E5, the relevant area capturing the proposed sites.

C. Inshore (0 – 3nm) the annual demersal netting effort along the north coast of Cornwall increased slightly from 2020 – 2021. However, within the belted statistical area which encompasses Port Quin Bay, appears to show a slight decrease in netting effort (as an annual average between 2017 – 2021 inclusive).

Noted in the assessment and responded to in regards to the relevant area surrounding the proposed sites.

d. The average annual demersal netting effort (Nh/km2) along the north coast of Cornwall indicates little variation between 2016 – 2021 (inclusive). There appears to be relatively little seasonal variation during 2021, within band A, which appears to correlate with the five-year average (between 2016 – 2020 inclusive).

Noted in the assessment and responded to in regards to the ICES30E5, the relevant area capturing the proposed sites.

e. Cornwall IFCA statistics: total shellfish (including crab, crawfish, lobster and spider crab) 2022: 13,914 kg total declared removed and landed by Port Isaac boats, presumed landed into the port of Port Isaac.

Noted in section 2.3.

f. Cornwall IFCA statistics: for the statistical belted area 30E53A from 2022, the total removed and landed 18,391 kg, encompassing the species crab, crawfish, lobster, and spider crab.

Noted in section 2.3.

3.6 Impact Assessment on Static Gear Fishing

This section of the Fisheries impact assessment states that the "proposed farm lies within an area of active static gear fishing efforts that specifically target shellfish, demersal and pelagic species…" then continues that the data from the MMO and Cornwall IFCA have been analysed and "suggest that the farm's impact on these efforts will be low". This statement appears to contradict the MMO landings data in Table 1 & Table 2 within the assessment, and the Cornwall IFCA data, synopsis of 2021 data given above. The following statement is also noted, "During our communication with local fishers and potters (pre-engagement), they advised that whilst potting and netting is active within the Port Quin Bay area, the fishers have been able to adapt their static operations to take into account mariculture within the Bay." The MMO would ask you to clarify this statement, as adaptation of fishing practices for mariculture is not evidenced within the 'Biome Pre-Engagement Log'.

We would disagree with the statement of contradiction. As stated in section 2.1 of the Fisheries Impact Assessment It should be noted that not all landings caught within the area of Port Quin Bay will be landed at Port Isaac Harbour and similarly not all of the Port Isaac Harbour landings will come from the Port Quin Bay area. Some of the fishing activity within the area of the Bay may be landed at Padstow Harbour or further afield and vice versa. Although the sites are located within an area of low active fishing efforts illustrated by our EMODnet data this does not mean that the area of the farms are actively static fished. EMODnet separates area into rectangles (the spatial extent of the data provided is C-Square 7500:104:459:3) and the sites are within one of these squares that also covers a wider area including the near coastline of Port Quin Bay. This is supported by the Appendix VIII that also answers the question of clarification of 'adapting static operations to take into account mariculture'. From the surveys we have received support from 23 different individuals and businesses that agree the proposed farms will **not** affect their activities. It was also agreed that the main species fished in Port Quin Bay are shellfish; crab and lobster. However, these species are caught closer to the coast or further offshore and not within the vicinity of the proposed works. This ties into the EMODnet data where the square illustrating static fishing covers the area of the bay by the coastline. A minimum of 12 of the supporting individuals/businesses are static fishers that use under 12m vessels. This is extremely significant as it justifies the statement that their operations will not be affected by the proposed farm locations. Not only does this document cover the under 12-meter vessel data gaps but also provides support for the applications from active fishers and businesses that operate within the bay. By giving their support, they show that two operational seaweed farms will not affect fishing activity within the bay as the site locations do not conflict with current activities. However, with that said, we have changed the statement to be more reflective of this to 'During our communication with local fishers, potters, and businesses during the engagement of two surveys they advised that whilst potting and netting is active within the Port Quin Bay area, the proposed farm locations and activity of seaweed farming will not affect their current operations and they support the applications. (Refer to Appendix VIII).

3.7 The MMO acknowledges your response regarding the different data sources available to yourselves, as well as the limitations of the data which have been acknowledged. The MMO consider that the lack of fine resolution data does not give the detail required to enable you to make general statements regarding the presence or absence of activity in the area of the proposed MLA. In light of the lack of evidence as to the importance of the specific area to the <10m vessels, it is worth noting that if the area is important, these small vessels are limited in their ability to move further offshore. In view of the above points, the MMO would query how this assessment has been carried out, particularly as the cumulative impact of both proposed *seaweed farm sites (MLA/2023/00308 and MLA/2023/00307), and the consented seaweed farm in Port Isaac Bay (Case ref: MLA/2022/00180 and Licence ref: L/2023/00169/1) have not been considered. The MMO request that consideration is given to these.*

In our response we have used different data sources available to us and we acknowledge that these sources do have data gaps for the <10m vessel. However, we have conducted two surveys and interviews of fishers/businesses that operate within ICES30E5 which covers the region of the three above mentioned farm sites. In Appendix VIII we have collated information from 23 individuals/businesses where the majority operate vessels under 12 meters which fills this data gap. One of the key take-aways from this document is the support of 23 individuals/businesses for the proposed locations of the two farm sites. This support is given as the proposed farms will not affect fishing activity. As mentioned in section 3.0 of the above-mentioned Appendix there is limited opportunity in the bay for fishers to catch their preferred species as they are not found in the proposed site areas. Regarding the consented seaweed farm, this site sits on a separate sediment (subtidal soft sediment) whilst the proposed farms in Port Quin Bay sit on (subtidal coarse sediment), this is significant. From discussions with fishers there is concern that the consented 100Ha site will affect fishing activity, particularly trawling, as this sediment is the preferred habitat of species that are actively fished. However, regardless of if there is displacement as a result of this consented licenced site this does not mean that the proposed sites in Port Quin Bay will further cause displacement or be an area that fishers would use as a result of losing the 100Ha in Port Isaac. Surveys and Interviews were both conducted after the licence was consented to and the fishers and businesses still agreed that the proposed sites would not affect their operations or activities. From the collation of MMO data, EMODnet data, AIS, VMS, MarineTraffic, Electronic Navigation Charts, and surveys/interviews with active fishers/businesses that operate within ICES30E5 in both over 12 m and under 12 m vessels we believe that we have enough collated data and understanding of fishing activity within ICES30E5, the area that captures all three sites, to make general statements regarding the presence or absence of activity. In the introduction to the Fisheries Impact Assessment, Appendix VIII has been noted as a source and have been referred to throughout the assessment in response to this point.

3.8 Demersal Gear Fisheries

The MMO would clarify that demersal is defined as that dwelling at or near the bottom of a body of water, with demersal fisheries being defined by the type of fishing activity, the gear used, and the varieties of fish and shellfish caught (K. Brander, International Council for the Exploration of the Sea (ICES), Copenhagen, Denmark). In regard to demersal fisheries, the Fisheries impact assessment has identified that the average landings by demersal gears comprised an average of 2.51% into Port Isaac and 17.55% in Padstow (encompassing 2021 and 2022 MMO data). You continue that "demersal gear fishing landings at Padstow will be caught in the area of the Port Quin Bay." In addition, the report states that "This data infers that activities such as trawling and dredging are not commonplace within the Bay area. This is further supported by our engagement with Pentire Fishing Limited, they discussed that they were the only fishers with a trawling vessel that was active within the bay and they fully supported our proposed licenced site." The MMO would outline that the MMO data only encompasses two years of information which is a relatively short time period and would clarify, in regard to the focus on trawling in this section, that certain types of netting and species caught would be classified as a demersal fishery. In addition, there are other ports in the vicinity into which fishing vessels operating demersal gears can land their catch.

In the updated Fisheries Impact Assessment provided to the MMO in December this statement is actually 'It should be noted that not demersal gear fishing landings at Padstow will be caught in the area of the Port Quin Bay'. This ties into the rest of this chapter in regards to landing where we state that landing data has been used to help us make assessments, but the limitation of this data is that it does not necessarily illustrate where the landed fish/shellfish were caught. Regarding MMO data only encompassing two years, we agree that yes, it is only a short period of time, however, at the time of producing the chapter it was the most up to date two years. However, we strongly believe that the above statement from Pentire Fishing Limited (Camel Fish) is valuable and this is supported by further interviews and surveys we have conducted with active fishers/businesses in the area. Refer to Appendix VIII, this document discloses two survey/interview periods with 23 separate fishers/businesses that operate in ICES30E5 (the area in which the proposed sites are located) and shows that fisheries operators support the applications. From this survey there is support for the proposed sites from businesses that operate trawling vessels and netting vessels. There are further anecdotal comments in the document from a fisher that attempted to trawl in the Bay within the past two years and only caught 2 Sole and 1 Plaice. This document also highlights that there were only two trawlers left that operate out of Padstow (the largest port in the region and the second closest port to the site) and neither of them operate within the bay due to the lack of fish species. We have included this in section 2.2 of the Fisheries Impact Assessment as further evidence.

3.9 Impact Assessment on Demersal Gear Fisheries The MMO would reiterate the clarification given in the section above regarding demersal gear fisheries, particularly as the impact assessment within this section appears to be solely focused on trawling – "…as the only fisher that trawls within the proposed site locations." Given the demersal gear MMO landings data detailed within Table 1 and 2 of the fisheries impact assessment, indicating that nets are used in the Port Quin Bay area to target demersal or shellfish species by vessels which are predominantly under 10m in length, which is further evidenced by the stakeholders detailed within the 'Engaged Fishers & Companies Vessel Size Letter'. The MMO asks you to elucidate upon their negligible impact assessment.

We have gone through both section 2.2 and 2.2.1 and have rewritten this section to refer to demersal trawling **and** demersal netting as you have requested. Based on the trawling and netting data from EMODnet, AIS, VMS, MMO Landings, CIFCA, and the Appendix VIII we have kept our impact assessment the same as we believe this data encompassing trawling and netting in the bay illustrates that 1) there is none-low activity of this form of fishing within the bay. 2) The limited activity that might be present of this form of fishing will **not** be affected by the proposed farm locations. With 23 fisheries operators supporting the site locations including those that actively net and trawl within ICES30E5 in under and over 12-meter vessels, we believe this is sufficient evidence to support this impact assessment.

3.10 Additional Supporting Evidence

The MMO would highlight that the data given by EMODnet only includes vessels over 12 m in length. The majority of vessels operating within the area of the proposed seaweed farm are vessels of <10 m in length, which are not encompassed by EMODnet data. Therefore, the low fishing activity determination made within the Fisheries impact assessment does not encompass the majority of fishing vessel activity within the area of the proposed seaweed farm. The Figure 2 caption is unclear. It states, "Data is taken from the overview year of 2021 and averages the years of 2017 – 2020." The MMO request clarification as to whether the data encompasses the years 2017 – 2021.

Regarding the EMODnet data, the composite image (Figure 2) was taken from the most up to date data at the time; this being averages taken from the years 2017-2020, a 3-year period. This data was compiled in 2021 (the overview year) but does **not** include 2021. The ICES rectangle this data is taken from is ICES30E5 and the C-Square is 7500:104:459:3. In response to the concerns of EMODnet only encompassing larger vessels we have added a statement in this section mentioning that the fishing data is regarded as low in terms of vessels over 12 meters. However, we have also added a section 3.1 that discusses the results of Appendix VIII which covers data for under 12 meters vessels and illustrates the same low fishing activity within the bay resulting in substantial fisher support for the sites and the proposes farm locations not having an impact of fishing data. This both supports and adds to the EMODnet data, the CIFCA data, the MMO data, the AIS data, and the VMS data, which when compiled together give a highly evidenced picture that the proposed site locations will **not** impact fishing activity.

3.11 VMS data included in this application will not identify any use of the area by fishing vessels of <12m in length which operate in and around the site of the proposed seaweed farm. The MMO notes the inclusion of the 'Engaged Fishers & Companies Vessel Size Letter', detailing individuals together with their respective vessel size category. This letter shows the predominance of the <10m vessels, however it provides no information on their respective fishing activities within the area. Please can you provide this.

In response to this point we have provided Appendix VIII that provides information on fishers and their respective fishing activities within the area. We have incorporated this document into the Fisheries Impact Assessment to add further evidence supporting our conclusions by encompassing data from both over 12-meter vessels and under 12-meter vessels. Please refer to this document.

3.12 Figure 7 shows vessel movement data from Marine Traffic for 2021, for all vessel types, which shows a high number of vessel movements through the area of the southern part of the proposed seaweed farm. The MMO notes the following statement: "Marine Traffic gives the highest traffic level (in the South of the site) as 221 routes/0.08km2 /year (medium). For the remainder of the site, it is less than this value. The EMODnet data (Provided in Section 4 of the Navigation Safety Assessment and Emergency Response Plan) presents traffic levels of between 0.27 to 0.57 hrs/km2 /year for fishing, sailing and pleasure vessels (low range). All vessels range from 5.174 – 6.226 hrs/km2 /yr which is low to medium. Overall traffic is assessed at low to medium within the proposed farm location." The MMO note that the data collected and shown by Marine Traffic and EMODnet are different, showing AIS and VMS respectively. In terms of the fishing data shown, Marine Traffic will give information on predominantly >15m fishing vessels and EMODnet on >12m fishing vessels, therefore the data given by the two different data is non-comparable, (encompassing the values, units and assessments given by yourself). It should be noted for the assessment that vessels with AIS are capable of turning it off, therefore the Marine Traffic data is likely an under representation of activity which takes place within the area.

This is a valid point by the MMO and we agree that due to the values, units, and assessments given by ourselves they are subject to being difficult to compare. However, we still believe these data sets are important in the overall Fisheries Impact Assessment as mentioned they cover different fishing vessel size range data. Although not necessarily comparable, the use of extensive data sets including Marine Traffic, EMODnet, AIS, VMS, CIFCA data, MMO data, and Appendix VIII provide a picture of the activity that takes place within ICES30E5. Each of these data resources encompass fishing activities, vessel sizes, and traffic data across a range of years from 2016 – 2022 as a whole. As you state, Marine Traffic can likely be an under representation, and only for fishing vessels over 15 meters. This is why we have provided Appendix VIII which provides insight, support, and data from active fishers in the bay that operate vessels under 12 meters (the data gap of EMODnet and Marine Traffic). When we look at all of the data individually, we can make an educated assessment of the traffic and assess it as low-medium, the fishing activity in the bay and assess it as low, and significantly the fishing activity within the proposed farm locations and assess that there will not be an impact on active fishing activity within the 100.8Ha area based on the data from the range of sources we have provided in this chapter and supporting documentation.

3.13 The MMO notes the statement "The main traffic transitioning in the area moves outside of both proposed farms to the South and North." The MMO require clarification as to why, the fisheries impact assessment refers to both proposed farms in this section and not throughout the document and also why there is no cumulative impact assessment regarding both proposed seaweed farms relating to fishing activity.

In response to this question, the statement was an addition to the initial questions raised by the MMO in December and was answered accordingly which is why the rest of the document did not, at the time, refer to both sites as they are individual licence applications and we had not been requested to conduct a cumulative impact assessment regarding both proposed seaweed farms. However, with that said based on discussions we have had with the MMO regarding the latest responses we have agreed that all updated and new chapters or documentation provided to the MMO will be written as cumulative chapters of both proposed seaweed farms. This can be seen throughout the updated and new chapters where we have referred to both site locations and taken them both into account in our assessments.

3.14 The fisheries impact assessment has stated as follows in section 3: In addition, the most Southern part of each proposed farm site is located 550 m + from land/headland (see Figure 8 and 9). Waters in this southern region are 10 m deep or less. Therefore, traffic passing between the land and proposed farms is likely to be small leisure vessels – allowing for ample space for transitioning. Larger vessels will continue to transition north of the proposed farms, where water *is deeper for safe keel/draft clearance (15-16 m +). This is further evidenced in our VMS ping data for vessels above 12m's showing a low number of pings for vessels in the bay. The fisheries impact assessment has reasoned that due to water depth and the location of the southern boundary of the seaweed farm site in proximity to the nearest land, that smaller leisure vessels will likely use this southern area. In comparison, it states that larger vessels will use the area to the north of the seaweed farm for transiting, with VMS data given as further evidence of this. The MMO would question whether you have considered the impacts of displacement of fishing activity (particularly by under 10m vessels) and of other legitimate sea users in the area to the south of the site, together with any potential bottleneck effects as a result. The MMO request that you note the limitations of the data presented, therefore any assessments and conclusions drawn are based upon vessels of predominantly >12m length.*

In response to the MMO concerns of a lack of data regarding vessels under 12m in length we have conducted and produced Appendix VIII which includes data and information from 23 different fishers/businesses that actively operate in ICES30E5 and predominantly use vessels under 12m. This data is extremely significant as it is data directly from operators of the sea that make a living in the area from their activities. All 23 of the surveyed fishers/businesses supported the locations of both proposed seaweed farms and stated that the sites would not affect their activities. They provided information about fishing within the Bay and that the majority, who are static fishers, operate in the southern area of the bay by the coastline as this is the region in which shellfish are predominantly located and thus fished. By allowing for a minimum of 550m between the closest point of the two sites and the coastline this is a space that allows vessel movement within the bay and does not cause displacement in the activities of these operating stakeholders. Due to having this additional information we disagree in noting limitations on the data presented as we have provided additional data that covers the gaps you have stated above. Assessments as a result cover both over 12m and under 12m vessels and our assessment remains the same. We have added this section into the chapter in section 3.

3.15 In regard to the following statement, "Within the Fisheries Impact Assessment across the six-year period no ping data was detected (VMS) for large trawling vessels…" the MMO would *reiterate that the VMS data provided by the MMO is anonymised to protect individual fishers; therefore, the fishing gear used, and size of fishing vessels cannot be inferred, beyond the fact that vessels encompassed within VMS data would be >12m in length. In regard to the observations of Camel Fish Ltd, The MMO would reiterate the comment already made (see above).*

This has been noted. We have changed this statement accordingly to refer to vessel length rather than the type of activity conducted.

3.16 Impacts on Salmonids Migratory Salmonid species and their migratory routes are protected under the Salmon and Freshwater Fisheries Act. Salmonids are sensitive to noise, and this can act as a deterrent to their migratory pathways. The River Camel Special Area of Conservation (SAC) and the River Camel Valley and Tributaries Site of Special Scientific Interest (SSSI) have Salmonids in the citations and given the location of the proposal in the Bristol Channel, many other rivers may have migrating fish moving directly through, or in proximity to, this location and therefore be impacted by the construction stage. The MMO requests that the impacts on Salmonids be considered within an impact assessment, this must include details of the construction of the proposed development (including timing of works, methods, and materials to be used), consideration of the impacts of the construction method on the protected species and habitats, and details on how the migratory salmonids are to be protected during construction works.

In response to this we have produced a HRA for salmonids. Please refer to Chapter 11. This assessment has been written cumulatively for both proposed farm sites similarly to the other updated HRA's.

1.0 Introduction

Biome and Camel Fish has prepared the following assessment of the impact of a proposed seaweed farms in Port Quin Bay on local fishing activities and updated it accordingly in line with questions raised by representative bodies and the MMO. This assessment has involved the sourcing and collation of information to provide evidence along with direct pre-engagement, ongoing engagement with key stakeholders and peak bodies including but not limited to local fishers, local trawlers, local potters/netters, local sailing clubs, Harbour Masters (Note that harbour masters are now regarded as a regulatory body), land farmers, local diving clubs, local charter companies, local boat tours, the RNLI, Trinity House, the MMO, and the Crown Estate over the proposed farm location. Published Cornwall IFCA information and data has also been used in preparing this chapter, including the most recent data from DEFRA, provided by Cornwall IFCA. Refer to Figure 1.0 and Chapter 3 for proposed farm locations.

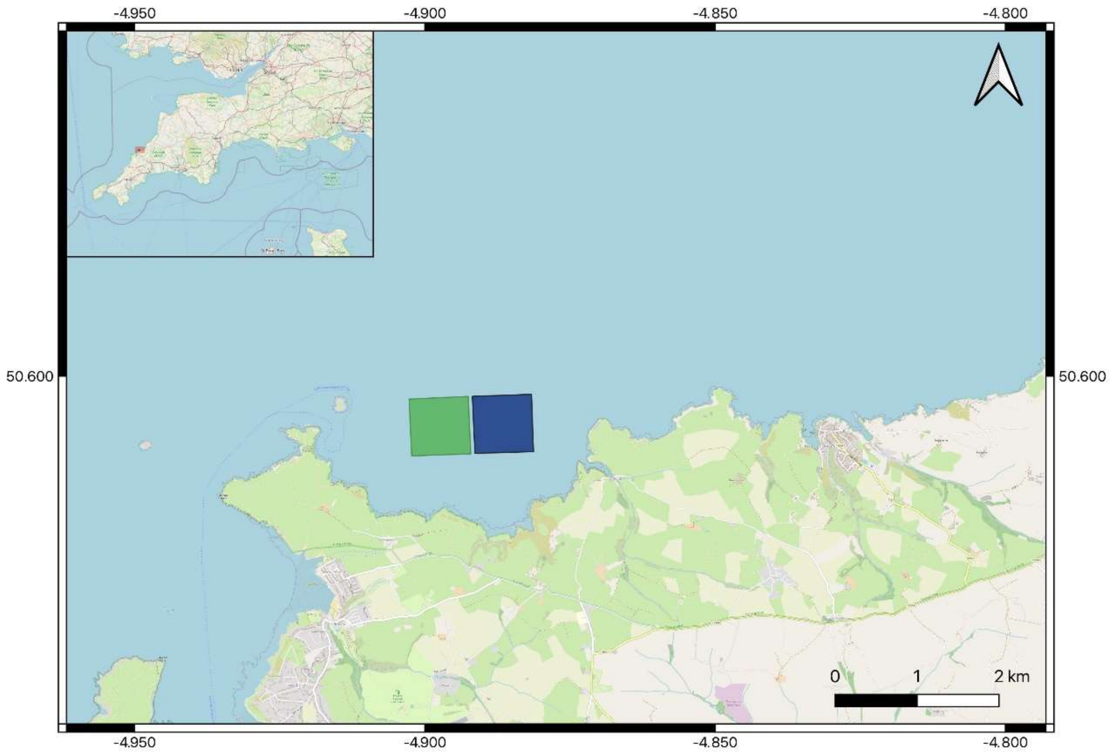


Figure 1.0. **Location of the proposed seaweed farms in Port Quin Bay.**

The purpose of this chapter is to assess whether the location of the proposed farms will significantly impact local fishing activities within Port Quin Bay. This assessment will enable Biome Algae and Camel Fish to accurately evaluate the impact of the licences being applied for and serve to minimise and, where possible, mitigate any such impacts. This assessment is in line with Marine Management Organisation (MMO) guidelines and requirements which clearly state that, with regards to granting a marine licence, impacts on relevant stakeholders (in this case fisheries) should be assessed with evidence to establish the significance of any impacts on the stakeholder and where possible, avoid or mitigate.

Combined with pre-engagement information, reliable evidence sources were used in assessing any potential impacts. Within this application, this relates to seaweed farm locations, vessel movement in the Bay area and data regarding relevant stakeholder activities within the area and surrounds of the proposed farms. Sources of data used within this chapter include but are not limited to Cornwall IFCA, Department for Environment, Food and Rural Affairs (DEFRA), MMO, EMODnet, MarineTraffic.com, Electronic Navigation Charts (ENCs), local coastguard data, AIS data, VMS data, and surveys/interviews with active fishers/businesses that operate within ICES30E5 in both over 12 m and under 12 vessel sizes.

2.0 Fishing Activity In Port Quin Bay

Landings data sourced from MMO for 2021 and 2022 for Port Isaac, the closest port to the proposed farm in Port Quin Bay, show that typical fishing activity in the area includes trapping, gill and entangling netting, and hook and line. Typical target species for the area include a mixture of shellfish, demersal and pelagic fish species. Fishing effort within the area is relatively low with the total landed 2021 and 2022 being 11.2 and 12.3 tonnes respectively. This data can be seen in Table 1.0 and Table 2.0.

The wider Port Quin Bay area serves as a recognised spawning and nursery ground for a number of commercially important fish species. For example, sole (*Solea solea*), thornback ray (*Raja clavata*), spotted ray (*Raja montagui*), tope shark (Galeorhinus galeus), plaice (*Pleuronectes platessa*), whiting (*Merlangius merlangus*), anglerfish (*Lophius piscatorius*) and mackerel (*Scomber scombrus*) all have nursery grounds around Port Quin Bay and Port Isaac Bay. sole, cod (*Gadus morhua*), sandeels (*Ammodytidae spp.*), plaice, whiting, sprat (*Sprattus sprattus*), Horse Mackerel (*Trachurus trachurus*) and Mackerel have spawning grounds within Port Quin Bay and Port Isaac Bay. (Coull *et al.*, 1998, Ellis *et al*., 2012).

Year	Month	Port of landing	Length Group	Gear category	Species group	Landed Weight (tonnes)
2021	1	Port Isaac	10m&Under	Gill nets and entangling nets	Demersal	0.12
2021	3	Port Isaac	10m&Under	Gill nets and entangling nets	Shellfish	0.059
2021	3	Port Isaac	10m&Under	Gill nets and entangling nets	Shellfish	0.035
2021	3	Port Isaac	10m&Under	Traps	Shellfish	0.054
2021	3	Port Isaac	10m&Under	Traps	Shellfish	0.171
2021	4	Port Isaac	10m&Under	Traps	Shellfish	0.185
2021	4	Port Isaac	10m&Under	Traps	Shellfish	0.301
2021	5	Port Isaac	10m&Under	Hooks and lines	Demersal	0.027
2021	5	Port Isaac	10m&Under	Traps	Shellfish	0.148
2021	5	Port Isaac	10m&Under	Traps	Shellfish	0.229
2021	6	Port Isaac	10m&Under	Gill nets and entangling nets	Shellfish	0.821
2021	6	Port Isaac	10m&Under	Hooks and lines	Demersal	0.08
2021	6	Port Isaac	10m&Under	Traps	Shellfish	0.834
2021	6	Port Isaac	10m&Under	Traps	Shellfish	0.515
2021	6	Port Isaac	10m&Under	Traps	Shellfish	0.153
2021	7	Port Isaac	10m&Under	Gill nets and entangling nets	Shellfish	0.0103
2021	7	Port Isaac	10m&Under	Hooks and lines	Demersal	0.02
2021	7	Port Isaac	10m&Under	Traps	Shellfish	1.8749
2021	7	Port Isaac	10m&Under	Traps	Shellfish	0.9924
2021	7	Port Isaac	10m&Under	Traps	Shellfish	0.073
2021	8	Port Isaac	10m&Under	Traps	Shellfish	1.477
2021	8	Port Isaac	10m&Under	Traps	Shellfish	0.4275
2021	8	Port Isaac	10m&Under	Traps	Shellfish	0.058
2021	9	Port Isaac	10m&Under	Traps	Shellfish	0.716
2021	9	Port Isaac	10m&Under	Traps	Shellfish	0.2815
2021	10	Port Isaac	10m&Under	Hooks and lines	Demersal	0.02
2021	10	Port Isaac	10m&Under	Traps	Shellfish	0.564
2021	10	Port Isaac	10m&Under	Traps	Shellfish	0.1111
2021	11	Port Isaac	10m&Under	Traps	Shellfish	0.3223
2021	11	Port Isaac	10m&Under	Traps	Shellfish	0.3002
2021	12	Port Isaac	10m&Under	Traps	Shellfish	0.0408
2021	12	Port Isaac	10m&Under	Traps	Shellfish	0.1615

Table 1.0: Breakdown of the MMO Landings Data for 2021 in Port Isaac. (source: MMO Landings data 2021- Provisional_Dataset_UK_and_Foreign_Vessels landings_by_UK_port_and_UK_vessel_landings_abroad_2021__year_to_date_).

Year	Month	Port of landing	Length Group	Gear category	Species group	Landed Weight (tonnes)
2022	1	Port Isaac	10m&Under	Traps	Shellfish	0.0636
2022	1	Port Isaac	10m&Under	Traps	Shellfish	0.3819
2022	2	Port Isaac	10m&Under	Traps	Shellfish	0.0073
2022	2	Port Isaac	10m&Under	Traps	Shellfish	0.0784
2022	3	Port Isaac	10m&Under	Traps	Shellfish	0.091
2022	3	Port Isaac	10m&Under	Traps	Shellfish	0.087
2022	4	Port Isaac	10m&Under	Traps	Shellfish	0.193
2022	4	Port Isaac	10m&Under	Traps	Shellfish	0.2132
2022	5	Port Isaac	10m&Under	Hooks and lines	Demersal	0.029
2022	5	Port Isaac	10m&Under	Traps	Shellfish	0.8901
2022	5	Port Isaac	10m&Under	Traps	Shellfish	0.4761
2022	6	Port Isaac	10m&Under	Hooks and lines	Demersal	0.032
2022	6	Port Isaac	10m&Under	Traps	Shellfish	0.0405
2022	6	Port Isaac	10m&Under	Traps	Shellfish	1.3008
2022	6	Port Isaac	10m&Under	Traps	Shellfish	0.8317
2022	6	Port Isaac	10m&Under	Traps	Shellfish	0.0023
2022	7	Port Isaac	10m&Under	Hooks and lines	Demersal	0.05
2022	7	Port Isaac	10m&Under	Traps	Shellfish	0.0566
2022	7	Port Isaac	10m&Under	Traps	Shellfish	1.2265
2022	7	Port Isaac	10m&Under	Traps	Shellfish	1.1341
2022	7	Port Isaac	10m&Under	Traps	Shellfish	0.102
2022	8	Port Isaac	10m&Under	Hooks and lines	Demersal	0.01
2022	8	Port Isaac	10m&Under	Hooks and lines	Pelagic	0.02
2022	8	Port Isaac	10m&Under	Hooks and lines	Pelagic	0.005
2022	8	Port Isaac	10m&Under	Hooks and lines	Demersal	0.03
2022	8	Port Isaac	10m&Under	Traps	Shellfish	0.9662
2022	8	Port Isaac	10m&Under	Traps	Shellfish	0.3767
2022	8	Port Isaac	10m&Under	Traps	Shellfish	0.025
2022	9	Port Isaac	10m&Under	Hooks and lines	Demersal	0.02
2022	9	Port Isaac	10m&Under	Hooks and lines	Pelagic	0.01
2022	9	Port Isaac	10m&Under	Traps	Shellfish	0.0014
2022	9	Port Isaac	10m&Under	Traps	Shellfish	0.909
2022	9	Port Isaac	10m&Under	Traps	Shellfish	0.5688
2022	9	Port Isaac	10m&Under	Traps	Shellfish	0.01
2022	10	Port Isaac	10m&Under	Traps	Shellfish	0.402
2022	10	Port Isaac	10m&Under	Traps	Shellfish	0.2823
2022	10	Port Isaac	10m&Under	Traps	Demersal	0.0011
2022	10	Port Isaac	10m&Under	Traps	Shellfish	0.016
2022	11	Port Isaac	10m&Under	Gill nets and entangling nets	Demersal	0.02
2022	11	Port Isaac	10m&Under	Hooks and lines	Demersal	0.1
2022	11	Port Isaac	10m&Under	Traps	Shellfish	0.251
2022	11	Port Isaac	10m&Under	Traps	Shellfish	0.2128
2022	12	Port Isaac	10m&Under	Gill nets and entangling nets	Demersal	0.03
2022	12	Port Isaac	10m&Under	Gill nets and entangling nets	Shellfish	0.05
2022	12	Port Isaac	10m&Under	Gill nets and entangling nets	Pelagic	0.02
2022	12	Port Isaac	10m&Under	Traps	Shellfish	0.429
2022	12	Port Isaac	10m&Under	Traps	Shellfish	0.2175

Table 2.0: Breakdown of the MMO Landings Data for 2022 in Port Isaac.

(source: MMO Landings data 2022- Provisional_Dataset_UK_and_Foreign_Vessels landings_by_UK_port_and_UK_vessel_landings_abroad_2022__year_to_date_).

NOTE: Although fish and shellfish are landed into Port Isaac, discussions with fishers indicate this does not necessarily mean that they are sourced from the area encompassing the proposed farm locations.

2.1 Static Gear Fisheries

Based on the landing data from the closest port recorded in Table 1.0 and Table 2.0, the proposed farms are located in an area where static gear fishing contributed to almost all of the landed catch for the area. Target shellfish include species of crab, spider crab, lobster and octopus, and demersal and pelagic fish species include (but not limited to) bass (*Dicentrarchus labrax*), pollack (*Pollachius* spp.), red mullet (*Mullus* spp.), mackerel, herring (*Clupea harengus*) and mullet (*Chelon* spp.).

EMODnet data has been used to further support the statement above. Figure 2.0 evidences a composite image of all the fishing activity recorded from 2017-2020 in Port Quin Bay and has averaged these out into MW Fishing Hours. The composite highlights that there is no recorded fishing activity other than static fishing. The static fishing within the bay where the sites are proposed is averaged at 0.2939 MW Fishing Hours This data is taken from C-Square 7500:104:459:3 within ICES30E5.

We have also produced Appendix VIII that further support the initial statement. This document provides survey and interview data from active stakeholders that operate within ICES30E5 of the North Cornwall Coast highlighting their fishing activity and their support for the applications. What is crucial from this document is the vessel sizes. The majority of the surveyed stakeholders use vessels under 12 meters and actively static fish. All of these stakeholders have supported the proposed locations of the seaweed farms and agree that they will not affect their operations. This is **significant** as it covers the under 12m data gap of EMODnet, AIS, VMS, and CIFCA and supports what the over 12m data presents, that static gear fishing contributes to almost all of the landed catch for the area.

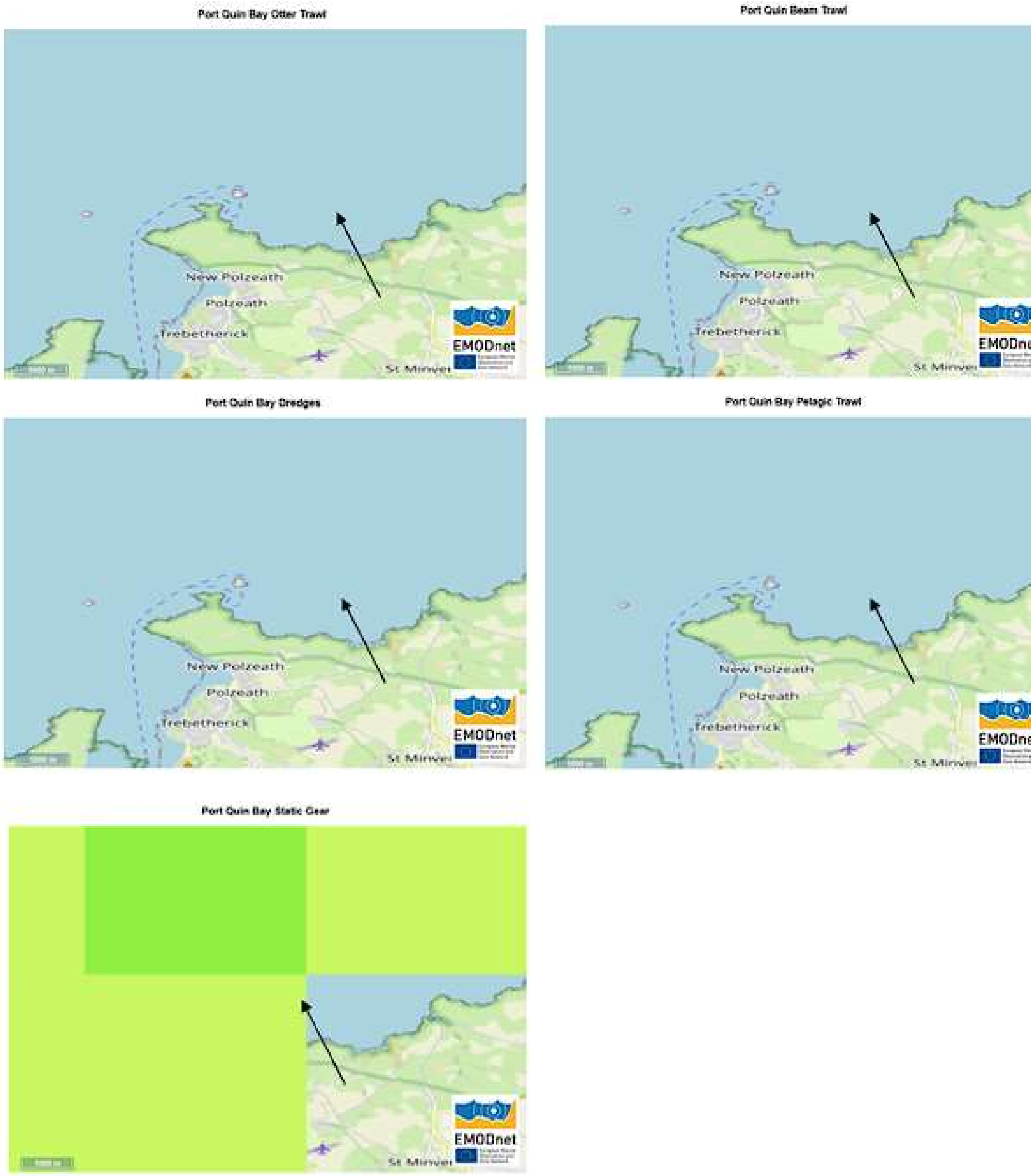


Figure 2.0. Composite Image of Fishing Intensity in Port Quin Bay. Data is taken from the overview year of 2021 and averages the years of 2017-2020. Data is taken from C-Square 7500:104:459:3 in the Ecoregion: Celtic Seas. Recorded in MW Fishing Hours. (Source: EMODnet) Spatial Extent: ICES30E5

Supporting data from Cornwall IFCA shows that potting activity within the area of ICE30E5 had a -300 to 0 kg/100Ph difference in annual potting effort between 2017 and 2021 (Figure 3.0). Across all districts there was a significant drop in Crab (mixed) from 80 LPUE (kg/100ph) to 50 LPUE (kg/100ph), with a slight rise of 1-2 LPUE (kg/100ph) in Lobster, and Spider Crab staying the same.

It should be noted that not all landings caught within the area of Port Quin Bay will be landed at Port Isaac Harbour and similarly not all of the Port Isaac Harbour landings will come from the Port Quin Bay area. Some of the fishing activity within the area of the Bay may be landed at Padstow Harbour or further afield and vice versa.

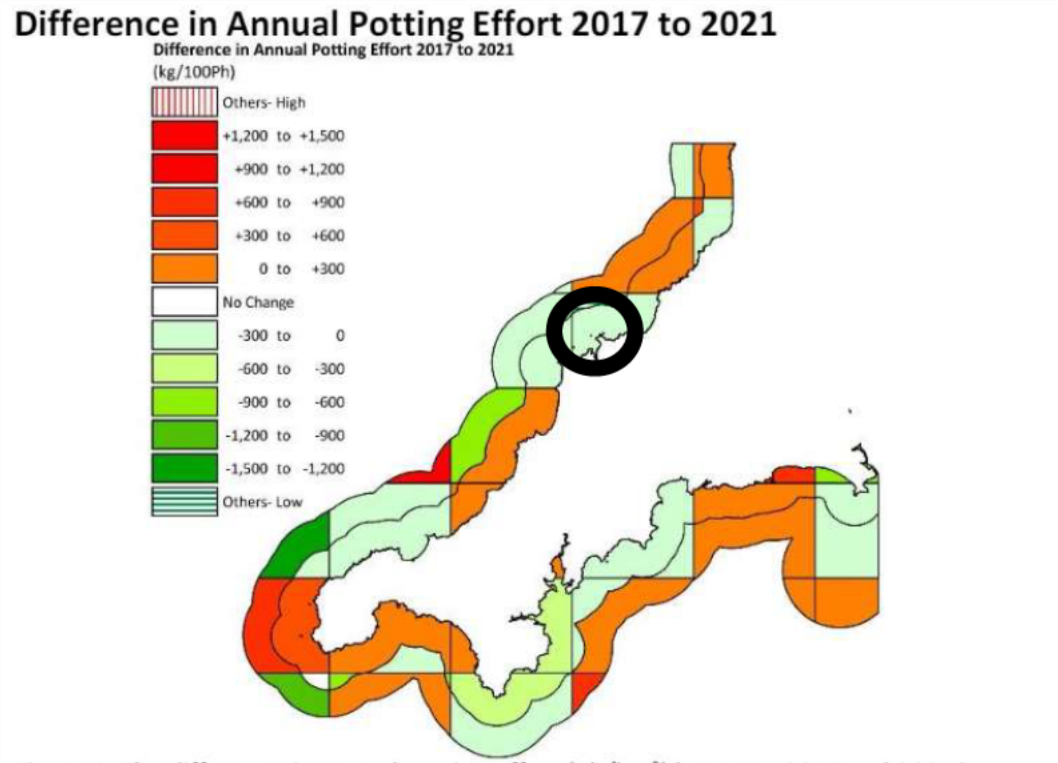


Figure 1: The difference in annual potting effort (Ph/km^2) between 2017 and 2021 in belted statistical areas thematically mapped in 300Ph/km^2 ranges where positive values i.e. increased effort are red and negative values i.e. decreases in effort, are green 'Others' refers to a value of -4,007 Ph/km^2 in 30E55B.

Figure 3.0. Potting activity in Cornwall between 2017-2021. The area of Port Quin Bay (black circle) is highlighted light green indicating a -300 to 0 difference in annual potting. This can be regarded as little to no decrease in potting hours within this timeframe. Source: Cornwall IFCA Summary Statistics 2017-2021. Spatial Extent: North Cornwall's 0-3 nm Coastline and specifically within ICES30E5.

2.1.1 Impact Assessment On Static Gear Fishing

Although the proposed farms lie within an area of active static gear fishing efforts that specifically target shellfish, demersal and pelagic species, the landings data accessible through the MMO, Cornwall IFCA data, and from the engagement with active fishers/businesses that operate in ICES30E5 recorded in Appendix VIII, we have analysed through this assessment and the varied data sources that the proposed farm's impact on these efforts will be low.

During our communication with local fishers, potters, and businesses during the engagement of two surveys they advised that whilst potting and netting is active within the Port Quin Bay area, the proposed farm locations and activity of seaweed farming will not affect their current operations and they support the applications. (Refer to Appendix VIII).

The South West Marine Spatial Plan was agreed through consultation with the MMO, DEFRA, IFCA and the public. In part, the plan aims to accommodate historical fishing activities with newer aquaculture activities in the South West region as both are recognised as equal legitimate users of the sea, despite aquaculture being the newer of the stakeholders. This is in line with the UK Marine Strategy.

As such, both fisheries and aquaculture have a documented government approved pathway toward a future in the use of English/UK marine resources ('blue economy'). Both bring significant benefits to local coastal communities. It is important Biome and Camel Fish considers the North Cornwall Coastline, as a whole, as a busy area for historical marine stakeholder activity (fishing). Therefore, identifying an area where fishing activity is lower, relatively, along the North Cornwall Coastline, is important. This will minimise impact on existing fisheries whilst accommodating seaweed farming at a scale that is economically feasible and fulfils the fundamental requirements of the new spatial plan. Biome and Camel Fish took this into consideration when selecting their proposed site locations and the evidence from the data sources support this. During the engagement process Biome and Camel Fish consulted with stakeholders that fish in the Bay and they have all stated that they have no objection to the proposed site locations. This includes trawlers, potters, charters, tours, and netters (Refer to Appendix VIII).

2.2 Demersal Gear Fisheries

Demersal gear fishing comprised of 2.4% (0.267 tonnes) of the total landed weight in Port Isaac in 2021 – This is evidenced from the MMO data in table 1. In 2022 Demersal gear fishing comprised of 2.62% (0.322 tonnes) of the total landed weight in Port Isaac as evidenced from the MMO data in table 2. Data provided by Cornwall IFCA was only inclusive of static gear potting and netting efforts. Averaging the percentages of total demersal gear fishing landed across the two years we arrive at the figure of 2.51% of the total landed weight in Port Isaac. This data infers that activities such as trawling and dredging are not commonplace within the Bay area, however we acknowledge that the MMO data only encompasses two years which is a relatively short period (Albeit these two years being the most up to date data at the time of publishing this chapter). This is further supported by Pentire Fishing Limited (Camel Fish – an applicant and active fisher in the area) stating that they are the only fishers with a trawling vessel that were active within the bay. Furthermore, refer to Appendix VIII, this document discloses two survey/interview periods with 24 separate fishers/businesses that operate in ICES30E5 (the area in which the proposed sites are located) and support the applications. From this survey there is support for the proposed sites from businesses that operate trawling vessels and netting vessels. There are further anecdotal comments in the document from a fisher that attempted to trawl in the Bay within the past two years and only caught 2 Sole and 1 Plaice. This document also highlights that there are only two trawlers left that operate out of Padstow (the largest port in the region and the second closest port to the sites) and neither of them operate within the bay due to the lack of fish species.

It should be noted that not all landings caught within the area of Port Quin Bay will be landed at Port Isaac Harbour and similarly not all of the Port Isaac Harbour landings will come from the Port Quin Bay area. Some of the fishing activity within the area of the Bay may be landed at Padstow Harbour or further afield and vice versa.

Figure 4.0 also highlights that although there has been a rise in annual netting efforts between 2017 to 2021 in Cornwall, that the area of the proposed farm locations, within ICES30E5 has actually had a -1000 to 0 (Nh/km^2) decrease in difference. This supports the EMODnet data, AIS, and VMS data provided that illustrates little to no demersal fishing activity in the area as well as the evidence provided by operational fishers and stakeholders in Appendix VIII

As requested by IFCA, we have included figures for landed weight in Padstow (the second closest port to the proposed site) for Demersal gear fishing. This data has been sourced from the MMO landing data for 2021 and 2022 that we have attached to our licence in our response. Demersal gear fishing comprised of 16.5% (94.995 tonnes) of the total landed weight in Padstow in 2021 – this is evidenced in the attached MMO landing data mentioned above. In 2022 Demersal gear fishing comprised of 18.6% (86.894 tonnes) of the total landed weight in Padstow, this is evidenced in the attached MMO landing data mentioned above. Averaging the percentages of total demersal gear fishing landed across the two years we arrive at the figure 17.55% of the total landed weight in Padstow. It should be noted that not demersal gear fishing landings at Padstow will be caught in the area of the Port Quin Bay. Demersal Fishing gear can be used inshore and offshore and as Padstow is the largest Port in the area Demersal landing have the potential to be caught anywhere in Northern Cornwall.

It should be noted that not all landings caught within the area of Port Quin Bay will be landed at Port Isaac Harbour and similarly not all of the Port Isaac Harbour landings will come from the Port Quin Bay area. Some of the fishing activity within the area of the Bay may be landed at Padstow Harbour or further afield and vice versa.

Difference in Annual Netting Effort 2017 to 2021

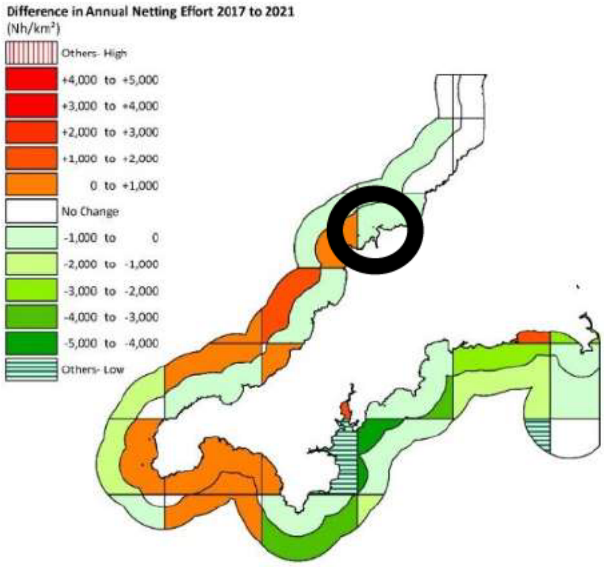


Figure 1: The difference in annual netting effort (Nh/km^2) in belted statistical areas between 2017 and 2021 thematically mapped in 1,000 Nh/km^2 ranges, where positive values i.e. increased effort are red and negative values i.e. decreases in effort, are green. 'Others' refers to -11,974Nh/km^2 in 29E49A(east) and 8,413Nh/km^2 in 29E56B.

Figure 4.0: Demersal net fishing activity in Cornwall between 2017-2021. The area of Port Quin Bay (black circle) is highlighted light green indicating a -1000 to 0 difference in annual demersal net fishing. This can be regarded as little to no decrease in demersal net fishing hours within this timeframe. Source: Cornwall IFCA Summary Statistics 2017-2021. Spatial Extent: North Cornwall's Coastline and ICES30E5.

2.2.1 Impact Assessment On Demersal Gear Fisheries

The demersal gear fisheries data provided from the MMO landing data in table 1 and table 2, the MMO landing data discussed and provided regarding Padstow Harbour, Port Isaac Harbour, the CIFCA demersal netting data, the EMODnet data provided in Figure 2, Appendix VIII, and the knowledge of Paul Blewett of Pentire Fishing Limited (Camel Fish) who has worked out of Port Quin for the past 20 years, all illustrate that the activity of demersal trawling and netting rarely takes place within the Port Quin Bay area and significantly, any activity that does take place within the bay will not be affected by the proposed site locations. Pentire Fishing Limited's (Camel Fish) knowledge of the area and relationship with all the fishers is significant in an evaluation of Demersal Gear Fishing – as the only fisher that trawls within the proposed site locations. Furthermore, the data collected in Appendix VIII further supports the notion that there will be none-low impact on demersal gear fishing (Trawling and Netting) in the Bay as the 24 supporting fishers/businesses, EMODnet data, AIS data, VMS data all show this. This data and knowledge imply that any impact imposed by the proposed farm towards this type of fishing venture would be negligible.

2.3 Additional Information From The Cornwall IFCA Summary Statistics 2017-2021

1. The average annual potting effort (Ph/km2) along the north coast of Cornwall indicates some variation between 2016 – 2021 (inclusive), with a small increase noted between 2020 – 2021. There is also clear seasonal variation shown during the year 2021 within band A (0-3nm), which appears to correspond with the majority of the five-year average. However, although there is an average increase along the north coast of Cornwall, referring to figure 3, there is a -300 to 0 kg/100Ph within ICES30E5 where the proposed sites are located. This means that the area is not following the same trends are the rest of Cornwall North supporting the notion that static gear fishing is lower in the area of the farm locations.
2. Inshore (0 – 3nm) the annual demersal netting effort along the north coast of Cornwall increased slightly from 2020 – 2021. However, within the belted statistical area which encompasses Port Quin Bay, appears to show a slight decrease in netting effort (as an annual average between 2017 – 2021 inclusive). This means that the area is not following the same trends are the rest of Cornwall North supporting the notion that demersal netting efforts is lower in the area of the farm locations.
3. The average annual demersal netting effort (Nh/km2) along the north coast of Cornwall indicates little variation between 2016 – 2021 (inclusive). There appears to be relatively little seasonal variation during 2021, within band A, which appears to correlate with the five-year average (between 2016 – 2020 inclusive). However, although there is little variation along the north coast of Cornwall, referring to figure 4, there is a -300 to 0 kg/100Ph within ICES30E5 where the proposed sites are located. This means that the area is not following the same trends are the rest of Cornwall North supporting the notion that demersal netting efforts is lower in the area of the farm locations.
4. Cornwall IFCA statistics: total shellfish (including crab, crawfish, lobster and spider crab) 2022: 13,914 kg total declared removed and landed by Port Isaac boats, presumed

landed into the port of Port Isaac.

5. Cornwall IFCA statistics: for the statistical belted area 30E53A from 2022, the total removed and landed 18,391 kg, encompassing the species crab, crawfish, lobster, and spider crab.

3.0 Additional Supporting Evidence

The data published and provided by MMO and Cornwall IFCA is supported further with data sourced from EMODnet, MarineTraffic.com, and Appendix VIII. These are also detailed within Chapter 16 and Appendix V.

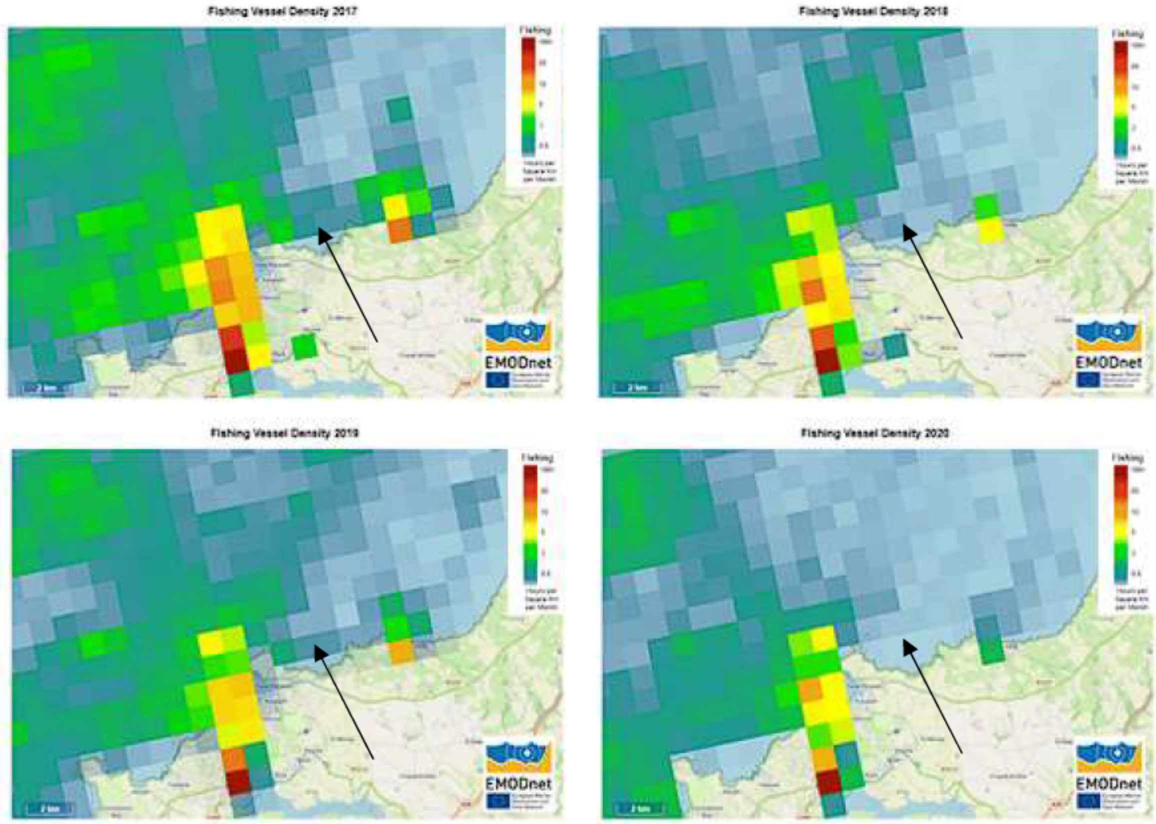


Figure 5.0: Fishing Vessel Density data averaged by year (average 0.195 vessel hours/km^2/month, 2017-2020) in the vicinity of the proposed farms at Port Quin Bay as indicated by the black arrow (source: EMODnet). Spatial Extent: ICES30E5

Year(s)	Lowest Density	Highest Density	Average
2017	0.33	0.45	0.39
2018	0.06	0.20	0.26
2019	0.12	0.32	0.22
2020	0.01	0.06	0.035
2017-2020	**0.13**	**0.26**	**0.195**

Table 3.0. Summary of Fishing Vessel Density recorded in hours for the 1 km^2 per year pixels that include the proposed farm at Port Quin Bay for 2017-2020. The table shows the lowest density, the highest density, and the average density for each individual year and the period as a whole. (source: EMODnet). Refer to Figure 5.0.

The fishing vessel density sourced from EMODnet within the area of the proposed farm averaged 0.195 hours/km^2/year (ranging from 0.01 to 0.45 hours/km^2/year) between 2017 and 2020 (Figure 5.0 and Table 3.0). This data shows low fishing activity in the area of the proposed farms with data provided being accurate to 1 km^2. With that being said, we understand that EMODnet data predominantly captures data for vessels over 12 meters in length so the low fishing activity recording from this data is specifically for those vessels. Please refer to the section below discussing Appendix VIII that provides data for vessels under 12 meters and also shows low fishing activity in the area.

Fisheries intensity (MW Fishing Hours) also sourced from EMODnet within the area of the proposed farm between 2017 and 2020 for the static gear, demersal (including, dredging, otter and beam trawl) and pelagic trawl fishing activities is detailed within Table 4.0 and Figure 2.0. The data shows that fishing activity within the area of the proposed farm is low and averaged <0.3 MW Fishing Hours during this period across all activities. No fishing activity was recorded for Otter Trawl, Beam Trawl, Dredges, and Pelagic Trawl activities within the Bay - these activities are typically shown to occur further offshore. Low levels of Static Fishing occurred within the Bay and, at times, within the vicinity of the proposed farm. These activities contributed 0.29 MW Fishing Hours over this period and are therefore classed as low.

Analysis on EMODnet Fisheries activity 2017 – 2020	Otter trawl	Beam trawl	Dredges	Pelagic Trawl	Static gear
MW Fishing hours	ND	ND	ND	ND	0.29

Table 4.0: Summary of intensity of fisheries activity for the 1 km^2 pixel that includes the proposed farm at Port Quin Bay for 2017-2020 (source: EMODnet). ND represents no fishing activity. Refer to Figure 2.0.

Biome and Camel Fish also investigated Vessel Monitoring System (VMS) data that was obtained using a freedom of information request (FOI) through the MMO. Data for all vessels equipped with a VMS (fishing vessels > 12m) between 2016 and 2021 were provided for the ICES rectangle that the proposed farm is located within. Data was analysed using the statistical modelling software R studio and was initially filtered to look at fishing vessels travelling at three speed windows: all speeds, >0-6 knots and 2-4 knots. Fishing vessels travelling between >0-6 and 2-4 knots were then focused on as these speeds are typical of fishing activity. These data have been spatially represented using QGIS and detailed in Figure 6. The data were then further filtered to investigate the number of VMS transmissions (pings) along with the number of unique fishing vessels that were recorded within the area of the proposed farm for the three speed windows. As the data provided by the MMO was anonymised to protect individual fisher's activity, the vessel numbers are those allocated by MMO. Each of these data are detailed within Table 5.0.

The data displayed within Figure 6.0 and 7.0 and Table 5.0 and 6.0 show that fishing activity within the proximity of the farms was extremely low. At all speeds, two unique fishing vessels were recorded during the timeframe between 2016 and 2021. This fishing vessels entered the area of the proposed farms once in 2019 and once in 2020, remaining in the proposed farms area long enough to transmit 1 ping. Both fishing vessel were recorded travelling in the >0 and 6 knots but not the 2 and 4 knots speed windows when in the area of the proposed farms. We can infer from this that they were travelling through the proposed sites at a speed above 4 knots as they both only pinged once. This data indicates that the level of fishing activity associated with the vessel sizes that are required to carry VMS is negligible within the area of the Bay. Furthermore, the refinement of data to >0-6 knots and 2-4 knots replicates analysis done by MMO and Devon and Southern IFCA in the Torbay Farm application as this highlights fishing activity. When investigating optimum speeds for demersal towed gear Biome found that a more accurate representation of fishing activity lies within the 2-4 knot speed window as these speeds will achieve optimum performance in trawl and dredging gear whilst reducing the risk of damage if the gear was to snag.

Port Quin Bay (**lat < 50.59801 & lat > 50.591518 & lon > -4.891862& lon < -4.881306)**		
Speed subset between **0-6 knots**		
Year	**Number of unique vessels (nv)**	**Number of VMS pings (np)**
2016	0	0
2017	0	0
2018	0	0
2019	0	0
2020	0	0
2021	0	0
All years	**0**	**0**
Number of pings per vessel ID per year **0-6 knots**		
Year	**Allocated vessel ID**	**Number of VMS pings (np)**
All years	ND	0
Speed subset between **2-4 knots**		
Year	**Number of unique vessels (nv)**	**Number of VMS pings (np)**
2016	0	0
2017	0	0
2018	0	0
2019	0	0
2020	0	0
2021	0	0
All years	**0**	**0**
Number of pings per vessel ID per year **2-4 knots**		
Year	**Allocated vessel ID**	**Number of VMS pings (np)**
All years	ND	0

Table 5.0: Fishing Vessel VMS data for >0-6 knots and 2-4 knots along with the unique fishing ID (allocated by the MMO) and the coordinates of the Biome proposed farm at Port Quin Bay used to filter the data.

Port Quin Bay (lat < 50.59801 & lat > 50.591518 & lon > -4.891862& lon < -4.881306)		
Speed subset between **0-6 knots**		
Year	**Number of unique vessels (nv)**	**Number of VMS pings (np)**
2016	0	0
2017	0	0
2018	0	0
2019	1	1
2020	1	1
2021	0	0
All years	**2**	**2**
Number of pings per vessel ID per year **0-6 knots**		
Year	**Allocated vessel ID**	**Number of VMS pings (np)**
2019	83	1
2020	529	1
Speed subset between **2-4 knots**		
Year	**Number of unique vessels (nv)**	**Number of VMS pings (np)**
2016	0	0
2017	0	0
2018	0	0
2019	0	0
2020	0	0
2021	0	0
All years	**0**	**0**
Number of pings per vessel ID per year **2-4 knots**		
Year	**Allocated vessel ID**	**Number of VMS pings (np)**
All years	ND	0

Table 6.0: Fishing Vessel VMS data for >0-6 knots and 2-4 knots along with the unique fishing ID (allocated by the MMO) and the coordinates of the Camel Fish proposed farm at Port Quin Bay used to filter the data.

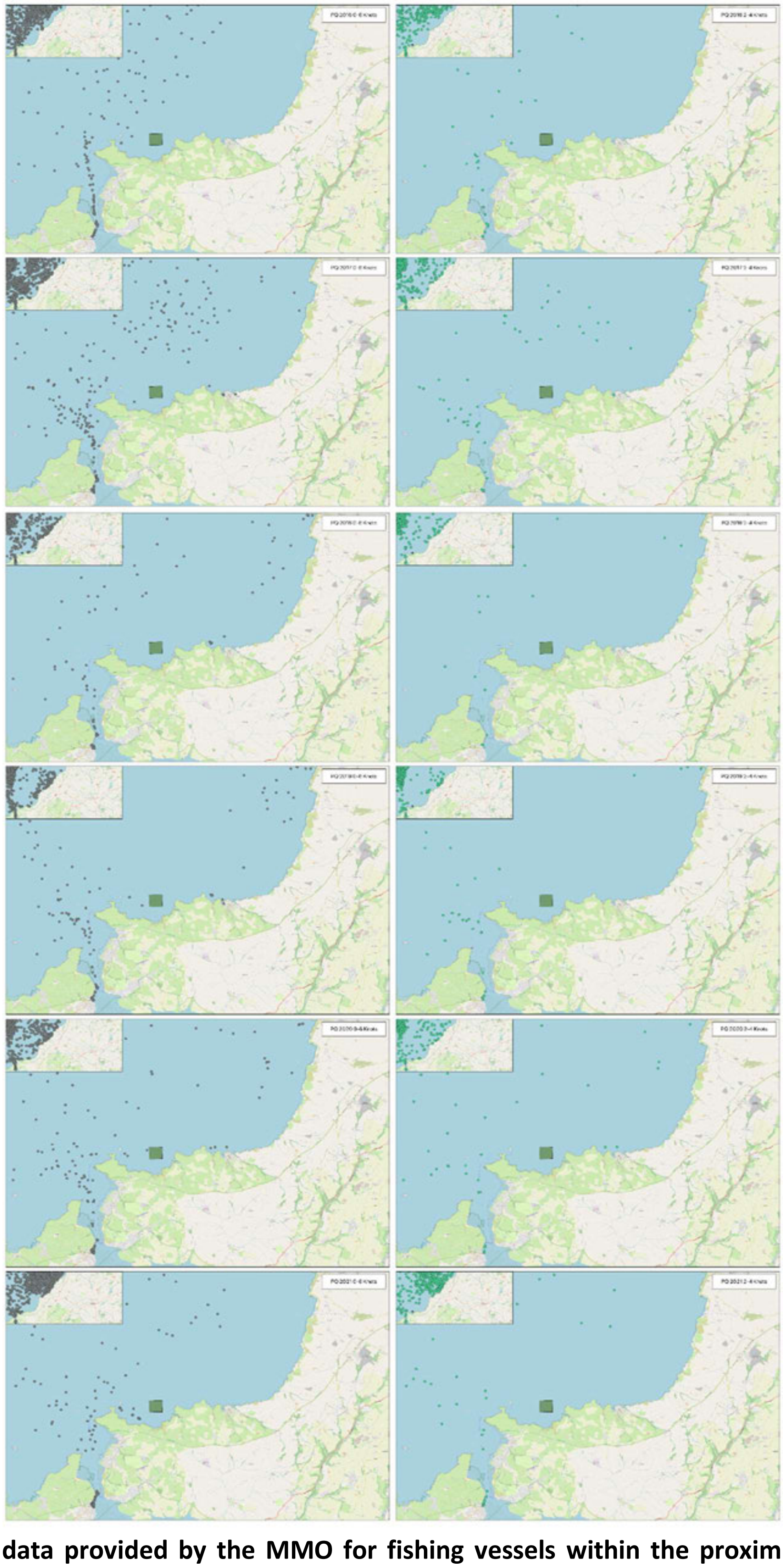


Figure 6.0: VMS data provided by the MMO for fishing vessels within the proximity of the Biome proposed farm (green rectangle) at Port Quin Bay between 2016 - 2021 for vessels travelling >0-6 knots (grey points on the left) and 2-4 knots (green points on the right). Spatial Extent: ICES30E5

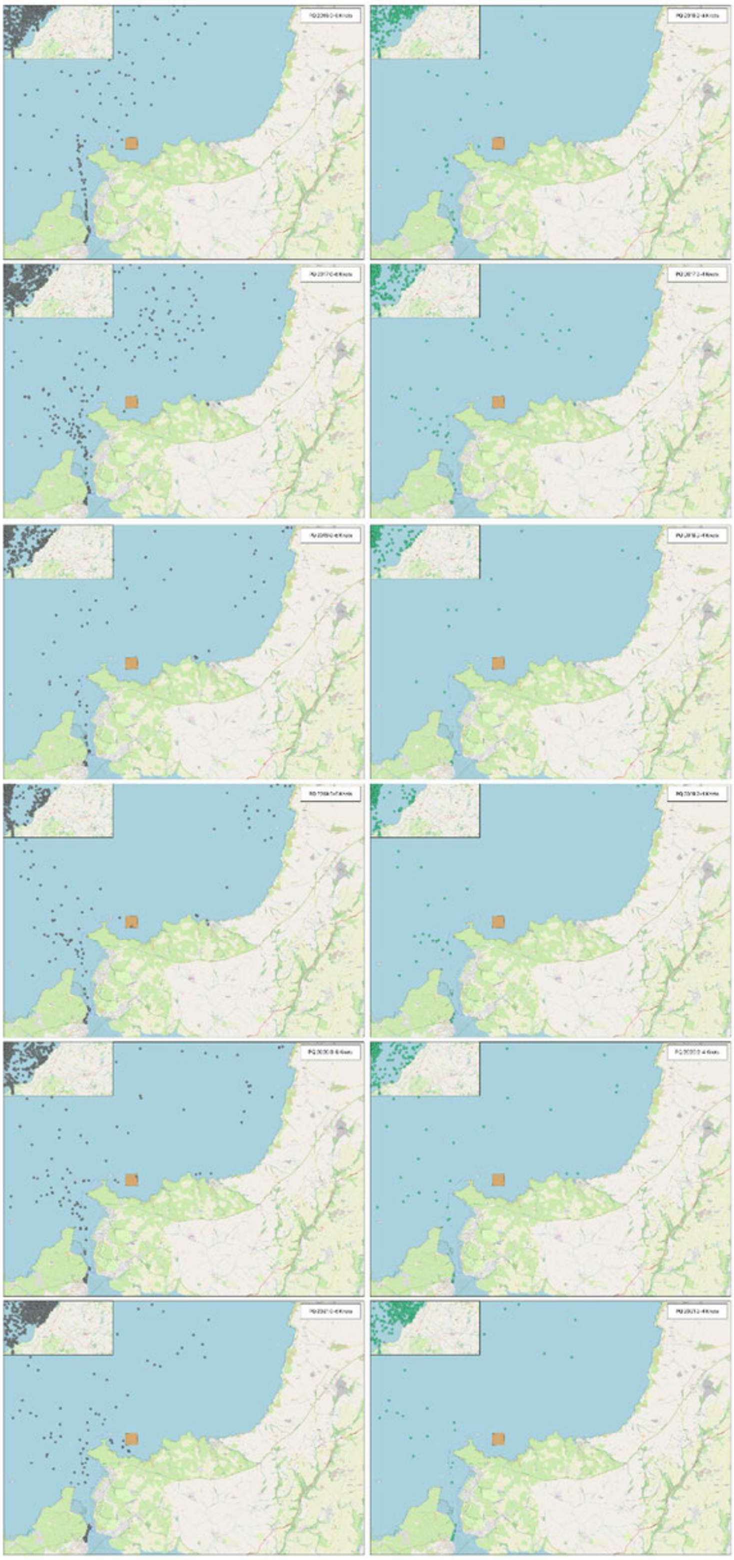


Figure 6.0: VMS data provided by the MMO for fishing vessels within the proximity of the Camel Fish proposed farm (orange rectangle) at Port Quin Bay between 2016 - 2021 for vessels travelling >0-6 knots (grey points on the left) and 2-4 knots (green points on the right). Spatial Extent: ICES30E5

In deciding the area of the proposed farm, Biome and Camel Fish gave consideration toward the location in relation to high traffic areas including the main transit and access pathways. This was particularly true in regard to maritime safety issues which are detailed further in the 'Marine Navigational Safety Assessment & Emergency Response Plan'. Figure 8 shows the main transit and access pathways for vessels within the vicinity of Port Quin Bay in 2021 sourced from MarineTraffic.com.

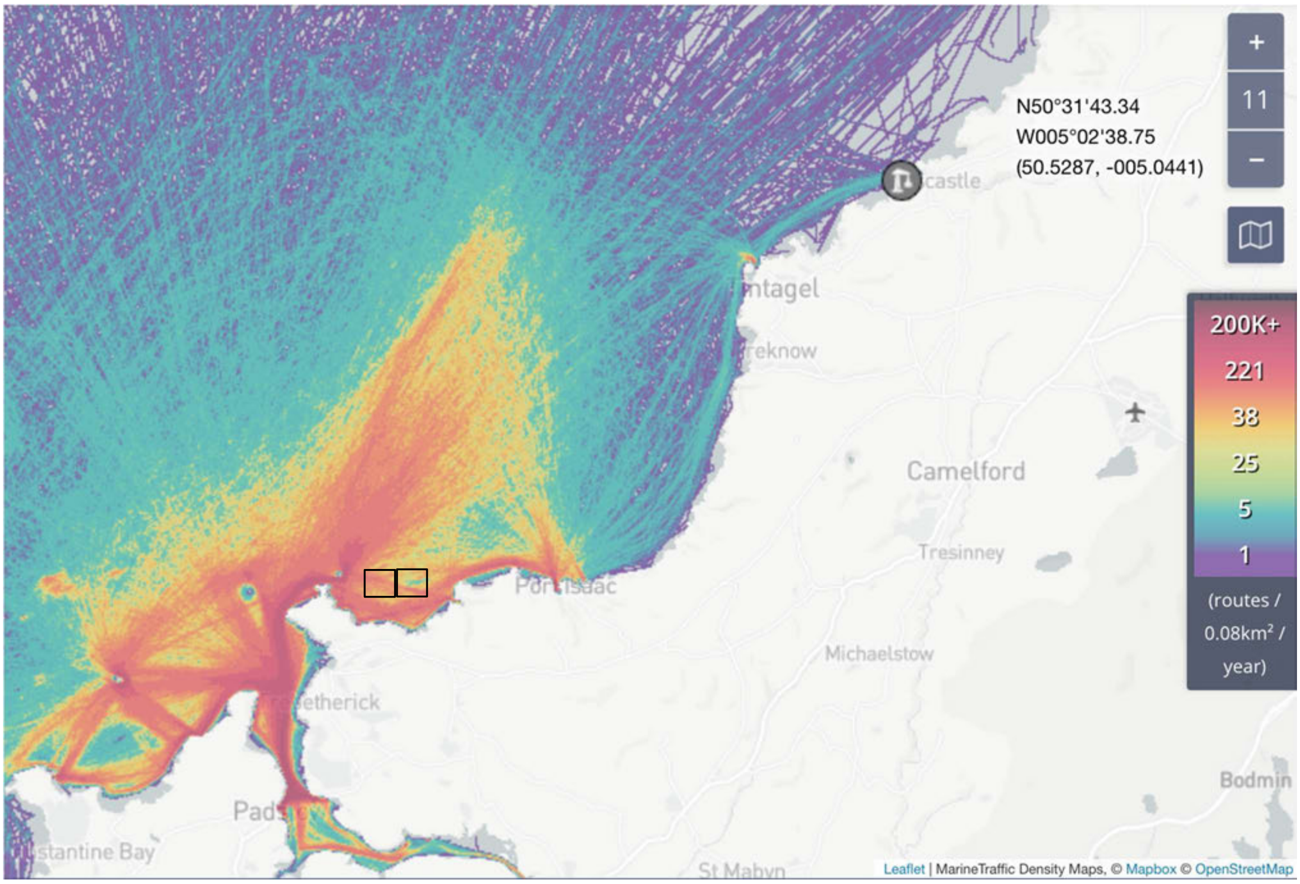


Figure 8.0: Movement of vessels within the area of the proposed farms (black rectangles) in Port Quin Bay (Source: MarineTraffic 2021). Spatial Extent: ICES30E5

Using EMODnet and MarineTraffic data (AIS), which are summarized in the 'Navigational Safety Assessment and Emergency Action Plan: Table 2.0 and Figures 2.0-6.0', MarineTraffic gives the highest traffic level (in the South of the sites) as 221 routes/0.08km^2/year (medium). For the remainder of the sites, it is less than this value. The EMODnet data (Provided in Section 4 of the Navigation Safety Assessment and Emergency Response Plan) presents traffic levels of between 0.27 to 0.57 hrs/km^2/year for fishing, sailing and pleasure vessels (low range). All vessels range from 5.174 – 6.226 hrs/km^2/yr which is low to medium. Overall traffic is assessed at low to medium within the proposed farm locations.

The main traffic transitioning in the area moves outside of both proposed farms to the South and North.

In addition, the most Southern part of each proposed farm site is located 550 m + from land/headland (see Figure 9.0 and 10.0). Waters in this southern region are 10 m deep or less. Therefore, traffic passing between the land and proposed farms is likely to be small leisure vessels or fishing vessels under 12m in length that are statically fishing near the coast for shellfish (refer to Appendix VIII) – allowing for ample space for transitioning. Larger vessels will continue to transition north of the proposed farms, where water is deeper for safe keel/draft clearance (15-16 m +). This is further evidenced in our VMS ping data for vessels above 12m's showing a low number of pings for vessels in the Bay.

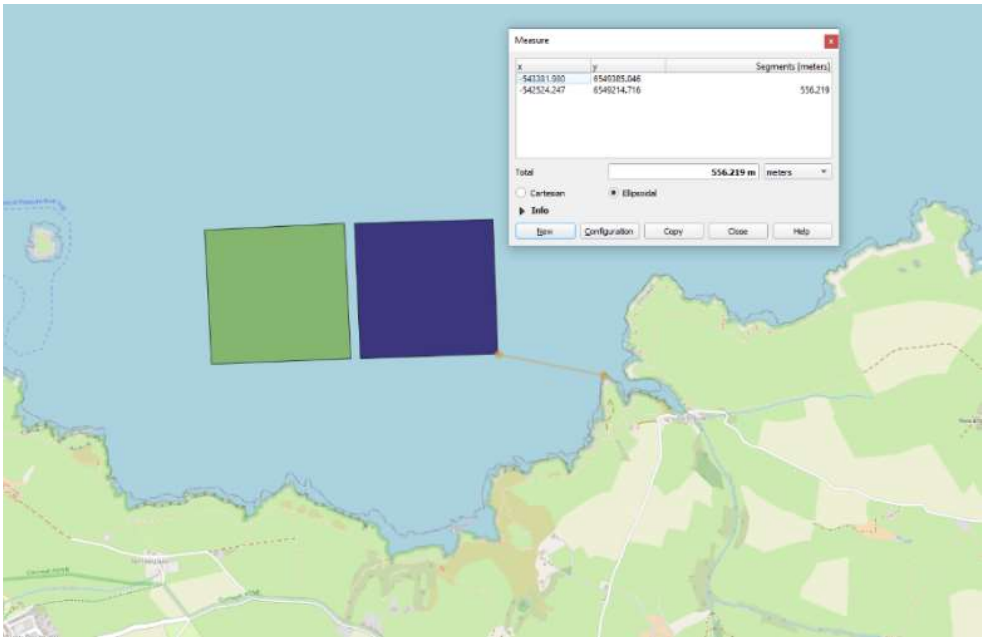


Figure 9.0: Closest distance from either site to the land.

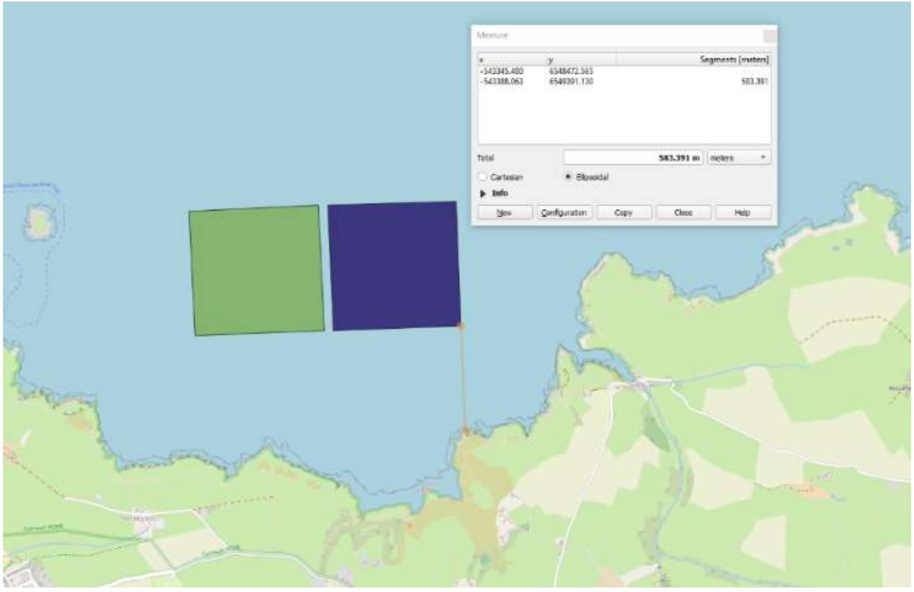


Figure 10.0: Second closest distance from either site to the land.

Within the Fisheries Impact Assessment across the six-year period no ping data was detected (VMS) for vessels over 12 meters – with smaller fishing vessels (Refer to Appendix VIII) using the bay infrequently (direct communication with operators and observations of Camel Fish – fishers operating within the region for 20+ years).

We have conducted surveys with local fishers – specifically the under 12 m fleet (Appendix VIII) which includes data and information from 24 different fishers/businesses that actively operate in ICES30E5 and predominantly use vessels under 12m. This data is extremely significant as it is data directly from operators of the sea that make a living in the area from their activities. All 24 of the surveyed fishers/businesses supported the locations of both proposed seaweed farms and stated that the sites would not affect their activities. They provided information about fishing within the Bay and that the majority, who are static fishers, operate in the south area of the bay by the coastline as this is the region in which crabs and lobsters are predominantly located and thus fished. By allowing for a minimum of 550m between the closest point of the two sites and the coastline this is a space that allows vessel movement within the bay and does not cause displacement in the activities of these operating stakeholders.

Note: both the full Biome and Camel Fish team has completed, and will maintain, all the required medicals and qualifications required to operate safely at sea and in accordance with legal requirements. They are very aware of marine safety, first aid, security, fire-training and safety/responsibility within a given area of operation.

3.1 Fisher Survey And Interview Data (Appendix VIII)

Please refer to the appendix VIII for tables evidencing the statements below:

An initial survey and interview of 17 fishers that work out of Padstow, Port Isaac, and Port Quin was conducted on the 15th of December 2024. This survey was conducted to provide information and data from active Stakeholders that actively work along the coastline of Padstow, Port Isaac, and Port Quin Bay (within ICES30E5). However, this is not limited to coastline fisheries operators and included those that operate within ICES30E5 but further offshore than the proposed farm locations. Furthermore, the majority of operators surveyed and interviewed operate vessels that are under 12 m however, this was not limited to under 12 m operators. The survey was conducted to collect data regarding the form of fishing/activity the operator conducts and their vessel size. This data was collected to fill the gaps of data used in the applications taken from EMODnet, MMO data, Marine Traffic, AIS, VMS, and CIFCA. All operators in this initial survey that were engaged supported the licence application farm locations and did not believe the proposed area of works would affect their current fisheries activities.

A second survey and interview of 15 fishers that work out of Padstow and Port Quin was conducted on the 14th of May 2024. This survey was conducted for multiple purposes;

- To provide data and information from active fishers who actively work with ICES30E5, the area in which the proposed seaweed farms are located.
- To share information in regards to shellfish, fish species, and fishing activity in Port Quin Bay and its surrounds specifically.
- To clearly state if the proposed farms will affect their fishing activities.

From the two interviews conducted there are 23 individual fisher/businesses that support the proposed licenced sites and have agreed that the proposed farms will **not** affect their activities.

This is crucial as these individuals are active stakeholders in the proposed area of works as well as the majority use vessels under 12m's which covers the data gaps of EMODnet, AIS, and VMS.

All individuals in Table 2 (Appendix VIII) agree that the fishing effort would not be affected by the proposal as they do not fish in that area and the species that they fish are not found in the proposed sites area. We have been told that Plaice used to be caught in Port Quin Bay but this was around 15 – 20 years ago when it was last worth fishing. During the interviews we were also told that over the last few years when the two trawlers left in Padstow tried to fish within the area of Port Quin Bay it has been a waste of time for fishing as they hardly caught anything. One vessel last fished the area 2 years ago and in a 2-hour trawl they caught 2 plaice and 1 sole. This data conducted from surveys and interview supports the data provided in the Fisheries Assessment and the Fisheries Impact Assessment, and data provided with the applications sourced from EMODnet, AIS, VMS, the MMO, and data collected from CIFCA. When looking at all of this data it is apparent that there is minimal fishing activity in Port Quin Bay and specially within the proposed area of works.

From the second survey it was agreed that the main species fished in Port Quin Bay were shellfish; Crab and Lobster. It was also mentioned that these species are caught close to the coast and further offshore, **not within the vicinity of the proposed area of works**. This is supported by the data provided in the Fisheries Assessment and the Fisheries Impact Assessment, and data provided with the applications sourced from EMODnet, AIS, VMS, the MMO, and data collected from CIFCA. This is also supported by the initial survey that showed that out of the 17 fishers/businesses, 12 of these are static fishers. These static fishers do not oppose the proposed area of works as they would not affect their fisheries activities.

From the second survey it was agreed that the main species fished in Port Quin Bay were shellfish; Crab and Lobster. It was also mentioned that these species are caught close to the coast and not within the vicinity of the proposed area of works. This is supported by the data provided in the Fisheries Assessment and the Fisheries Impact Assessment, and data provided with the applications sourced from EMODnet, AIS, VMS, the MMO, and data collected from

CIFCA. This is also supported by the initial survey that showed that out of the 17 fishers/businesses, 12 of these are static fishers which included static fishers that do not oppose the proposed area of works as they would not affect their fisheries activities.

From both sets of surveys and interviews we have found that vessel size varies from 6m-15m. With 23 individuals/businesses. This data holds significance as it covers the data gap of EMODnet, AIS, VMS, and CIFCA data that may not capture vessels under 12 meters. As this data is not captured through resources and sources online the only way to capture it is through surveys and interviews of active fisheries operators which have been conducted by the applicants. This is crucial as active fisheries operators that have been surveyed and interviewed have unanimously supported the farm locations and have provided data that evidences that they do not conduct activities within the proposed area of works and that the farms will **not** affect their activities.

4.0: Pre-Engagement and Engagement Summary

In the preparation of this licence application, Biome and Camel Fish has undertaken a pre-engagement and ongoing engagement process with key stakeholders before submitting the licence application to the MMO and during the licence applications. This was in order to inform the licence applications with respect to relevant stakeholders and the proposed locations of the farm sites.

With respect to fisheries and sea related businesses as stakeholders, the applicants have pre-engaged and ongoingly engaged directly with local fishers/trawlers, potters/netters, charters, and boat tourers. Elements of that engagement are reported throughout this assessment chapter. It is also evidenced within the documents 'Pre-engagement Log', 'Pre-engagement Evidence', and Appendix VIII. Additional letters of support are provided in Annex 1.0 of Chapter 14. Pre-engagement and engagement with fishers/trawlers, potters/netters, charters, and boat tourers was conducted with the stakeholders being aware and acknowledging that there would be two independent licenced site proposals going into the bay; one licenced to Biome Algae and one licenced to Camel Fish, for 50.4 Ha each.

In terms of pre-engagement and engagement with local fisheries representatives and other relevant stakeholders:

1. Biome and Camel Fish has consulted with the local potting community and they have raised no objections (Appendix VIII).
2. Biome and Camel Fish has consulted with the local trawlers and they have raised no objections (Appendix VIII)
3. Biome and Camel Fish has consulted with the local sailing clubs and they have raised no objections.
4. Biome and Camel Fish have consulted with local Charters and they have raised no objections (Appendix VIII).
5. Biome and Camel Fish have consulted with local Boat Tourers and they have raised no objections (Appendix VIII).
6. Biome had consulted with the local Harbour Master's and they raised no objections and provided a letter of support historically. However, Harbour Masters have been made regulatory bodies (primary advisors) in the licencing process and it is understood they can no longer provide a letter of support for the applications.
7. Biome has consulted with the local diving clubs and they have raised no objections.
8. The Crown Estate has indicated that the area is available to lease and both licence applications reveal no conflict within the conflict plan assessments.
9. Trinity House have been consulted during the licence applications and have raised questions that have been answered accordingly. Navigational Safety Markers will be used to establish the safe marking of the farms for the purpose of keeping other marine users safe. Biome and Camel Fish will follow their guidelines for navigational safety markers and other actions (please refer to Chapter 16 and Appendix V). Within the same chapter and Appendix there is a clear decommissioning statement. It should be noted that the Crown Estate, as landlords for the licenced sea-space, conduct due diligence and have their own procedures in place related to the Crown licence issued and decommissioning.

5.0 Applicant Response

At the core of this assessment, Biome Algae and Camel Fish have aimed to answer the following through pre-engagement, engagement, analysing evidence and based on site selection criteria when considering where the farms should be located:
'Does the proposed licence reasonably avoid or mitigate impacts on legitimate users of the sea.'

This assessment indicates the answer is yes in terms of fishing activity. The application achieves those criteria. This can be seen in the 'Pre-engagement Log' where it is evident that there have been limited objections from stakeholders that are **legitimate users of the sea and operate businesses and actively make a livelihood from working on the sea.** We have also received a lot of support from these active fishers/businesses and the fishing community as a whole, please refer to Appendix VIII which evidences supporting individuals and businesses.

The evidence provided within this chapter demonstrates that the impact of the proposed farms (Figure 1) on current fisheries activities is **none-low** for static fishers operating within the area. With a **none-low** impact assessed for demersal fishers.

When compared with other areas of the Cornwall coast, the proposed location is within a relatively low intensive fishing area. Therefore, it provides a good option for co-location of the seaweed farms with fishing activity. Our assessment and the evidence analysed indicates the farm locations will not significantly impact fishing operators within this area. This is important when considering the location of aquaculture in Cornwall. There has also been an effort to **reasonably avoid significant impacts on local Cornwall fishing operators.**

It should be noted that all pre-engagement and engagement with the local fishing community and sailing clubs was conducted with the stakeholders being aware that there was going to be two applications going in for sites within the bay. During pre-engagement stakeholders regarded as **legitimate users of the sea that operate businesses and actively make a**

livelihood from working on the sea responded with having **no objection** and furthermore 23 of them **supported the locations** of the two site proposals during the ongoing licence applications and this is evident in the Appendix VIII. The local fishing community and the local sailing clubs are in support of the Biome proposed site and the Camel Fish proposed site.

Port Quin Bay provides excellent infrastructure to support the farm. This will bring vital revenue into the local harbours in line with their plans. The farm will also input positively into the local economy and provide vital employment, training and educational/research opportunities. The positive economic/social impact of the farm has been assessed in Chapter 15.

6.0 Conclusion

Overall, the assessment indicates that the proposed locations of the seaweed farms in Port Quin Bay would have a negligible impact on the local fisheries. The assessment clearly answers the following:

1. Do the proposed seaweed farming sites significantly impact fisheries activities in the area and has this been avoided or mitigated where possible? **No and yes respectively.**
2. Do the proposed seaweed farming sites significantly impact the access of fishing vessels in and out of Port Quin Bay? **No.**

More importantly, Camel Fish, as major fishers in the region for 50+ years are partnering with Biome, in order to futureproof and diversify their income through seaweed farming (please refer to Chapter 1).

Biome and Camel Fish will continue to liaise with the local fishing industry and liaise with Cornwall IFCA, ensuring they are kept informed of works through notices to mariners as is likely to be a condition of the licence (requirement). It is hoped Cornwall IFCA would be able to circulate information to its permit holders should Biome and Camel Fish wish to disseminate further information to the fishers. Cornwall IFCA currently displays Notice to Mariners on the IFCA website. In addition, the proposed sites would be clearly marked for navigational purposes according to legal requirements (please refer to Chapter 16 and Appendix V).

Chapter 14: National Landscape Assessment

Preface

The following assessment is in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence application, as referenced above.

6. Landscape and seascape impacts

6.1 The MMO considers the landscape/seascape visual impact assessment requires further information, and that additional evidence is required before a conclusion of low impact can be reached.

In response to this we have produced a new assessment that supersedes the AONB Assessment. This new assessment is the National Landscape Assessment and is written cumulatively, similarly to all other new and updated chapters, assessments, and appendix. This new assessment also includes a visual impact assessment.

6.2 The Cornwall AONB Management Plan 2022-2027 includes the policy PPW-P3 specific to the location of the seaweed farms and is as follows: "Seek conservation and enhancement of the undeveloped character of the coast; for example Witches Cauldron to Port Quin Bay, around High Cligg and around Dizzard in order to retain rugged and simple tranquillity and promote the enhancement of other parts of the coast for example around Tintagel, Boscastle and Port Isaac such that they return to having a more undeveloped character."

This has been assessed within this chapter.

6.3 The application documents and additional information provided do not include any detailed landscape and seascape character and visual assessment. Instead, it provides some comment to suggest that "it is located inshore at a distance to minimise visual impact." This statement is not evidenced, and no methodology is provided for the determination of this effect. Given the scale of the seaweed farm and cumulatively with the additional seaweed farm within the modest scale *of Port Quin Bay and with intervisibility between The Rumps and Kellan Head from the Southwest Coast Path it is considered that this reported impact is substantially understated. Likewise, the statement that the "Seascape disturbance will be minimal" is not evidenced.*

This has been elaborated on and evidenced with methodology within this chapter and assessed cumulatively.

6.4 The MMO has included the full response for both sites within the additional information request and will require the resubmission of the visual impact assessment with the additional information requested within the response.'

This has been elaborated on and evidenced with methodology within this chapter and assessed cumulatively.

7.4 Tourism/recreation
Further to the comments relating to landscape and seascape impacts (section 6) comments have been received relating to impacts on recreational vessels using the bay and the impacts of seaweed becoming detached from the farm and entering the wider bay and areas used for recreation including personal watercraft and swimmers. The MMO ask that impacts from this also be considered.

In response to this concern, we have updated our chapters and produced new assessments with considerations for lost gear including the potentiation for seaweed becoming detached and have assessed this. Please refer to the following chapters: 7,8, 12, 13 and 14. This has been done cumulatively for both proposed seaweed farm sites.
The assessment has been conducted with independent input from universities, research groups, marine engineers and active fishers in the region. And has utilised peer-reviewed, published research from within scientific journals, in combination with other literature.
This chapter should be read in conjunction with chapter 15 (Economic Assessment).

1.0 Objectives

- Conduct an assessment of the proposed seaweed farms with regards to policies in place for protection of the Pentire Point to Widemouth Bay Cornwall National Landscape (02).
- Assess impacts of the proposed seaweed farms on the seascape outside of the designated Cornwall National Landscape (02).
- Conduct a Visual Impact Assessment (VIA).
- Detail the operational profile of the proposed farms and infrastructure stability assessments in relation to the VIA.
- Consider the Cornwall National Landscape policies with the South West Marine Spatial Plan.
- Consider benefits of the proposed seaweed farms on the seascape outside of and features within the designated Cornwall National Landscape (02).
- Consider the value-add of the proposed seaweed farms in terms of biodiversity net gain.
- Provide letters of support from operators within the Cornwall National Landscape (02).

2.0 Overview

The purpose of this chapter is to primarily assess whether locating the proposed seaweed farms in Port Quin Bay (under application numbers MLA/2023/00307 and MLA/2023/00308) will significantly impact the seascape located outside of the Pentire Point to Widemouth Bay Cornwall National Landscape (previously AONB), or any of the designated features within the Cornwall National Landscape (02). And how this relates to the South West Marine Spatial Plan and specifically aquaculture developments.

The CNPL Manual 2024, South West Marine Spatial Plan, application response from Cornwall National Landscape were researched or reviewed and the information presented within the chapter. Evidence was collated and presented related to the seaweed farms, operational profiles, infrastructure integrity and biodiversity net gain. A Visual Impact Assessment (VIA) was conducted by an independent organisation.

3.0 Farm Sites

Please refer to Chapter 3.

4.0 Cornwall National Landscape (AONB)

4.1 Overarching Policies And Objectives (National Landscape)

Designated in 1959, The Cornwall National Landscape comprising 12 areas of outstanding natural beauty (AONB) is a national asset, critical to Cornwall's economy and well-being of communities. It inspires people to be connected to the landscape, with special qualities to be conserved, enhanced and appreciated. Of relevance to the proposed seaweed farms (which occupy the seascape outside of the National Landscape, the Cornwall AONB Partnership's vision applies as follows:

- AONB's within the National Landscape are to play a critical role in nature recovery, resilience to climate change and conservation of the natural environment. This is achieved through people, place, nature and climate.
- Inclusivity is at the heart with people understanding the value of the AONB's (a protected landscape) that provides opportunity for prosperity, good health, enabling re-investment into the landscape in order to sustain benefits for the long term.
- They play an integral role in tourism and recreation.
- They are working landscapes where human activities are part of everyday life.
- The land is farmed.

AONB's are Protected Landscapes (internationally) as are National Parks and are protected under the European landscape Convention (Florence Convention). Their character is the result of the action and interaction of natural and human factors. Following a landscape review (May 2018) and within the context of the Governments 25 Year Environmental Plan, the Secretary of State said: "*Amid growing population, changes in technology and decline in certain habitats, the time is right for us to look afresh at these landscapes, we want to make sure they are not only conserved but enhanced for the next generation*."

The Countryside and Rights of Way Act (2000) is of importance. Of particular relevance is Section 82 (conserve and enhance natural beauty), Section 85 (statutory duty of relevant authorities to have regard to the purpose of conserving and enhancing the natural beauty when considering

developments, including developments outside the boundaries of the AONB's that have potential to significantly impact within the designated area) and Sections 86 to 88 which references AONB Conservation Boards, who have an obligation to foster the economic and social well-being of local communities in co-operation with local authorities and other public bodies. In addition, The Natural Environment and Rural Communities Act 2006 (NERC) clarifies in law that the fact an AONB includes agriculture, does not stop it being treated, for legal purposes as being an AONB.
Sustainable seaweed farming (defined by DEFRA as an equivalent to land farming) extends this to working seascapes outside of AONB's and provide an opportunity for prosperity, good health, re-investment, climate resilience, nature recovery, conservation of the natural environment and enhance landscapes and natural beauty for the next generation through their socio-economic and environmental benefits. Although a relatively new industry, seaweed farming connects people to place in a tangible way.

Natural beauty is defined as going well beyond scenic or aesthetic value. It encompasses the relationship between people living and working in the AONB (past and present) and place; it's nature, culture, wildlife and ecology, settlement history and land-use, archaeology and buildings.

The National Landscape (Cornwall AONB) has a Management Plan (2022 to 2027). The policies inform the Management Plan (principles for decision-making frameworks). The objectives provide tangible opportunities for collaborations to deliver the primary purpose, to conserve and enhance the protected landscape, which includes development in a sustainable way (best practice and positive management). This includes project delivery, opportunities for people living and working within the AONB and attracting funding to maximise the benefits the protected landscape offers.

AONB partners include Cornwall Council, Environment Agency, Historic England, Natural England, University of Exeter (Environment and Sustainability Institute). A number of the partners are primary advisors for the MMO Marine Licence and Biome works on projects related to seaweed farming that involve Exeter University.

Both applicants aim to work with additional partners (for example, Cornwall Wildlife Trust, the

National Farmers Union and the Cornwall Agri Food Council) to provide tangible conservation and farming data, as well as seaweed-derived products that can benefit land-based farmers (for example: feeds and bio-fertilisers). This is explored within this chapter, as well as Chapters 7,8,9,10 and 11.

4.2 Management Plan Strategy

The Cornwall AONB Strategy aligns with global, national and local strategies. At its heart are the 17 Sustainable Development Goals (SDG's). The goals underpin that ending poverty and deprivation must go hand-in-hand with strategies that improve health, education, reduce inequality and spur economic growth – all while tackling climate change and working to preserve our oceans and forests. People within the Cornwall AONB do experience 'extreme deprivation' with roots in primary economic sectors (farming, forestry, mining and fishing) alongside tourism.

The founder of Biome is an experienced, published researcher and marine biologist (28 years) whose primary reason for establishing Biome and seaweed farming was to enhance marine environments whilst providing 'blue-economy' natural-capital opportunities for people in the South-West region and leaving something of value for future generations. Biome has operated seaweed farms for four seasons in both Cornwall and Devon, and have won a number of prestigious awards – which independently examined their contributions to SDG's (www.biomealgae.co.uk). These include:

2. Zero Hunger

3. Good Health and Wellbeing

5. Gender Equality

9. Industry, Innovation and Infrastructure

11. Sustainable Cities and Communities

12. Climate Actions

13. Responsible Consumption and Production

14. Life Below Water

Camel Fish have a strong connection to the Cornwall AONB, specifically Padstow and Wadebridge CNA plus they have worked in Port Quin Bay and surrounds for decades. Family generations have lived and worked in the region for over 50+ years. Rooted in a traditional primary sector (fishing), in recent years they have seen tangible and worrying declines within the industry. In order to futureproof their economic contributions in the region and offer continued family security within the AONB, they wish to partner with Biome and diversify into seaweed farming – operating a sustainable aquaculture practice. This provides a clear pathway to providing their current and future family generations and additional employees in the region with a use of the sea, generating income in a sustainable way and utilising the resources and knowledge they already have. The applicants have consulted with other local fishers in this respect and the area selected for the proposed seaweed farms offers a unique area that does not clash with fishing, an existing use of the sea and has garnered support from these stakeholders.

An AONB Management Plan challenge is to support sustainable farming, so that farmers can continue to effectively steward the landscape and improve environmental conditions. Seaweed farming offers the same opportunity within AONB seascapes, without directly impacting the protected Heritage coastline (physical landscape) or people's access to it.

The Management Plan states - 'the world is changing and we need to change with it'. Due to climate change, Cornwall has experienced extreme temperatures, loss of food resources, and flooding. Not preparing for regional climate change resilience could lead to local socio-economic and environmental damage. It requires resilient communities (communities willing to adapt in their capacity to respond to risk management associated with climate change), nature-based solutions and a sustainable coastline. Seaweed farming provides a softer engineering approach to climate change adaptation and mitigation – protecting sites of biodiversity whilst enabling wider benefits from natural capital and ecosystem services.

A local nature recovery strategy (LNRS) is integral to the overall Cornwall AONB strategy (statutory requirement of local areas under the Environment Act, November 2021). This is to help identify strategic places to support nature recovery in order to enhance biodiversity and wider ecosystem services. It is to guide investment for nature, identify spatial allocations for nature and guide the delivery of Biodiversity Net Gain. The aim is 30% of land and seas will be well managed for nature by 2030. It considers current protected areas, opportunity areas and opportunities outside the network, where restoration, enhancement and protection are key.

The Cornwall AONB consists of 75% farmland. The AONB is committed to supporting farmers to achieve sustainable and profitable farm business that delivers outcomes for people, place, nature and climate. Working with farmers is a priority. This includes understanding natural capital, increasing biodiversity, ecosystem services and storing carbon. This is embedded in the aims and objectives of the Cornwall AONB Management Plan. And references local food and fibre production. Farmers are considered integral to cultural heritage and are architects of the conservation and enhancement of the protected landscape for future generations (see 'The path to Sustainable Farming: An Agricultural Transition Plan 2021 to 2024). This aims to support farmer networks that help prepare farmers for agri-environment schemes.

Seaweed farming is defined as the sea-based equivalent of land farming (DEFRA) and produces both food and fibres for alternatives to traditional paper and oil-based plastics. Moreover, seaweed-derived products help to support land-based agriculture in their goals by providing feeds and bio-fertilisers. Biomass and biofuel crops can also be provided through seaweed farming. A local agricultural business within the Area of the Cornwall AONB in question have offered letters of support to the proposed seaweed farming developments as they can see the local and tangible benefits, including the use of seaweed within their agri-environment practices and this compliments letters of support sent by fishers and an aquaculture operator in the area (Annex I).

Relevant landscape and seascape character policies, linked to the proposed seaweed farms are LS-P1 (social, environmental and economic benefits), LS-P3 (safeguarding and enhancing peace, tranquility and dark night skies), LS-P5 (accommodate biofuel and biomass crops and new forms of horticulture) and LS-P6 (the proposed farms do not impact the historic built environment). Of objective relevance to the landscape and seascape character are LS-Ob1 (maintain and enhance landscape character through sustainable farming, optimising fiscal support) and LS-Ob3 (enhance landscape character within biodiversity and nature recovery projects that contribute to habitat characteristics of AONB landscapes.

In terms of nature recovery policies and objectives, those that apply are NRLM P1 (support opportunities to deliver nature recovery, NRLM-Ob2 (improve understanding of the nature capital and ecosystem services of the Cornwall AONB – promoting and identifying investment), NRLM-Ob11 (support opportunities to increase wildlife rich habitats, including ecosystem engineers) and NRLM-Ob12 (Support land management initiatives which promote nature friendly farming and soil health as part of a profitable farm business). This supports the link between seaweed farming in the seascape and land-based farming within the designated AONB area, forming a network.

In terms of climate policies and objectives, those that apply are CCBR-P1 (support appropriate green infrastructure which mitigate climate change whilst conserving and enhancing landscape), CCBR-OB1 (Identify natural capital within the Cornwall AONB (ecosystems approach) supporting adaptation to and mitigation from climate change including investment into these areas), CCBR-OB2 (restore and connect habitats at a landscape scale within the AONB to mitigate against and adapt to climate change) and CCBR-OB5 (educate and engage local communities in projects that focus on climate change mitigation and resilience).

In terms of people policies and objectives, RSA-P2 applies (seek to improve the sustainable connectivity between population centres and sections of the Cornwall AONB with green infrastructure that enhances landscape character and increases public health opportunities).

In terms of sustainable communities and economies policy and objectives, SCE-P1 applies (support green economies that can be accommodated within the sensitive landscapes of the AONB), SCE-P2 (support fishing communities to conserve and enhance coastal character, ensuring sustainable businesses and thriving communities) and SCE-P4 (support communities to be more sustainable, self-reliant in terms of food, services, employment and green infrastructure adapting to climate change and improving economic resilience). In addition, SCE-OB3 promotes an approach to sustainable environmental growth in the Cornwall AONB using the principles of circular economies. SCE-OB4 promotes the use of farming through funding and DEFRAs Future Schemes. SCE-OB7 supports sustainable plastic free initiatives.

Health and well-being of people, including addressing health inequalities is a focus. Within this HWB-Ob6 addresses improvement of access to locally produced and affordable food.

Suggested project themes within the AONB Management Plan include improved condition and resilience of habitats, creation of new habitat for improved biodiversity, investment in natural capital and ecosystem services, data collection to inform county and national datasets, promote further understanding of invasive species, support productive regenerative farming, sequester carbon, promote better understanding among farmers about opportunities to deliver for carbon storage or reduced carbon emissions, connect people with the marine environment, increase opportunities for blue and green prescription within the AONB, raise awareness with seafaring communities on the impacts of marine activities on the environment, support educational opportunities within the AONB and develop farm clusters working together and sharing knowledge. The proposed seaweed farms, in combination with a network of local land-based farmers would offer an excellent project opportunity for the region.

There is scientific debate around the potential of seaweed and therefore seaweed farming to directly 'sequester' carbon, contributing to climate change mitigation. For example, Boyd et al. 2024. Conducting research and establishing tangible data is essential to fully understand carbon potential – it requires additional research and these farms can contribute positively to further understanding. However, what is evident and tangible is that use of seaweed-derived products can and does avoid or mitigate carbon emissions. Feed, bio-fertiliser and replacement materials for oil-based plastics are examples of indirect carbon offset. When assessing the carbon potential of seaweed farms, a full life cycle approach (LCA) is required.

4.3 A Nationally Protected Landscape (Management Plan 2022-27)

Areas of outstanding natural beauty (AONB) in Cornwall are housed under one umbrella designation, Cornwall National landscape which covers 96,403 Ha. This is divided into 12 separate local sections (Figure 1.0). 10 local sections are coastal, 1 is moorland and 1 is estuarine. The majority of the coastline in Cornwall is included in the Cornwall National Landscape designation. Each of the 12 areas are distinct with their own local pressures and strengths. Due to this, management strategies have been developed for each local area. This is with regards to policies and objectives but all align with the overarching strategy for Cornwall National Landscape.

A major development within the AONB is determined by its scale, location and type of development proposed. It differs from Town and Country Planning (England) Order 2015. It also includes the extent to which 'harm' can be mitigated and whether the benefits of the development outweigh negatives. Key indicators suggesting a development is likely to be major in its effect on the landscape quality are (a) detrimental visual impacts within the AONB or its setting, (b) location of the development erodes the special qualities and features of an area (landscape, biodiversity, tranquility), (c) the development type is not compatible with its surroundings and (d) the development conflicts with the economic and social needs of the local community and AONB's guiding principles of sustainable development.

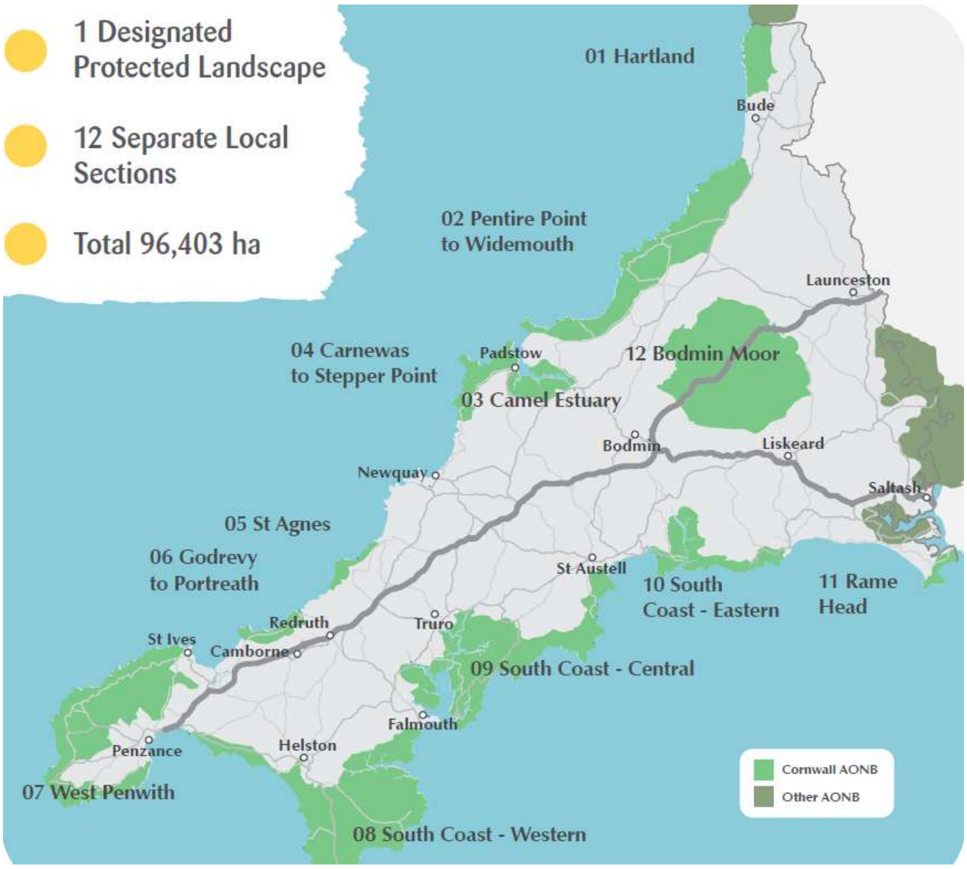


Figure 1.0: Cornwall National Landscape and 12 local sections (Source: CNPL Manual 2024)

4.4 Pentire Point To Widemouth Bay Cornwall National Landscape (02)

The proposed seaweed farms will be located outside of section 02 of the Cornwall National landscape. This stretches from Pentire Point to Widemouth Bay. It covers an area of 11,879 Ha (12.3% of the total AONB area). Port Quin Bay is located to the south within the designated landscape. Character areas within the area include Camel Estuary (CA34), Kellan Head to Millook Haven Coast (CA35), Delabole Plateau (CA36), Western Culm Plateau (CA37) and Bude Basin (CA38). Marine character areas covering the coast and adjacent waters are designated under MCA 44: Hartland Point to Port Isaac Bay and MCA 45: Port Gaverne Bay to St Ives Bay. The National Trust manages significant portions of the AONB. There are active quarrying operations within the AONB, controlled under the Review of Mineral Planning Permissions (example: slate quarrying).

Special qualities within Cornwall National Landscape (02) include: the landscape is described as craggy with dramatic contour cliffs and folded slates. Shales volcanic rocks and sandstone are features. Coastal features include rocky stacks, arches, headlands, caves and blowholes, interspersed with rocky coves and a few sandy beaches. Cliffs are around 70-80 m high at Pentire Point. Behind the coastline are valleys, streams and farmland with hedgerows (agricultural). Land use is mainly agriculture (grazing fields with larger fields behind Port Quin. Inland is arable and pasture land with coastal healthland dominating the cliffs. South and west of the AONB, there are not many settlements, with the exception of Port Isaac and Port Gaverne and Trebarwith. There is a notable lack of tree cover. Coves form protective areas for haul out of grey seals (refer to 'Marine Mammal Assessment May 2024'). Key species of interest for this section include puffins, guillemots and Razorbills (refer to chapter 8). Relevant policies and plans that apply to the AONB, specifically where proposed seaweed farms (aquaculture) are to be located, have been assessed separately (Chapters 1 and 15). The proposed development is outside of the Padstow Bay and Surrounds MCZ within the AONB (refer to Chapter 10). The SAC for porpoise has been considered (refer to Chapter 9). The proposed farms our outside of the IRZ for SSSI's within the AONB, although they have been assessed against the Pentire Peninsular SSSI (refer to Chapter 8).

Issues flagged with the AONB (landscape condition) include building materials used, Delabole wind farms outside of the AONB, unsympathetic restoration of quarries, roads, overhead wires, lack of broadleaf woodland management, Japanese knotwood, bracken encroachment, hedgerow and elm loss and traffic congestion.

In terms of social facts about the community network area (CNA), the most appropriate CNA is Wadebridge and Padstow. The multiple deprivation percentile in 2019 was 51.5% with the CNA covering 3% of Cornwall's population (20,614 people). 14.1% households are fuel poor. 3% of all claimants in Cornwall are claiming disability living allowance and 2% of all claimants in Cornwall are claiming free school meals. 11.2% of local children live in low-income families. Obesity, diabetes and chronic kidney disease are prominent health risk groups.

The policies and objectives that are applicable to this area are summarised within the CNPL Manual 2024. In terms of objectives, of relevance is PPW-P3 (Figure 2.0). Specifically, 'enhancement of the undeveloped character of the coast: for example, Witches Cauldron to Port

Quin Bay….to retain rugged and simple tranquility'. The visual impacts of the semi-submerged buoys for the proposed seaweed farms are assessed.

Policy	Detail	References to the main aims, policies & objectives
PPW-P3	Seek conservation and enhancement of the undeveloped character of the coast; for example, Witches Cauldron to Port Quin Bay, around High Cliff and around Dizzard in order to retain rugged and simple tranquillity and promote the enhancement of other parts of coast for example around Tintagel, Boscastle and Port Isaac such that they return to having a more undeveloped character.	LS-P1, LS-P2, LS-P3, LS-P4, LS-P6, LS-Ob1, LS-Ob2, LS-Ob3, LS-Ob4, LS-Ob6 NRLM-Ob1, NRLM-Ob3, NRLM-Ob5, NRLM-Ob9, NRLM-Ob11 CCBR-P1, CCBR-Ob4 HC-Ob1, HC-Ob4, HC-Ob11 RSA-P1, RSA-P3 HWB-Ob2, HWB-Ob5 SCE-P2, SCE-P3, SCE-P5, SCE-P6, SCE-Ob1, SCE-Ob4, SCE-Ob5 PD-P1, PD-P3, PD-P7, PD-P12, PD-P18

Figure 2.0: PPW-P3 for Pentire Point to Widemouth Bay (02) (Source: CNPL manual 2024).

5.0 Visual Impact Assessment

Biome and Camel Fish instructed an independent professional (Cornwall-based) to produce visual renders of both the proposed seaweed farms in Port Quin Bay. These were to aid with a visual impact assessment (VIA) for the proposed farms which are located within the seascape of the Cornwall AONB (National Landscape).

Front, side on and aerial renders have been produced for the farms in the day (calm sea) and at night (calm sea) have been generated. Information was provided relating to longline buoy size, colour, type and number, orientation and submersion. The same was provided for the navigational safety markers (a regulatory body requirement (Trinity House) for navigational safety around and within the farm). Plans were provided for the 288 longlines (arranged in rows with 20 m channels between and within the farm footprints of 100.8 Ha. The buoys and navigational safety marker are the only visible infrastructure at the sea surface (sea-level) during the day. At night the only visible structures are the lit navigational safety lights (8 total around the perimeter of both farms).

The farm longlines have been engineered to hold position based on 8 x uniform buoys per longline (refer to Chapter 5 and Appendix I). This reduces the buoy number for both proposed farm sites (100.8 Ha, 288 longlines) to **2,304** with both farms at full operational capacity. In their response to the MMO, the Cornwall National Landscape planning officer miscalculated the buoy number as 1,728 buoys per 50.4 Ha farm. The correct number presented here is a reduction of the reported planning officer's figures (1,152 less overall – a reduction of 33%). This will significantly reduce visual impact. The main buoys are grey (camouflage against the sea), are semi submerged, are horizontal in the water and streamlined in profile. The 8 x navigational markers are yellow as required by law.

Methodology: Assets were created in 3D and texturized. The farm was created using precise dimensions, GPS co-ordinates and accurate distances from cliffs (585 m for front renders and 560 m for side renders). Renders were created using the most visible spots for the proposed farms in the Bay. The landscape scale was modelled using Google Maps. The camera was set at head high (6ft) **on the edge of the cliff** so closer than the coastal path. Aerial views are from a drone perspective. A 50mm lens was used as this is an accurate representation of what the human eye will see. The zoom represents what will be seen at the exact distances from the cliffs to the start of the farms. Both are presented for comparison. The renders are as follows:

These renders are created with a 35 mm lens which is a wider field of vision compared to the human eye and therefore gives a wider field of view (Figures 3.0 to 4.0).

Figure 3.0: 35mm renders of proposed seaweed farms in Port Quin Bay (daytime and calm sea) from the cliff edge: side and front renders. Zoom level represents actual seen visual.

Figure 4.0: 35mm render of proposed seaweed farms in Port Quin Bay (night and calm sea) from

the cliff edge: aerial render at height. Zoom level represents actual seen visual.

These renders are created with a 50 mm lens which is comparable to a human field of vision and therefore gives a human field of view (Figures 5.0 to 7.0).

Figure 5.0: 50mm (human eye) render of proposed seaweed farms in Port Quin Bay (daytime and calm sea) from the cliff edge: side and front renders. Zoom level represents actual seen visual.

Figure 6.0: 50 mm (human eye) render of proposed seaweed farms in Port Quin Bay (night, clear night and calm sea): side and front renders. Zoom level represents actual seen visual.

Figure 7.0: 50 mm (human eye) render of proposed seaweed farms in Port Quin Bay (night): aerial render at height. Zoom level represents actual seen visual.

The VIA provides renders of the proposed farms in the most visible conditions. When the sea is active (energetic) or with cloud cover the farms will be less visible in both day and night periods. Both the day renders from different angles and the night renders from different angles at 35 and 50 mm demonstrate the following (for both day and night):

(a) The visual impact is low to moderate and will not distract from the rugged tranquillity of the seascape in Port Quin Bay and will not distract from being able to see starry skies at night (impact on a level comparable to lit vessels sheltering in the Bay overnight at the anchorage area provided within the Bay).
(b) The proposed farms will not significantly impact PPW-P3.
(c) The proposed visible farm infrastructure is compatible with its location in design (seascape).
(d) The proposed visible farm infrastructure is not a detrimental visual impact.
(e) The proposed visible farm infrastructure does not significantly erode the special qualities or features of the seascape within the designated AONB (landscape, biodiversity and tranquillity).

6.0 Operational Profile And Construction

Please refer to Chapter 4 and Chapter 10 for operational profile and noise impacts.

July and August are inactive farm months (minimal maintenance/monitoring only). This is during periods when recreational vessels will increase in number during school summer holidays as regional tourism increases. Therefore, the operational profile does not add significantly to summer activity in the Bay area.

In terms of the Cornwall AONB Management Plan policies and objectives, the majority of farming activities occur across late autumn/early winter and then spring. Once the farm infrastructure (eco-blocks) is deposited to full farm capacity for both proposed sites, this activity ceases for the life of the farm (besides repairs or maintenance). The most inactive period for seaweed farming is during the summer period which coincides with tourist peaks in the area (sea use and access to the coastal path).

In terms of access within the Bay, tourism businesses and tourists can still utilise the Bay across all seasons. Movement around the periphery of the farm is possible with a distance of over 700m between the proposed farms and Moul Island and 500-600m from the coastline. In addition, the farm infrastructure only takes up a total area of 10% across both farm sites. This occupies 10.08 Ha out of 100.8 ha and leaves 90.72 Ha of open sea within the proposed farms footprint at full operational capacity. Moving through the farm is also possible for vessels with low draft (ribs, leisure boats, paddle boards, kayaks etc.) due to the minimum 20 m wide open channels between longline rows. This has also been assessed with the RNLI (refer to Chapter 16, Appendix V).

The applicants have discussed the opportunities for local diving companies to utilise the farms for tourism opportunities (they submitted a letter of support) which connects people and nature and is a platform for education. The proposed farms support social, economic and environmental benefits within the Cornwall AONB, helping to connect people with nature and improve well-being.

The operational profile combined with good practice by the operators ensures assets within the AONB seascape are not damaged or harmed. This includes physical assets and biodiversity assets. Please refer to 'Marine Mammals Assessment May 2024', 'Birds Assessment June 2024' and HRA Assessments updated in June 2024 for the full, evidence-based assessments.

7.0 Farm Infrastructure

Please refer to Chapter 5 and Appendix I.

Materials are made of standard polypropylene (ropes), 100% recycled concrete (eco-blocks), marine grade steel (connectors for risers and eco-blocks) and plastic (buoys). All are stable in the marine environment and used as standard across a number of marine developments (mooring, harbours, aquaculture facilities, commercial fishing).

In terms of the Management Plan and policies/objectives for the Cornwall AONB, it has been established that the only visible part of the proposed seaweed farms within the seascape of the AONB are semi-submerged, grey camouflaged, horizontal buoys and the legally-required navigational safety markers (see section 5.0, this chapter). All the remaining infrastructure is below the sea surface and not visible. However, any development within the designated AONB or seascape of the AONB must not damage the designated features of the AONB (which for these purposes would include the Heritage coastline where it meets the sea, habitats below the sea or protected areas (SAC's, SSSI's or the MCZ). The engineered longlines that form the farm will be absolutely stable, as determined by independent marine engineers, across 50-year storm activity and the lifetime of the farm (Chapter 5 and Appendix I). Regular maintenance by the operators will further ensure this. Therefore, the farm infrastructure will not move and will not damage habitats or AONB assets by washing up. By not moving (remaining static and in place), the low visibility lines will not significantly disturb the tranquility of the Bay (see section 5.0, this chapter).

8.0 Biodiversity Net Gain

Please refer to Chapter 10, section 8.0. Of note is as follows:

Biome has farmed varying tonnages of seaweed across different sites from 2020 to 2024 which provides habitat for a range of species. In that period there has been frequent and intense storm action. There have been no significant losses of seaweed biomass and no incidences of significant amounts of farmed seaweed washing up in Bays or on shores. We maintain consistent growth along the seed lines. Sugar kelp, for example, remains connected to the seed lines in current speeds up to 1.5m/s (CEFAS data). Maximal current speeds at the proposed site across 50 years, as reported by Arc Marine are 1.0m/s. This is well within growth parameters and tensile strength of the holdfasts on the seed lines.

Any natural seaweed drop-off tends to get dispersed (particularly in energetic waters such as Port Quin Bay) or can provide a food source for fish and shellfish. This is supported by scientific, independent research into organic enrichment below seaweed farms which is in publication.

Corrigan et al. summarised the study as follows:

*'Here we add to the existing evidence base for SW England, reporting on a time series of surveys in St Austell Bay examining effects on macrobenthic community structure and sediment composition by the addition of cultivated sugar kelp (Saccharina latissima) to a pre-existing shellfish farm (*Biome notes this is a 100 Ha site*). No effect on sediment composition or macrofaunal abundance, biomass, diversity or assemblage composition was detected. There was no significant difference in total macrofaunal abundance between blue mussel (Mytilus edulis), European lobster (Homarus gammarus) or S. latissima culture areas. However, the aquaculture areas consistently hosted higher abundances of macrofauna compared with reference areas outside the farm over time. Macrofaunal diversity was not significantly different between lobster, seaweed and the reference areas, but was significantly lower in mussel culture areas. Patterns in macrofaunal abundance and diversity corresponded with spatial variations in benthic substrate and sediment composition over the 70 Ha farm site. However, sediment composition did not differ within each treatment area over time. Overall, this study indicates that suspended seaweed farms likely have minimal impacts on benthic habitats, particularly in relatively dynamic and open coastal environments.'*

Based on all the academic evidence reported here and within Chapter 10, section 8, it is highly likely that the proposed seaweed farms (100.8 Ha) will contribute positively to fisheries and biodiversity in the Port Quin Bay area which may positively overspill into the MCZ.

In terms of the AONB, the proposed seaweed farms will facilitate the AONB policies and objectives and enhance the marine environment for future generations. This relates to the evidence for increased benthic biodiversity, biodiversity net gain, biodiversity protection, nature recovery, healthy ecosystems and habitat restoration or provisioning. It includes commercially valuable species and benthic communities. Seaweed farming is regenerative. The farms will act as *defacto* MPA's in Port Quin Bay. These benefits should be considered alongside assessments conducted within Chapters 7 and 8 for marine mammals and birds. Based on evidence and independent expertise, impacts were assessed as non-significant.

In addition, seaweed farms have the potential to provide ecosystem services in the form of bioremediation (improving water quality through nutrient removal (N,P,K), which prevents harmful algal blooms or bacteria outbreaks). This could be significant related to recently reported untreated sewage out-spills in the North Cornwall region, resultant water quality, tourism impacts and human health.

9.0 Cornwall AONB And The South West Marine Spatial Plan

This section should be read in conjunction with Chapter 1.

Port Quin Bay covers an area approximately between 5.54 and 5.16 km^2. The proposed seaweed farms cumulatively occupy 1 km^2 of the nearshore centre of the Bay. This represents between 18-19.37% of the Bay area total. And is below the 32% level of coverage which could restrict essential habitat use for certain marine mammals (Ribeiro et al. 2007). In addition, open sea channels between longlines mean the cumulative infrastructure occupies a total of 10% of the 1 km^2 (0.1 km^2 ad 1.8-1.9% of the Bay area total).

Port Quin was selected as a site for a range of key reasons which are covered across the various chapters within this chapter. This included (but is not limited to) proximity of natural kelp ecosystems, depths, currents, allocation as a strategic area for aquaculture by the MMO, land-based infrastructure to support farming (harbours) and levels of fishing in the Bay and agreement by fishers the farms will not negatively impact current fishing levels (refer to Appendix VIII). A very important factor in selecting the site was sediment type within the Bay. Coarse sediment is not a supporting habitat for marine mammals or birds in terms of prey (see Chapters 7 and 8).

There has been discussion around the suitability of Port Quin Bay for farming seaweed. This was partially based on MMO spatial maps that indicate broadly areas suitable for seaweed farming. The area in question has been allocated by the MMO as a strategic site for aquaculture. Suitability for seaweed farming is explored in depth in Chapter 1, with evidence and expert conclusions it is suitable.

Taking all this into consideration, the South West Marine Spatial Plan and associated marine spatial maps need to be considered in the context of the Cornwall National landscape and designated AONBs, specifically from Pentire Point to Widemouth Bay (02). Cornwall has a high percentage of its land-based coastline protected under the Cornwall National Landscape and 12 integral AONB designated areas (Figure 2.0). However, based on data supplied by CEFAS and refined data after the MMO applied their own filters, the MMO interactive South West inshore marine spatial maps (June 2021) for strategic places identified for aquaculture are clear. Figure 8.0 illustrates the MMO South West marine maps for strategic aquaculture around the whole Cornwall coast. Specifically, an MMO strategic place for aquaculture is identified for Port Quin Bay (Figure 9.0).

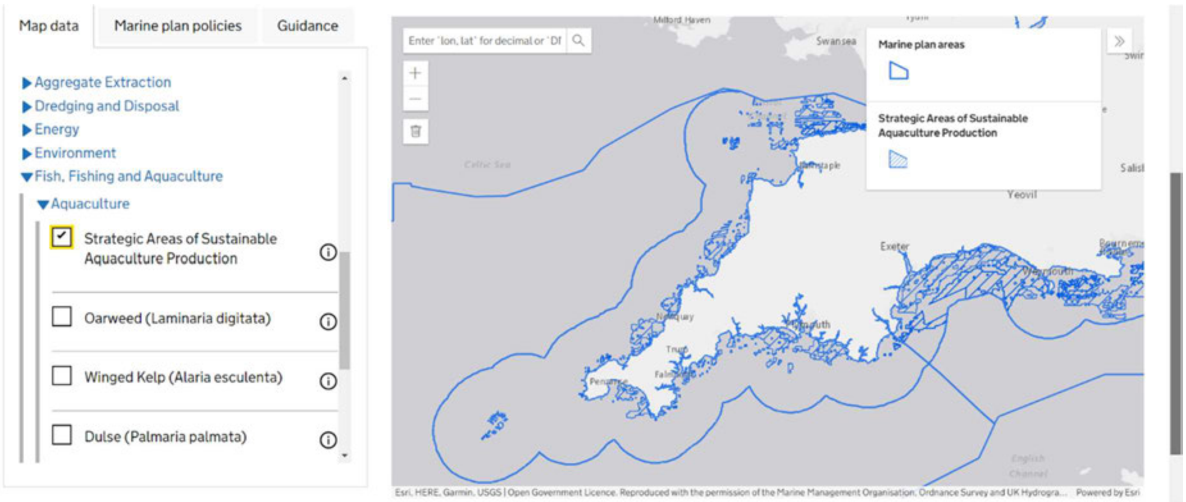


Figure 8.0: MMO interactive tool for South West Marine Spatial Plans, indicating areas for strategic locations for marine aquaculture (accessed June 2024).

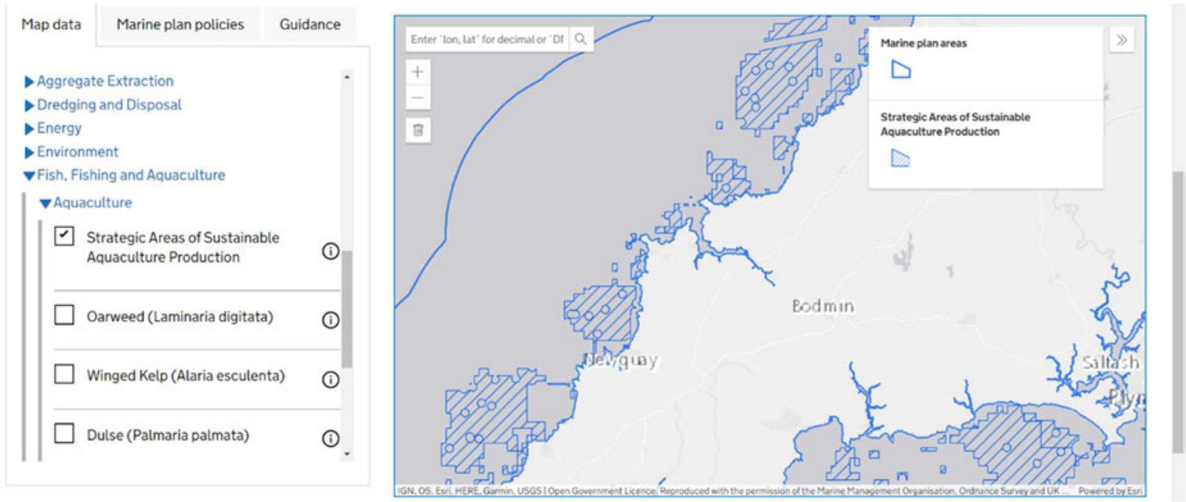


Figure 9.0: MMO interactive tool for South West Marine Spatial Plans, indicating an area for strategic location of marine aquaculture in Port Quin Bay (accessed June 2024).

Notable is that the majority of areas identified by the MMO as areas for strategic marine aquaculture are located within the seascape of the Cornwall national Landscape and integral AONB's (Figure 9.0). It is also notable that Port Quin Bay is identified as an area identified for strategic marine aquaculture (Figure 9.0).

Aquaculture developments within the seascape of designated AONB's should be supported, provided that they align with the policies and objectives of the Cornwall National landscape management plans (2022-27), including specific policies and objectives for the specific designated AONB area in question.

10.0 Conclusions

The overall assessment demonstrates several important points that allow the proposed seaweed farms to be located within Port Quin Bay, within the seascape of an AONB designated within the Cornwall National Landscape. There is alignment with the policies and objectives of the Cornwall National Landscape and the specific policies and objectives of the Pentire Point to Widemouth Bay AONB (02).

(a) The proposed seaweed farms are not a major development

- There are no detrimental visual impacts within the AONB or its setting (low to moderate)
- Location of the development does not significantly erode the special qualities and features of an area (landscape, biodiversity, tranquillity)
- The development type is compatible with its surroundings and
- The development does not significantly conflict with the economic and social needs of the local community and AONB's guiding principles of sustainable development (see chapter 15).

(b) Specific to the Pentire Point to Widemouth Bay AONB, the cumulative farm proposals do not significantly impact policy PPW-P3.

(c) The proposed farms align with a large number of the Cornwall AONB policies and objectives.

(d) Any potential negatives of the development are mitigated and the potential benefits of the proposed seaweed farms outweigh the mitigated negatives.

(e) The selected site is an MMO strategic area for aquaculture in line with the South West Inshore Marine Spatial Plan and it is suitable for farming seaweed.

Annex 1: Letters Of Support

Application number MLA/2023/00307 & MLA/2023/00308

To whom it may concern,

As a lifelong Padstow Fisherman I would like to show my support for the proposed Seaweed Farm in Port Quin Bay.

I have been fishing for 50 years and have skippered several of my own boats during this time and have fished right around Britain.

Port Quin Bay used to be a prolific ground for trawling for flat fish and semi demersal fish, but over recent years has diminished to almost zero, I have in fact been there recently and have not had a single fish to put on a plate.

It is truly my belief that a seaweed farm will encourage many species of fish back onto the ground.

I have spoken to divers who have dived on farms and can confirm this. Port Quin Seaweed Farm will not affect me at all, and my only hope is that as a lifelong commercial fisherman it will help replenish fish stocks in that area. I must add that I was consulted by Camel Fish about the proposal some time ago.

Yours sincerely

David Evans.

Application number MLA/2023/00307 & MLA/2023/00308

Good morning,

I am from Porthilly Shellfish, as you may or may not know we have been in the aquaculture business for the last 40 years in your area. I note you are applying for a seaweed farm, what a great idea.

We feel our shellfish farm has produced a huge amount of environmentally sound product over the last 4 decades without any impact on the area, infact it has been a bit of a focal point for the tourist industry that we all rely on so heavily and has provided 4 non seasonal jobs. I am sure the seaweed farm will be the same providing chemical free fertilisers, animal feed and who knows what other extracts in the future.

We also found our farm had a positive effect on the local wildlife, birds fish and mammals. Offshore mussel farms are basically artificial reefs, so a seaweed farm is bound to be the same.

The benefits of such a low impact farming system are both exciting and interesting. I wish you luck in your coming venture and if I can be of any help please give me a call.

Kind Regards

Tim Marshall
Porthilly Shellfish

[redacted]

To Whom It May Concern

We are writing in support of the application by Camel Fish MLA/2023/00307 & Biome Algae MLA/2023/00308 to establish a seaweed farm off the North Cornish coast between Pentire and Port Quin.

As we seek to mitigate climate change it is important that we support the growth of emerging industries such as seaweed farming which can have a positive and significant impact in carbon sequestration (capture) and, where well managed, a positive environmental impact. Seaweed works as a water purifier through its capture of carbon, nitrogen & phosphorus. As such it is a valuable tool in fighting climate change.

Harvested & processed seaweed can be turned into bio-plastic packaging displacing harmful plastic products. Its inclusion in ruminant diets can significantly reduce methane emissions, and its use on farmland can displace artificial petrochemical-based fertilisers. Given the importance of the dairy farming sector in the area this is significant. Seaweed can also be used in human health supplements and food. As we increasingly recognise the climate crisis we are facing we should be encouraging this dynamic industry.

With good management and sustainable harvesting methods as proposed by this application seaweed farms become artificial reefs that provide habitat, shelter and food for many different sea creatures including commercial fish. Impact monitoring and working towards ASC-MSC Seaweed Standard Certification as this project plans to do, environmental risks can be are avoided.

Camel Fish is a well-established, well respected local family business who employ a number of local people with a range of skills sets. They are seeking to diversify and expand that business to ensure it continues to be a significant year-round employer into the future thus adding to the alternative options to seasonal hospitality-based rjobs. Camel Fish aim to process the seaweed at their facilities near Rock although this may not be fully operational in the first year. They have followed all the correct marine planning procedures in applying to the Marine Management Organization (MMO) and have undertaking extensive research in choice of site to avoid any negative impact on important fishing grounds. This application should be supported.

Berlewen Fishing and Leisure ltd

[redacted]

Padstow fisherman and Jubilee Queen tripping vessel

Regarding - Seaweed Application MLA/2023/00307 & MLA/2023/00308

To whom it may concern,

My name is Nick chapman a local resident in Padstow who owns a under 10 meter fishing vessel and a 80ft tripping boat who uses the bay up to 3 time a day on my tripping route.

As someone who has used the bay for work and pleasure over 40 years I cannot see the seaweed farm impeding me in either pursuit in anyway.

Port Quin Bay from a fisherman's point of view is basically a desert, when a feature is placed in it it will give an environment for animals and in turn attract bigger fish to the same area.

It is a well-known fact that seals love to hunt and play in kelp forests and with bigger fish attracted this will provide them with a food resource. The little fish will also provide food for all of the bird life locally.

As for the argument about light pollution static gear is legally required to be marked by a flashing light. My fishing vessel is looking into the possibility of a cuttle fish fishery and should we do that by 350 cuttlefish pots will all be marked with flashing lights.

As far as I am aware when you move into a new area and a house the one thing you can not buy is a view and despite the amount of NIMBYISM being expressed by recent incomers they are not allowed to impede someone from making a living in a perfectly normal and reasonable way.

Kind Regards

N P Champan

Director

Chapter 15: Economic Assessment

Preface

The following assessment is in response to a FIR from the MMO. The assessment refers to both Biome Algae and Camel Fish's licence applications, as referenced above. This chapter supports Chapter 14 – the National Landscape Assessment.

The assessment has been conducted with input from Cornwall Plan Recovery, Neighbourhood Plans, Community Level Up Programs, the Cornwall Good Growth Plan, prominent research groups (Cornwall), and the Cornwall Census. This represents a wide range of experts and sources, published data, and certified experts in the field of economics.

1.0 Objectives

Cornwall's economy has long been closely tied to its natural environment, including its coastline, countryside, and natural resources. Climate change poses risks such as sea-level rise, extreme weather events, and impacts on agriculture and fisheries.

Traditionally reliant on tourism, the economy is undergoing a significant transformation and is embracing green technology and sustainable industries in the face of climate change to ensure the long-term viability of Cornwall's economy. There are few regions with the potential to realise so many opportunities and provide the solutions to unlock net zero and attract ESG-orientated businesses and investment.

Cornwall's unique geographic advantages, rich natural resources, and strategic positioning provide a strong foundation for attracting investment in green technology and new global industries. By leveraging these assets, Cornwall can play a crucial role in the UK's efforts to mitigate climate change, enhance environmental sustainability, and drive economic growth. Through innovation, UK government policy support on reducing carbon emissions and promoting green industries, local government initiatives, and community engagement, Cornwall can transition to a resilient and diversified green economy.

The region also benefits from renowned research capabilities at the Universities of Plymouth and Exeter and possesses strong research capabilities in marine science, environmental technology, and aquaculture expertise.

In summary, Biome Algae and Camel Fish want to support Cornwall in transitioning from a tourism-driven economy to a hub for green technology and sustainable industries. This shift is already being supported by innovative agricultural practices and advancements in renewable energy. These combined efforts have the potential to position Cornwall as a leader in the UK's green revolution. Cornwall has a unique geographic advantage whereby it can leverage its natural resources and coastline making it an ideal location for establishing seaweed farms as documented by the MMO. This would not only significantly support the UK's efforts to mitigate climate change but would also create new, high-quality jobs that offer progression in coastal communities, (from cultivation and harvesting to processing and distribution), help diversify the local economy, and reduce dependence on traditional sectors such as tourism and fishing, and make the region more resilient to economic fluctuations.

2.0 The Case For Seaweed Farming In Cornwall

Seaweed farming presents a significant opportunity for Cornwall and offers a multitude of benefits, from environmental sustainability and economic diversification to enhanced food security and agricultural productivity. By capitalizing on its natural advantages and fostering innovation, Cornwall can establish itself as a leader in the emerging blue economy, contributing to regional growth and global sustainability efforts. Leveraging the coastline for seaweed farming can contribute to carbon sequestration, improve marine water quality, and produce sustainable products for food, feed, and biofuels. Cornwall has the opportunity to position itself as a leader in the blue economy, attracting research, innovation, and investment.

Seaweed farming aligns well with the objectives of notably the Community Levelling Up Program in Cornwall as well as the Cornwall Plan 2020 to 2050. It offers economic diversification, environmental benefits, and community engagement, making it a strategic initiative for sustainable development. By fostering this industry, Cornwall can leverage its natural resources and geographic advantages to support economic resilience, environmental sustainability, and community well-being.

The Cornwall and Isles of Scilly Good Growth Programme and the Cornwall Levelling Up Programme work together to support the development of Cornwall and the Isles of Scilly by creating opportunities for businesses and communities, and providing access to training and jobs:

- Good Growth Program:

  This program is funded by the UK Shared Prosperity Fund and Rural Prosperity Fund, and managed by Cornwall Council. The program's goal is to create a sustainable and dynamic future for Cornwall and the Isles of Scilly. The program's principles include clean and inclusive economic growth, and it supports projects that cut carbon dioxide emissions, ensure fair wages, and foster environmental growth. Some of the projects funded by the Good Growth Program include STRIDE, Made Smarter Cornwall, and Agri-Carbon Kernow.

- Cornwall Levelling Up Program:
  This program supports community-level investment plans for Good Growth across Cornwall and the Isles of Scilly. The program's primary goals are to level up communities, tackle deprivation, and put communities at the heart of delivery. One example of a project funded by the Cornwall Levelling Up Program is the Big Newquay monthly street market initiative.

3.0 The Cornwall Good Growth Plan (2024-2035)

The Cornwall Good Growth Plan (2024-2035), issued recently in 2024, sets out a comprehensive framework for inclusive and sustainable economic growth in Cornwall and the Isles of Scilly. It has been designed to foster sustainable, inclusive economic growth in Cornwall, addressing key local challenges such as housing shortages, aging demographics, and the need for environmental resilience.

It emphasizes a carbon neutral economy, improving social equity and long-term resilience. Strategic investment into these areas will boost productivity and job quality, whilst strengthening Cornwall's reputation for sustainability across clean energy, tourism, agriculture, innovation and the creative economy. This is central to the region's economy, identity and future prosperity. Both applicant's intention is to support these core principles. The plan supports the UK's broader economic and environmental goals with which Biome Algae is fully aligned and Camel Fish wishes to adopt.

3.1 Key Core Sectors

3.1.1. Visitor Economy

Tourism plays a crucial role, but this year, the county has experienced an unexpected lull in tourism which visit Cornwall's chairman Malcolm Bell has attributed to the soaring cost of living and cooler weather. There are still numerous reasons to visit Cornwall and even those who have had to tighten their budgets can still enjoy the county affordably. The plan aims to shift toward low-carbon, sustainable tourism that operates year-round which could provide high-quality, regenerative experiences for both tourists and residents, reducing the industry's reliance on such seasonal business all which Biome Algae and a solid aquaculture business can support:

- Offering unique, eco-friendly experiences that align with the region's focus on sustainable tourism such as guided tours where visitors learn about sustainable seaweed cultivation, marine ecosystems, and the environmental benefits of seaweed;
- Workshops and cooking classes; local culinary tourism; partnering with local restaurants and food markets to incorporate seaweed into dishes, seaweed farms could boost the region's reputation for innovative, sustainable cuisine;
- Health and Wellness Tourism; Seaweed is often used in health and beauty treatments due to its beneficial properties. Collaborations with spas and wellness centres could attract visitors seeking organic, nature-based treatments, like seaweed baths or seaweed-based skincare.

- Marine and Environmental Tourism; Seaweed farms can tie into broader marine conservation tourism, offering visitors the chance to support environmental projects, learn about marine life, and participate in restoration efforts, which could appeal to eco-minded travellers.
- Cultural and Heritage Tourism: Highlighting Cornwall's long history of seaweed harvesting and its connection to local traditions could attract visitors interested in the region's coastal heritage.

By integrating seaweed farming into Cornwall's tourism offerings, the region can attract eco-conscious, health-focused, and culinary tourists, enhancing the visitor economy while supporting sustainable practices.

3.1.2. Agri-Food And Fishing

Cornwall is set to become a leader in sustainable agriculture, particularly in livestock production (dairy and beef), fresh produce, and biomethane energy. The focus is on rural decarbonization by reducing emissions, improving local supply chains, and enhancing food processing. Seaweed is strongly placed to support this both in animal feed and being scientifically proven to reduce methane emissions in livestock. Promoting sustainable agriculture and local food production is essential to the success of Cornwall's economy. Moreover, Camel Fish have fished in the County for decades and in the face of challenges within the industry, are looking for a sustainable alternative to enable diversification and inter-generational longevity.

3.1.3. Creative And Cultural Sector

The creative sector in Cornwall thrives in digital media, arts, music, and design. The plan envisions expanding this sector to position Cornwall as the UK's top rural creative economy, with a focus on innovation and sustainability in cultural industries. Biome Algae is well placed to support this by way of educational initiatives both rurally, in education via schools, extracurricular activities, and leisure.

3.2 Vision For 2035

Cornwall aims to:

- Be a leader in renewable energy, critical minerals and space industries
- improve living standards, housing, and employment opportunities.
- play a pivotal role in the UK's clean energy transition and broader economic growth, with a focus on creating a resilient, inclusive, and sustainable economy.

All these aims align with the vision and values of Camel Fish and Biome Algae who, respectively, wish to continue to contribute to the local economy and support the county which first supported Biome Algae thanks to Marine-I and an EU grant.

For this to be achieved, the Cornwall Good Growth Plan outlines several essential conditions for growth to build a sustainable, inclusive economy. These conditions focus on utilising Cornwall's natural resources, strengthening partnerships, improving infrastructure, and advancing environmental goals all which Camel Fish and Biome Algae are positioned to support.

3.3 Key Conditions For Growth

1.Physical Assets: Leverage Cornwall's coastal and geothermal resources, and fertile agricultural land to support marine sector growth, sustainable energy production, and food production.

2. Business Support: Streamlined support systems like the CIoS Growth and People Hubs facilitate business development, while strong partnerships enable collaboration across sectors.

3. Educational Institutions: Anchor institutions such as the University of Exeter and University of Plymouth provide crucial research and skills development to drive innovation.

4. Infrastructure: Investment in housing, like the Langarth Garden Village, and transportation projects, such as the Mid-Cornwall Metro, are pivotal for growth.

5. Net-Zero Transition: Cornwall's renewable energy resources are central to achieving carbon neutrality, supported by initiatives like the Cornwall Net Zero Methane Hub.

6. Digital Connectivity: Enhancing digital infrastructure allows for global competitiveness and innovation in the local economy.

These conditions set the foundation for inclusive, environmentally sustainable economic growth in Cornwall.

3.4 Meeting Challenges

Cornwall's demographic challenges, including an aging population, low productivity, and high housing costs, are addressed through sector diversification, workforce upskilling, and creating higher-paid jobs.

Investment Priorities: The plan calls for investments in infrastructure, skills, and sectoral growth, emphasizing the importance of attracting private investment, securing government funding, and fostering regional partnerships.

proposed farms in Port Quin Bay operated by Camel Fish and Biome Algae will provide local employment and much needed diversification opportunities, local business support and help develop an innovative economy opportunity that supports sustainable development while improving social equity and economic resilience.

4.0 Cornwall Levelling Up Programme – Cornwall Council

Firstly, the Community Levelling Up Programme (CLUP) highlights several reasons why seaweed farming would be a strategically beneficial initiative for the region;

4.1 Economic Diversification And Job Creation

- New Industry Development; seaweed farming introduces a new sector to Cornwall's economy, reducing reliance on traditional industries like tourism and fishing. This diversification helps build economic resilience against sector-specific downturns.
- Job Opportunities; the establishment and expansion of seaweed farms create jobs at various levels, from cultivation and harvesting to processing and distribution, contributing to local employment.

- Local Economic Boost; seaweed can be processed into various high-value products such as food additives, fertilizers, biofuels, and cosmetics. This not only boosts the local economy but also attracts related businesses and investments.

4.2 Environmental Sustainability

- Carbon Sequestration; seaweed absorbs CO2, playing a significant role in carbon capture and contributing to the UK's climate change mitigation goals. Large-scale farming could significantly offset regional carbon emissions.
- Marine Ecosystem and Ocean Health; seaweed farming improves water quality by absorbing excess nutrients, reducing the impact of agricultural runoff, and preventing eutrophication.
- Biodiversity Enhancement; seaweed farms provide habitats for various marine species, enhancing local marine biodiversity and ecosystem resilience.

4.3 Social And Community Benefits

- Community Involvement; the CLUP emphasizes community involvement in project planning and implementation. Seaweed farming initiatives can engage local communities, fostering a sense of ownership and participation in sustainable development.
- Educational Opportunities; seaweed farming projects can be integrated with educational programs, providing learning opportunities about sustainable practices and marine biology for schools and community groups.

4.4 Food Security

Local Food Production; seaweed is a nutritious food source rich in vitamins, minerals, and proteins. Promoting seaweed farming can enhance local food security and provide healthy dietary options for not only the community but as animal feed promoting animal health.

4.5 Strategic Alignment And Investment Attraction

- Alignment with Regional Goals; seaweed farming aligns with the principles of Good Growth promoted by the CLUP, focusing on sustainable and inclusive economic development that benefits all community members.
- Environmental Goals; the initiative supports Cornwall's broader environmental sustainability goals, including reducing carbon footprints and promoting biodiversity.
- Green Technology Investment; seaweed farming can attract investments in green technology and sustainable practices, positioning Cornwall as a leader in the blue economy and renewable resources.
- Research and Innovation; the presence of renowned research institutions in Cornwall can foster innovation in seaweed farming techniques, product development, and environmental benefits, attracting further research funding and partnerships.

Seaweed farming aligns well with the objectives of the Community Levelling Up Programme in Cornwall. It offers economic diversification, environmental benefits, and community engagement, making it a strategic initiative for sustainable development. By fostering this industry, Cornwall can leverage its natural resources and geographic advantages to support economic resilience, environmental sustainability, and community well-being.

It is worth noting that aquaculture and indeed the establishment of new green industries are needed in Cornwall for several critical reasons and will help to address both socio-economic and infrastructural challenges as referred to in the Cornwall Levelling Up Program, (CLUP), issues that include:

- Deprivation; certain areas in Cornwall experience significant levels of deprivation, impacting the quality of life and economic opportunities for residents. The CLUP aims to tackle these disparities by funding projects that directly benefit the most deprived communities.
- Economic Inequality; there are notable income disparities within Cornwall, with some areas suffering from lower average incomes and higher unemployment rates. The program seeks to create jobs and boost local economies through targeted investments.

- Community Empowerment; the program emphasizes putting communities at the heart of the delivery process. By involving local groups and residents in decision-making, the CLUP fosters a sense of ownership and empowerment, which is crucial for sustainable development.
- Infrastructure and Development Needs; many public spaces and facilities in Cornwall are in need of renovation or improvement. The CLUP provides funding to refurbish, repurpose, and create new community buildings and public spaces, enhancing the living environment for residents.
- Economic Regeneration; by investing in high streets, neighbourhood infrastructure, and economic regeneration projects, the program aims to increase economic activity and resilience. This is vital for revitalizing local economies and attracting further investment.
- Environmental Sustainability; projects funded by the CLUP often include elements that promote environmental sustainability, such as improving accessibility and resilience to natural hazards. This aligns with broader goals of reducing carbon footprints and enhancing sustainability.

4.6 Alignment With Broader Goals

- Good Growth Principles; the CLUP aligns with the principles of "Good Growth," which focus on sustainable and inclusive development. This includes creating economic opportunities that do not compromise environmental health and social equity.
- Strategic Priorities; the program supports the delivery of strategic priorities outlined in local plans and frameworks, ensuring that investments are aligned with broader regional goals for development and growth.
- Funding and Support; by providing initial funding and support, the CLUP helps leverage additional resources from other public and private sector investments. This multiplies the impact of the program and facilitates larger-scale development projects.

The Community Levelling Up Programme is essential for addressing the socio-economic and infrastructural challenges facing Cornwall. By focusing on deprivation, economic inequality, and community empowerment, and by improving public spaces and supporting sustainable development, the CLUP plays a crucial role in levelling up communities and fostering inclusive growth throughout the region, all of which Biome Algae is committed to supporting.

5.0 The Cornwall Plan 2020 To 2050 – Cornwall Council

The Cornwall Plan Annual Review 2023 highlights the region's commitment to a sustainable and inclusive future, while also acknowledging the challenges and areas needing further development and support. It is our intention to support these areas.

5.1 Aims Of The Cornwall Plan

1. Creative, Net-Zero Economy
2. Sustainable Food, Land, and Seas
3. Thriving Places with Decent, Affordable Homes
4. Equality, Education, and Entrepreneurship
5. Safe, Healthy, Resilient Communities
6. A Digital Revolution for Sustainable Living.

5.2 Progress And Challenges – Current Situation

- Creative, Net-Zero Economy; significant progress has been made in this area with various initiatives supporting sustainable economic growth.
- Sustainable Food, Land, and Seas; despite successes like new sustainable growing schemes and a robust sustainable food map, this area remains a challenge with several targets off-track.
- Affordable Housing; the target for affordable housing was exceeded, but homelessness remains a critical issue.
- Connectivity; there have been improvements in digital and transport infrastructure, including the rollout of superfast broadband and successful transport schemes.

The data from the Cornwall Plan has been visualised using a model based on Kate Raworth's

Doughnut Economics. The 2023 review indicates that out of 19 measurable elements, 5 are significantly off-target, 10 are slightly off-target, and only 4 are on or above target. Refer to Figure 1.

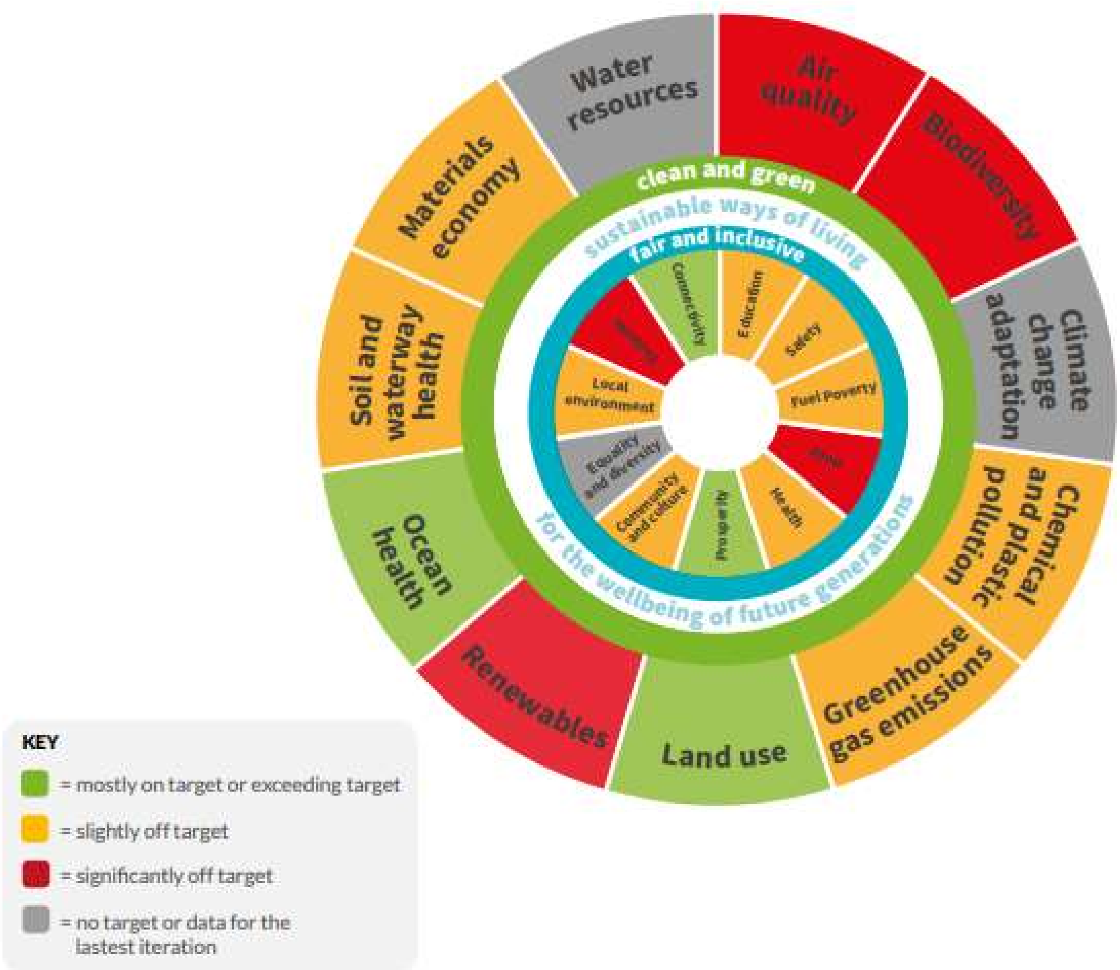


Figure 1.0 The Cornwall Plan 2023 Environmental Targets and Target Status. Source: The Cornwall Plan 2023.

5.3 Strategic Initiatives

- Nature Recovery Strategy; a strategy is being developed to tackle the ecological emergency and enable the recovery of nature, involving mapping valuable areas for wildlife and identifying opportunities for improvement.

- Cost-of-Living Initiatives; the strategic group addressing the cost-of-living crisis has made progress, with ongoing support and prevention work becoming part of the regular business framework.
- Digital Inclusion; efforts continue to enhance digital infrastructure and include a data-led approach to financial hardship prevention.

5.4 Future Actions

- Strategic Convenors; newly appointed convenors will coordinate collective efforts to drive positive change and ensure the Cornwall Plan's aims are met.
- Pledge for Nature; various organisations and individuals across Cornwall have pledged to protect the natural environment, with ongoing efforts to encourage more participation.

We believe the Cornwall Plan 2020 to 2050, supports seaweed farming through its broader goals and strategic priorities focused on sustainability, economic diversification, and environmental resilience. The plan aligns with and supports the development of seaweed farming in Cornwall through the following initiatives:

- Economic Diversification and Growth; the plan emphasizes the need for a diversified and resilient economy that reduces dependence on traditional sectors like tourism and agriculture. Seaweed farming introduces a new, sustainable industry that can contribute to this economic diversification.
- Innovation and Investment; by fostering innovation in new industries, the Cornwall Plan supports the development of seaweed farming as a high-value sector that attracts investment and drives local economic growth.
- Environmental Sustainability; the plan outlines ambitious goals for reducing carbon emissions and promoting green technologies. Seaweed farming plays a role in carbon sequestration and the production of renewable resources, aligning with the plan's climate action objectives.

- Marine Conservation; the focus on protecting and enhancing Cornwall's natural environment includes marine ecosystems. Seaweed farming can contribute to marine conservation by improving water quality and providing habitats for marine life.
- Community and Social Benefits; the plan prioritizes community-led development and local engagement. Seaweed farming initiatives can involve local communities, providing education and employment opportunities while fostering a sense of ownership and participation in sustainable practices.
- Health and Well-being; by promoting local food production and sustainable agriculture, the plan supports initiatives like seaweed farming that can improve food security and provide nutritious food sources for the community.
- Strategic Alignment and Support; the Cornwall Plan's commitment to sustainable development includes supporting industries that enhance environmental resilience and economic stability. Seaweed farming, as a sustainable and innovative industry, aligns well with these strategic priorities.
- Policy and Funding; the plan can facilitate policy support and access to funding for seaweed farming projects, encouraging the growth of this sector through incentives, grants, and infrastructure development.

The Cornwall Plan 2020 to 2050 provides a supportive framework for seaweed farming through its emphasis on economic diversification, environmental sustainability, community engagement, and strategic development. By aligning with these goals, seaweed farming can contribute to a resilient and sustainable future for Cornwall.

The Cornwall Plan Annual Review 2023 provides a comprehensive overview of the Cornwall and Isles of Scilly (CIoS) Leadership Board's vision and progress towards a greener, cleaner, and more inclusive Cornwall all of which align with the values and objectives of Biome and Camel Fish.

6.0 Padstow

Seaweed farming in Cornwall, or any coastal region, can offer many economic benefits. With the location of the seaweed farm at Port Quin, Padstow would benefit from the creation of a range of employment opportunities thereby boosting the local economy.

To compile the report, it was essential to examine the "Padstow Economic Profile" which provides an overview of the economic and social conditions as of September 2021 along with the Padstow Neighbourhood Plan 2018-2030.

The Padstow Parish Neighbourhood Plan 2018- 2030 outlines the vision and aspirations of the communities for the development of their neighbourhood. The plan is a community-led framework for guiding the future development, regeneration, and conservation of the Padstow area. It allowed residents to have a say in the development of their community by outlining policies and proposals for land use, housing, transportation, and other key aspects for the area's development.

The Parish of Padstow presents a unique set of challenges. Biome and Camel Fish have taken time and careful consideration to align our future operations to support a sustainable future for the Padstow area. We hope to be able to support and safeguard everything important to the area of Padstow whilst responding to the current needs of the community such as job creation and so helping to address the affordability crisis.

The economy of Padstow is primarily driven by tourism, particularly its renowned restaurant trade which has gained national fame. The natural setting of Padstow attracts a significant number of visitors each year, with over 150,000 staying in the town annually and over 500,000-day visitors. Fishing also plays a significant role in the local economy by supplying restaurants, providing year-round employment for locals, and serving as a tourist attraction.

While tourism has brought benefits to Padstow, it has also presented challenges. These include a continuous growth in holiday lets and second homes, leading to a reduction in permanent housing. The plan suggests that a majority of those who partook in responding to the survey based on which the plan has been compiled are cautious about encouraging more tourism development, emphasising the need to ensure that any future proposals will be beneficial to the community without harming the environment or the area's character.

Local enterprises, initiatives, and the town's natural resources have helped establish Padstow as a prime tourist destination in Cornwall, attracting both visitors and businesses. Despite its economic success and popularity, there are ongoing efforts to balance economic growth with the well-being of the neighbourhood area and to address challenges such as sustainable tourism development and economic diversification.

Based on the Padstow Neighbourhood Plan, some of the economic challenges highlighted include:

- **Seasonal and Part-time Jobs:** Many jobs in Padstow are seasonal or part-time, especially in the tourism and service sectors. This leads to a lack of stable, full-time employment opportunities.
- **Low Wages:** A significant portion of the jobs available are not highly paid, which can contribute to financial challenges for local residents.
- **Tourism Dependency:** The local economy heavily relies on tourism, which can be both a strength and a challenge. Over-reliance on tourism may lead to issues such as congestion, limited parking, and seasonal fluctuations in economic activity.
- **Limited Economic Diversification:** There is a need to diversify the local economy beyond tourism to create higher-paying and more stable job opportunities. This could involve attracting hi-tech industries, promoting apprenticeships, and encouraging economic development that benefits the well-being of the area without harming the environment.
- **Affordable Housing:** The lack of affordable housing options can pose a challenge for residents, especially those working in low-paid or seasonal jobs.

Addressing these economic challenges needs to involve plans for economic diversification, skills development, affordable housing initiatives, and sustainable economic development strategies to ensure a balanced and resilient local economy in Padstow. Biome and Camel Fish fully supports these initiatives and believes it can support the area notably with high-quality employment opportunities:

6.1 Key Economic Indicators

- Employment Sectors; accommodation and food services dominate Padstow's employment landscape, accounting for 31.1% of employees in 2019. This is significantly higher than the Cornwall average of 15.3%.
- Other Sectors; wholesale and retail trade also form a substantial part of the employment, with 22.2% of employees. Construction, administrative and support services, and manufacturing are other notable sectors.
- Employment in Padstow is heavily influenced by the tourism industry, as mentioned, and given its status as a popular tourist destination. The town sees a surge in job opportunities during the peak tourist season. Key sectors contributing to employment in Padstow include hospitality, restaurants, retail, and related services.
- It is important to note that many jobs in Padstow are seasonal or part-time in nature, which can present challenges in terms of stable employment and income for residents. The availability of year-round, high-quality employment opportunities is a key consideration for the sustainable economic growth in the town and a key area that Biome and Camel Fish can support.
- More efforts are being made to support the growth of existing businesses and attract new enterprises that provide year-round employment opportunities while being conscious of the town's character and environmental sustainability. Supporting new industries in suitable locations with a focus on eco-friendly and sustainable practices that serve local needs and demands will help address some of these issues.
- By adhering to sustainable Government Policy initiatives and promoting economic diversification beyond tourism where necessary, encouraging higher-paying jobs, and supporting local entrepreneurship, these measures will help to enhance the economic resilience of Padstow and provide greater opportunities for employment for residents, all of which Biome and Camel Fish aim to support.
- House Prices and Housing; house prices and availability are key challenges for the area where the average house price has been reported to be over £550,000 as of 2021. This

places Padstow as one of the least affordable seaside places for properties in England, as indicated by the Halifax Building Society in 2017.

- The high average house price is a reflection of the strong demand for properties in Padstow, driven in part by the attractiveness of the area to second-home seekers and holiday lets. This demand may outstrip the supply of available homes, contributing to the high cost of housing.
- These high house prices can have significant implications for the demographic makeup of the local population, potentially leading to a higher proportion of second-home owners and an older population profile.
- Efforts to address housing affordability may include initiatives to increase the supply of affordable housing, control the growth of second homes, and address the needs and aspirations of local residents through the creation of high-quality jobs that offer career progression. This information also reflects the need for a balanced approach to housing policy in Padstow to ensure that the housing market meets the needs of both local residents and those seeking second homes in the area and that the issue of affordability is addressed urgently through the creation of new sustainable industries offering high-quality employment opportunities.

Both the Padstow Economic Profile and the Padstow Neighbourhood Plan offer a comprehensive snapshot of the town's economic landscape, highlighting key areas of employment, deprivation, and broader socio-economic conditions. This information is critical for planning and implementing strategies aimed at improving the economic well-being and quality of life for Padstow residents, all of which Biome and Camel Fish intends to fully support through the creation of high-quality and diverse employment opportunities.

7.0 Wadebridge

Similar to Padstow, seaweed farming can offer many economic benefits. With the location of the seaweed farm, Wadebridge would benefit from the creation of a range of employment opportunities thereby boosting the local economy in the area.

Again, for this chapter, we have looked at the Wadebridge Area Neighbourhood Plan to 2030, which provides extensive details on the local economy, employment, and business environment. The objective of the plan which also includes Egloshayle and St Breock is to grow and create a more vibrant, resilient, and sustainable community that reflects the unique character of the area.

The Neighbourhood Plan for Egloshayle, St Breock, and Wadebridge identifies several economic challenges the area faces;

- High Economic Inactivity; nearly a third of residents aged 16-74 were not economically active with the majority being retirees.
- Dependence on Low-Paid Sectors; a significant portion of the workforce is employed in sectors related to tourism and retail. Almost half of the workforce is engaged in retail, accommodation, food services, or arts and entertainment, which tend to be low-paying sectors.
- Youth Outmigration; many young people leave the area to pursue further education and career opportunities, which is partly driven by the lack of high-quality employment options locally.
- Housing Affordability; there is a substantial gap between average earnings and house prices, making it difficult for local people to afford homes. This affordability issue is a barrier to retaining residents and attracting new ones.
- Deficiency of Employment Land; there is a potential deficiency in suitable employment land and premises, which hinders the growth of local businesses and the attraction of new enterprises.
- Traffic and Transport Issues; the area's modest public transport service and fluctuating traffic levels, especially during peak tourist seasons, pose additional challenges to economic activity and accessibility.

These challenges highlight the need for policies that support economic diversification, improve employment opportunities, and address housing affordability to sustain and grow Wadebridge's economy which Biome and Camel Fish is committed to supporting. Equally, the Wadebridge Plan highlights the reliance on low-wage sectors like tourism and retail, and the need for economic diversification and improvement in job quality, all of which Biome, Camel Fish, and seaweed farming can support.

In order to achieve these goals, the plan focuses on several key themes:

- Sustainable Development; ensuring development is appropriate, well-placed, and positively contributes to the community.
- Natural Environment; maintaining and enhancing the countryside's value.
- Jobs & Economy; improving employment opportunities.
- Town Centre and Retail; keeping the town centre a focal point for shopping, social, and leisure activities.
- Housing; meeting the long-term housing needs of the community.
- Natural Resources & Energy; realising the value of natural resources.
- Traffic & Transport; reducing the impact of car use while acknowledging its importance.
- Arts & Culture; expanding cultural offerings and activities.
- Sport & Recreation; maintaining an active and healthy community.
- Community & Infrastructure; ensuring services and facilities meet community needs and demands.

Overall, the plan aims to guide sustainable development to benefit residents, workers, and visitors up to 2030, all of which Biome and Camel Fish fully supports. We are committed to generating new employment, offering career progression, and retaining talent in the area, with the objective being to enhance the quality of life and prosperity for local residents.

An overview of the current situation in the Wadebridge area includes the following;

7.1 Employment And Business Sectors

- Retail: 23% of local employment.
- Accommodation and Food Services: 19% of local employment.
- Manufacturing: 8%.
- Education: 8%.
- Health and Social Care: 8%.

The dominant sectors reflect the area's reliance on tourism and local services.

7.2 Business Characteristic

- Agriculture, Forestry & Fishing: 17.3%
- Retail: 15.7%
- Accommodation & Food Services: 13.3%
- Construction: 12.9%
- Business Administration & Support Services: 6.0%

7.3 Business Size

- 85% of businesses employ 0-9 persons
- 9% employ 10-20 staff
- 6% employ 20 or more staff

7.4 Business Longevity

- 50% of businesses are more than 10 years old
- 17% are less than 2 years old