Marine Management Organisation

MMO Stage 3 Site Assessment: South of Celtic Deep MPA (DRAFT)






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Title: MMO Stage 3 Site Assessment: South of Celtic Deep MPA DRAFT

Contents

Executive Summary

This assessment analyses the impact of anchored nets and lines, bottom towed gear, and traps on the designated features subtidal sand, subtidal coarse sediments and subtidal mixed sediments, and the impact of anchored nets and lines, and traps on moderate energy circalittoral rock in South of Celtic Deep Marine Protected Area (MPA) to determine whether a significant risk of hindering the conservation objectives of the site can be excluded. The assessment sets out the evidence considered and analyses the quality of that evidence.

The assessment finds that ongoing fishing activities by bottom towed gear occurring in the site on the designated features subtidal sand, subtidal coarse sediments and subtidal mixed sediments pose a significant risk of hindering the achievement of the conservation objectives of South of Celtic Deep Marine Protected Area (MPA). As such the Marine Management Organisation (MMO) concludes that management measures are required.

1 Introduction

This assessment considers whether fishing activities are compatible with the conservation objectives of South of Celtic Deep MPA.

This site is designated as a marine conservation zone (MCZ). This assessment uses the best available evidence to review site characteristics and fishing activity and determine if there is a significant risk of fishing activities hindering the conservation objectives of the site. If so, the Marine Management Organisation (MMO) will develop and introduce suitable management measures, such as MMO byelaws. If MMO byelaws are required, then these will be subject to public consultation and will require confirmation from the Secretary of State to come into effect.

2 Site information

2.1 Overview

The following Joint Nature Conservation Committee (JNCC) site information and Department for Environment Food and Rural Affairs (Defra) factsheet were used for background on site geography, designations, features, conservation objectives and general management approaches:

- JNCC Site Information - South of Celtic Deep MCZ[1];
- Defra Factsheet - South of Celtic Deep MCZ[2].

South of Celtic Deep MPA is located in the Western Channel and Celtic Sea region 90 km to the north-west of Land's End and covers an area of approximately 278 km^2 (**Figure 1**). As it is situated offshore of 12 nautical miles (12 nm), fishing activity in the site is regulated by MMO and JNCC is the relevant Statutory Nature Conservation body for the site.

South of Celtic Deep MPA was designated as an MCZ in 2019. The site is designated for moderate energy circalittoral rock, subtidal coarse sediments, subtidal sand and subtidal mixed sediments and varies in depth between 50 and 100 m, with two small areas dipping below 100 m. The seabed is highly heterogeneous, and the variety of habitats support a broad diversity of species including bivalve molluscs, polychaete worms, anemones, starfish and a range of fish species including haddock *Melanogrammus aeglefinus*, angler fish *Lophius piscatorius* and John dory *Zeus faber*. Basking sharks *Cetorhinus maximus* have also been sighted within the MPA. The designated features and their general management approaches are set out below in **Table 1**.

The general management approaches for the features of South of Celtic Deep MPA have been set based on a vulnerability assessment.

[1] JNCC Site Information - South of Celtic Deep MCZ: jncc.gov.uk/our-work/south-of-celtic-deep-mpa/ (last accessed 16 January 2024)
[2] Defra Factsheet – South of Celtic Deep MCZ: www.gov.uk/government/publications/marine-conservation-zones-south-of-celtic-deep (last accessed 16 January 2024)

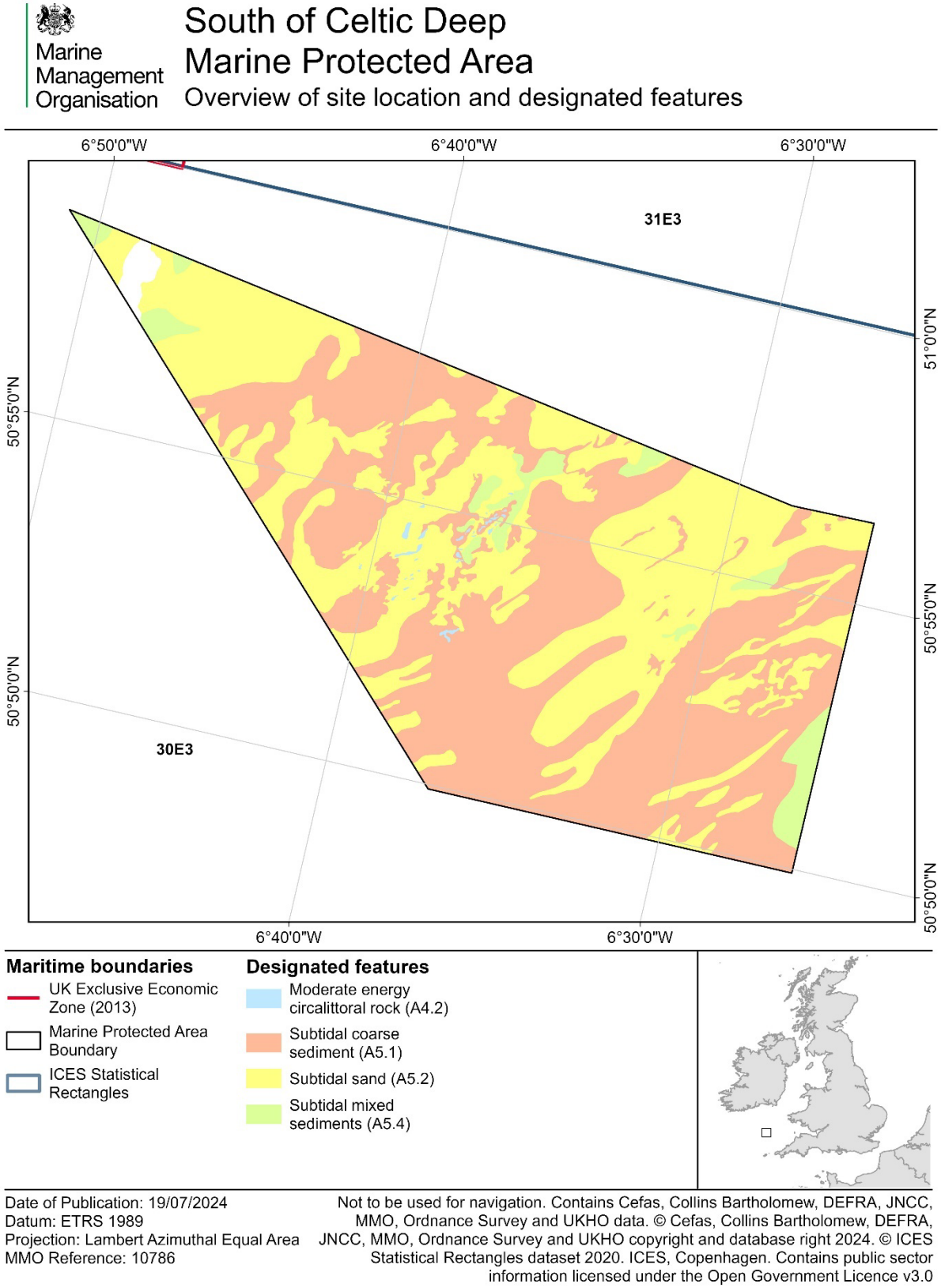

Figure 1: Site overview map.

Table 1: Designated features, including supporting habitats, and general management approaches.

Designated feature	General management approach
Moderate energy circalittoral rock	Maintain in favourable condition
Subtidal coarse sediment Subtidal mixed sediments Subtidal sand	**Recover to favourable condition** This means that: • extent is stable or increasing; and • structures and functions, quality, and the composition of characteristic biological communities (which includes a reference to the diversity and abundance of species forming part of or inhabiting each habitat) are such as to ensure that they remain in a condition which is healthy and not deteriorating; and • supporting processes; water and sediment quality.

JNCC consider that "fishing: benthic trawling" is capable of significantly affecting the qualifying features of the site[3]:

There is no feature condition assessment available for this site; in its absence a vulnerability assessment, which includes sensitivity and exposure information for features and activities in a site, is used as a proxy for condition.

2.2 Scope of this assessment

The scope of this assessment covers fishing activities alone, and relevant activities in combination with fishing.

Bottom towed gear interactions with the feature moderate energy circalittoral rock has not been included in this assessment as it has already been addressed in the

[3] JNCC Conservation Advice Statements - South of Celtic Deep MCZ: data.jncc.gov.uk/data/136727b6-5fb7-4a08-94bc-b6de37aecb19/SouthOfCelticDeep-ConservationStatements-V1.0.pdf (last accessed 16 January 2024)

MMO Stage 2 assessment of South of Celtic Deep MPA[4] and prohibited by the MMO Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2024[5]. Stage 2 assessed the impacts of fishing using bottom towed gears on rock and rocky and biogenic reef in 13 MPAs.

[4] Stage 2 MPA Fisheries Assessment: www.gov.uk/government/publications/marine-protected-areas-bottom-towed-fishing-gear-byelaw-2023 (last accessed 03 September 2024)

[5] MMO Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2023: www.gov.uk/government/publications/marine-protected-areas-bottom-towed-fishing-gear-byelaw-2023(last accessed 03 September 2024)

3 Part A - Identified pressures on the MPA

Part A of this assessment was carried out in a manner that is consistent with the 'capable of affecting (other than insignificantly)' test required by section 126 of the Marine and Coastal Access Act 2009[6].

Part A assesses the interactions between pressures from fishing gears and the designated features of this site, screening for interactions that require further consideration. Assessment of interactions not screened out in Part A will form Part B of the assessment. For each activity assessed in Part A, there are two possible outcomes for each identified pressure-feature interaction:

1. The pressure-feature interactions **are not** included for assessment in Part B and screened out:
    a. if the feature is not exposed to the pressure, and is not likely to be in the future;
    b. the pressure is not capable of affecting the feature, other than insignificantly; or
    c. if MMO has information that the activity or pressure is not occurring in the site and/or does not need to be considered further.

2. The pressure-feature interactions **are** included for assessment in Part B:
    a. if the feature is exposed to the pressure, or is likely to be in the future;
    b. the pressure is capable of affecting the feature, other than insignificantly;
    c. if it is not possible to determine whether the pressure is capable of affecting the feature, other than insignificantly; or
    d. if MMO has information that the activity or pressure is occurring in the site and/or does need to be considered further.

Consideration of a pressure on a protected feature in an MPA includes consideration of the pressure's exposure to, or effect on, any ecological or geomorphological process on which the conservation of the protected feature is wholly or in part dependent.

3.1 Activities taking place

Table 2 lists all commercial fishing gears included for assessment. All other gears have been screened out of further assessment as they do not take place and are not likely to take place in the future, as there are no vessel monitoring system (VMS) records present within the site linked to these gear codes, nor do they appear in landings data for International Council for the Exploration of the Sea (ICES) statistical rectangles that overlap the site.

[6] For more information see: www.legislation.gov.uk/ukpga/2009/23/section/126

To determine fishing activity occurring within the site, the following evidence sources were used:

- VMS data;
- fisheries landings data (logbooks and sales records);
- MMO catch recording project data;
- ICES rectangle level fishing effort data in days (reference: MMO1264);
- swept area ratio (SAR) data.

For more information about the above evidence sources, please see the Stage 3 MPA Site Assessment Methodology document[7], which describes each type of fishing activity evidence and summarises the strengths and limitations of each source.

Table 2: Fishing activities covered by this assessment present in VMS records (2016 to 2021) and landings data (2016 to 2020) for South of Celtic Deep MPA.

Gear type	Gear name	Gear code	Justification
Anchored nets and lines	Trammel net	GTR	Present in VMS records and under 12 m vessel landings data for ICES statistical rectangles that overlap the site.
	Set gillnet (anchored)	GNS	
	Gill nets (not specified)	GN	
	Longlines (demersal)	LLS	Present in VMS data.
	Combined gillnets-trammel nets	GTN	
Bottom towed gear	Twin bottom otter trawl	OTT	Present in VMS data.
	Towed dredge	DRB	
	Seine (unspecified)	SX	
	Pair seine	SPR	

[7] Stage 3 MPA Site Assessment Methodology document: www.gov.uk/government/publications/stage-3-site-assessments (last accessed 03 September 2024).

Gear type	Gear name	Gear code	Justification
	Danish / anchor seine	SDN	
	Bottom otter trawl	OTB	
	Beam trawl	TBB	
Midwater gear	Purse seine (ring net)	PS	Present in VMS data.
	Midwater otter trawl	OTM	
	Longlines (pelagic)	LLD	
	Hand-operated pole-and-line	LHP	
	Encircling gillnet	GNC	Present in under 12 m vessel landings data for ICES statistical rectangles that overlap the site.
Traps	Pot/Creel	FPO	Present in under 12 m vessel landings data for ICES statistical rectangles that overlap the site.
Miscellaneous	Not known	NK	Present in VMS data.

3.2 Pressures, features and activities screened out

This section identifies activities or pressures that are **occurring but do not need to be considered** for South of Celtic Deep MPA.

The gear types and pressures screened out on this basis are listed below with justification:

- **Bottom towed gear interactions with moderate energy circalittoral rock:** These interactions have not been included in this assessment as they have already been addressed in the Stage 2 assessment of South of Celtic Deep MPA[4]. Stage 2 assessed the impacts of fishing using bottom towed gears on rock, rocky and biogenic reef in 13 MPAs. These features were chosen for

Stage 2 as they are some of the most sensitive to the impacts of bottom towed gears.

- **Midwater gears:** although the use of midwater gears does occur within South of Celtic Deep MPA, there is no feasible pathway for gears of this type to interact with benthic designated features as part of normal operation (not considering gear failure or net loss). These gears are not designed to operate on or near the seabed and are deployed entirely within the water column. Therefore, the use of midwater gear within South of Celtic Deep MPA is not considered to be capable of affecting the designated features other than insignificantly and is not considered further within this assessment.
- **Unknown gear:** 'other gear' has been declared as having been used to land fish from this ICES statistical rectangle. The gear code used to report these landings does not provide any further information relating to the fishing method used. It is therefore not possible to assess the likelihood of this fishing method interacting with the seabed and it is not considered further within this assessment.

3.3 Pressures to be taken forward to Part B

The Stage 3 Fishing Gear MPA Impacts Evidence documents detail all pressures created by fishing activity on features of interest. The documents justify which pressures should be taken forward for consideration for each feature. This is documented in Table A1.2 in the anchored nets and lines, bottom towed gear and traps Impacts Evidence documents:

- Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines[8];
- Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear[9]; and
- Stage 3 Fishing Gear MPA Impacts Evidence Traps[10].

Bottom towed gear interactions with moderate energy circalittoral rock have not been included in this assessment as they have already been addressed in the Stage 2 assessment of South of Celtic Deep MPA[4]. Stage 2 assessed the impacts of fishing using bottom towed gears on rock, rocky and biogenic reef in 13 MPAs. These

[8] Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines: www.gov.uk/government/publications/stage-3-impacts-evidence (last accessed 03 September 2024).
[9] Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear: www.gov.uk/government/publications/stage-3-impacts-evidence (last accessed 03 September 2024).
[10] Stage 3 Fishing Gear MPA Impacts Evidence Traps: www.gov.uk/government/publications/stage-3-impacts-evidence (last accessed 03 September 2024).

features were chosen for Stage 2 as they are some of the most sensitive to the impacts of bottom towed gears.

To determine whether a pressure should be taken forward for this particular site, **Table 3** uses the information from the Impacts Evidence documents, alongside site level information, including sensitivity assessments, risk profiling of pressures from conservation advice packages, and JNCC advice to assess the sensitivities of pressures on the designated features of the site.

Table 3 details the pressures for each gear type - anchored nets and lines (A), bottom towed gear (B) and traps (T) - to be assessed in Part B, taking into account the pressures screened in and out in **sections 3.1** and **3.2.**

Key	
	Dark blue highlighting indicates that the feature is sensitive to this pressure from the gear type in this site, and that the interaction should be taken forward for consideration.
	Light blue highlighting indicates that feature is sensitive to the pressure in general, but the gear type is unlikely to exert this pressure to an extent where impacts are of concern in the site.
	Grey highlighting indicates that there is insufficient evidence to make sensitivity conclusions, or that a sensitivity assessment has not been made for this feature to this pressure from the gear type.
	If there is no highlighting within a cell, this indicates that the pressure from the gear type is not relevant to the feature, or that the feature is not sensitive to the pressure.

Table 3: Summary of pressures on designated features of South of Celtic Deep MPA to be taken forward to Part B.

Potential pressures	Designated features										
	Moderate energy circalittoral rock		Subtidal coarse sediments			Subtidal mixed sediments			Subtidal sand		
	A	T	A	B	T	A	B	T	A	B	T
Abrasion or disturbance of the substrate on the surface of the seabed											
Barrier to species movement											
Changes in suspended solids (water clarity)											
Deoxygenation											
Hydrocarbon and polycyclic aromatic hydrocarbon (PAH) contamination											
Introduction of microbial pathogens											
Introduction or spread of invasive non-indigenous species											
Litter											
Organic enrichment											
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion											
Removal of non-target species											
Removal of target species											
Smothering and siltation rate changes											
Synthetic compound contamination											
Transition elements and organo-metal contamination											

4 Part B - Fishing activity assessment

Part B of this assessment was carried out in a manner that is consistent with the 'significant risk of hindering the achievement of the conservation objectives' test required by section 126 of the Marine and Coastal Access Act 2009[6].

Table 3 shows the fishing activities and pressures identified in Part A which have been included for assessment in Part B. The most relevant attributes of the designated features that could be compromised by fishing pressures were identified using the South of Celtic Deep MPA conservation advice package and are shown in **Table 4**.

Table 4: Relevant favourable condition targets for identified pressures.

<table>
<tr><th>Feature</th><th>Attribute</th><th>Target</th><th>Relevant pressures</th></tr>
<tr><td>Moderate energy circalittoral rock</td><td rowspan="2">Extent and distribution: presence and spatial distribution of biological communities

Structure and function: presence and abundance of key structural and influential species

Supporting processes: sedimentation rate</td><td>Maintain in favourable condition</td><td rowspan="2">Relevant to:
abrasion or disturbance of the substrate on the surface of the seabed
removal of non-target species
removal of target species</td></tr>
<tr><td>Subtidal coarse sediment

Subtidal mixed sediments

Subtidal sand</td><td>Recover to favourable condition</td></tr>
</table>

4.1 Fisheries access and existing management

Non-UK vessels can operate within South of Celtic Deep MPA, provided that they have a licence issued by the UK to do so. Nationalities which fished within the MPA from 2016 to 2021 included Belgium, France, Ireland, the Netherlands, Spain and the UK. VMS records indicate that UK, French and Irish vessels were most prevalent.

More information on non-UK vessel access to UK waters can be found on MMO's Single Issuing Authority page[11].

South of Celtic Deep MPA is subject to the following MPA specific legislative restrictions that are applicable to fisheries occurring in the site:

[11] The UK Single Issuing Authority: www.gov.uk/guidance/united-kingdom-single-issuing-authority-uksia (last accessed 26 July 2023).

- **Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2023**[5] **–** prohibiting the use of bottom towed gear within specified areas of the MPA which contain moderate energy circalittoral rock.

4.2 Fishing activity summary

Table A1. 1 to **Table A1. 8** in Annex 1 display a detailed breakdown of fishing activity within South of Celtic Deep MPA. When discussing weights from landings in this section, figures used are a total of weights from UK and EU member states.

Of the fishing activities not screened out in Part A of this assessment, VMS data show that the most prevalent gear types operated by over 12 m vessels within the site were beam trawls and bottom otter trawls. This was followed by trammel nets, set gillnet (anchored) and gillnets (unspecified). Landings for all gear types operated by all under 12 m vessels equated to an annual average of less than 1.29 tonnes (t) between 2016 and 2020.

Anchored nets and lines

Over 12 m vessels using anchored nets and lines in the site had an annual average of 135 VMS records between 2016 and 2021, landing an approximate annual average of 21.75 tonnes between 2016 and 2020 across trammel nets, set gillnet (anchored), gillnets (unspecified) and long lines (demersal). Under 12 m vessels using anchored nets and lines landed approximately 1.23 tonnes per year on average in the same data reporting period.

Under 12 m landings are recorded at ICES rectangle level and for the purpose of assessment have been attributed to the MPA based on the proportion of the ICES rectangle it overlays. Average fishing effort recorded by UK vessels under 12 m in length using anchored nets and lines between 2016 and 2021 for the area of South of Celtic Deep MPA that intersects ICES rectangle 30E3 was 1.04 days per year. South of Celtic Deep MPA covers 7.10 % of ICES rectangle 30E3. Fishing effort days are derived from logbooks and is collected at ICES rectangle and then apportioned accordingly.

Bottom Towed Gear:

Demersal Seines

According to VMS data for over 12 m vessels, the use of demersal seines in the site is minimal with an average count of one VMS record between 2016 and 2021. No landings for vessels over and under 12 m were recorded between 2016 and 2020.

Demersal Trawls

According to VMS data, beam trawls and bottom otter trawls were the most prevalent types of fishing gear deployed in South of Celtic Deep MPA. Between 2016 and 2021, there were 390 beam trawl and 304 bottom otter trawl VMS records on

average per year. Between 2016 and 2020, vessels over 12 m in length using demersal trawls landed approximately 76.42 tonnes per year, whereas no landings for vessels under 12 m in length were recorded for demersal trawls in the same data reporting period.

SAR analysis for demersal trawls between 2016 and 2020 indicate that mean surface SAR values for C-squares intersecting South of Celtic Deep MPA ranged between 0.68 and 2.22, with an increasing trend to the highest figure in 2020. Mean subsurface values were between 0.25 and 0.38. An SAR value of one would indicate that each C-square experienced a pass of fishing gear on average once per year. It should be noted that SAR analysis uses VMS data, and therefore only captures over 12 m vessel activity. However, these values nevertheless indicate that demersal trawl activity has increased since 2016 to two sweeps per year.

Dredges

Between 2016 and 2021, there was an annual average of 32 dredge VMS records in the site. However, no landings for vessels over and under 12 m using dredges were recorded in the site between 2016 and 2020. Surface and sub surface swept area ratio (SAR) values for dredging activity for C-squares intersecting the site equated to 0 between 2016 and 2020.

Traps

No VMS records or landings for over 12 m vessels using traps were observed in the site between 2016 and 2021. Under 12 m vessels using traps in the site recorded 0.01 tonnes and an average fishing effort between 2016 and 2021 for the area of South of Celtic Deep MPA that intersects ICES rectangle 30E3 of 0.02 days per year.

4.3 Pressures by gear type

The Stage 3 Fishing Gear MPA Impacts Evidence documents for anchored nets and lines[8], bottom towed gear[9] and traps[10] collate and analyse the best available evidence on the impacts of different fishing gears on MPA features. This section summarises the analyses and conclusions of those documents, and considers these alongside site level information, including the nature and condition of the habitats and species present, the general management approaches for designated features, intensity of fishing activity taking place and exposure to natural disturbance.

As the designated features subtidal coarse sediment and subtidal mixed sediments have similar sensitivities to the pressures identified for different gear types, these features have been considered together. Where there are differences between the features or the potential impacts of different gears within each grouping, this has been highlighted.

In the context of MPA assessment, the pressures removal of target and non-target species refer to any damage, loss, or removal of species defined as a designated feature or integral to the integrity of a designated feature (for example key structural or influential species). This may occur through intentional or unintentional catch associated with the act of commercial fishing. For the purposes of benthic feature assessments, the physical effects of fishing gears on seabed communities are best addressed through the assessment of abrasion and penetration pressures. As there are no designated species features associated with South of Celtic Deep MPA, and the detail of key structural and influential species is yet to be fully defined, we conclude that impacts from target and non-target removal pressures can be scoped out from further assessment of this site. These pressures may require consideration as a result of any future evidence review, in conjunction with updated conservation advice from JNCC and Natural England.

4.3.1 Anchored nets and lines

The features of South of Celtic Deep MPA (moderate energy circalittoral rock, subtidal coarse sediment, subtidal mixed sediments, and subtidal sand) have been considered in relation to the relevant pressures from anchored nets and lines. This pressure was identified in **Table 3** as abrasion or disturbance of the substrate on the surface of the seabed.

Impacts on these features relating to abrasion or disturbance of the substrate on the surface of the seabed occur primarily during setting and retrieval of nets and the associated ground lines and anchors, as well as by their movement over the seabed during rough weather.

Section 4.2 describes the fishing activity within South of Celtic Deep MPA and indicates that anchored nets and lines is the second most prevalent gear group used in the site. There were annual averages of 135 VMS records, landing approximately 21.75 tonnes, and under 12 m vessels landing approximately 1.23 tonnes and fishing for 6.18 days. VMS density records also indicate that this gear type occurs across the whole site.

Information about the biotopes in the site was provided by the Biotope Presence-Absence spreadsheet of JNCC Report No.647 (Tillin et al., 2020), which listed European Nature Information System (EUNIS) biotopes that were present, likely to be present, or absent from each UK offshore bioregion based on survey data, environmental information, species records, literature and expert judgement. Biotopes were screened out if they were not located in the same region as South of Celtic Deep MPA (Western Channel and Celtic Sea), and if they were not found at the depth range for the site (50 to 100 m). Information about the depth range of each biotope was listed in the Biotope Database of JNCC Report No. 647 (Tillin et al., 2020). Biotope sensitivity data was then extracted from The Marine Life Information Network (MarLIN, 2024) to outline biotopes sensitivity for the appropriate pressure.

Moderate energy circalittoral rock

Table A2. 1 in Annex 2 lists the biotopes that may be found within the moderate energy circalittoral rock feature of the site. 19 biotopes were identified as potentially being present at the site. 11 of these biotopes were identified as having medium sensitivity to abrasion. Three of these biotopes will not be considered further in this assessment because they are normally found at depths shallower than that of South of Celtic Deep MPA.

As described in section 7.1 of the anchored nets and lines Impacts Evidence document[8], sensitivity assessments suggest there is the potential for static gear such as anchored nets and lines to cause damage to rocky reefs and sensitive epifauna. Although targeted research on the impacts of netting on reefs is extremely limited, there are some literature reviews that state that high levels of netting and associated anchoring can damage reefs and the associated communities through cumulative damage over time.

The potential for impact will depend on the intensity of fishing activity taking place, with increasing activity increasing the likelihood of weights and ropes associated with nets and lines damaging, entangling, or removing epifaunal species. Epifaunal and epifloral communities' recovery following gill netting activity is not well understood, however, as with other gears, the likely impact of nets and lines on rocky reef will vary based on several factors including gear type, fishing intensity, habitat, and environmental variables. A study assessing the sensitivity of different seabed habitats to existing fishing activities, across a range of potential fishing intensities, showed that rock with erect and branching species has high sensitivity to anchored nets and lines at light, moderate and heavy fishing intensity (Eno et al., 2013). This study was based on the best information available, which may or may not have been supported by empirical evidence from well-designed experimental studies (Eno et al., 2013) and the overarching conclusion from the literature available is that rocky reef features are estimated to have low sensitivity to all but heavy levels of fishing intensity from static fishing gear.

Given the activity level for anchored nets and lines within South of Celtic Deep MPA described in **section 4.2**, coupled with the spatial footprint of the gear, and no evidence of highly sensitive biotopes being present within these rocky reef habitats, it is unlikely that the ongoing use of anchored nets and lines over moderate energy circalittoral rock will pose a significant risk of hindering the achievement of the conservation objective of South of Celtic Deep MPA.

Subtidal coarse sediment; subtidal mixed sediments; subtidal sand

Table A2. 2 to **Table A2. 4** of Annex 2 detail the biotopes that may be found within the different sediment features of the site. For the subtidal coarse sediment feature, 13 biotopes were identified which could be present in the site. As outlined in **Table A2. 2**, nine of these have low sensitivity to abrasion pressures and three are not

sensitive to this pressure. One biotope does not have an assessment available on MarLIN. Therefore, these biotopes have not been considered further within this section. For the subtidal mixed sediments feature, seven biotopes were identified which could be present in the site. Four of these biotopes, shown in **Table A2. 3**, were identified as having medium sensitivity to abrasion. For the subtidal sand feature, 14 biotopes were identified which could be present in the site, four of which have medium sensitivity, shown in **Table A2. 4**. It is also worth noting that although ocean quahog (*Arctica islandica*) is not a designated feature of the site, one occurrence of the species was recorded during a survey as being potentially present over the subtidal sand feature.

VMS fishing activity data indicates that anchored nets and lines activity is spread evenly across the site, with slightly higher densities of VMS records occurring in the northwest section of the site, and broadly across all the sediment habitats of the site. As the fishing activity data for the under 12 m fleet does not indicate where it occurs within South of Celtic Deep MPA, the use of anchored nets and lines could be occurring over all of the sediment features, but it should be noted that under 12 m vessels only landed approximately 1.23 tonnes and fished for 6.18 days per year.

Abrasion impacts are greater on subtidal mixed sediments and subtidal coarse sediment compared to subtidal sand, as the coarser habitats often contain populations of sessile epifauna. Section 9.3 of the anchored nets and lines Impacts Evidence document[8], indicates that anchored nets and lines are unlikely to negatively impact the extent or distribution of any sediment feature or structure and function of the ecosystem in a significant manner. Subtidal sediment habitats are considered resilient to all but intense fishing activity using anchored nets and lines on species rich sediment habitats or those with long-lived bivalves. The site is also subject to the moderate hydrodynamic energy of the Western Channel and Celtic Sea, so it is likely that the biological communities in this stie's sediments are acclimatised to some level of natural disturbance.

Given the good rates of resilience and recoverability of the biotopes found within this feature, and the likelihood that these biotopes already have some resilience to the described levels of anchored nets and lines in the site, it is unlikely that the ongoing use of anchored nets and lines will pose a significant risk of hindering the achievement of the conservation objective of South of Celtic Deep MPA.

Therefore, MMO conclude that the ongoing use of anchored nets and lines at the levels described does not pose a significant risk of hindering the achievement of the conservation objectives of South of Celtic Deep MPA.

4.3.2 Bottom towed gear

The following features of South of Celtic Deep MPA have been considered in relation to pressures from bottom towed gear:

- subtidal coarse sediment;
- subtidal mixed sediments; and
- subtidal sand.

The relevant pressures on these subtidal sediment features from bottom towed gear were identified in **Table 4** and are:

- abrasion or disturbance of the substrate on the surface of the seabed*
- penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion*
- changes in suspended solids (water clarity)^
- smothering and siltation rate changes^.

Pressures marked with matching superscript symbols (* and ^) have been consolidated in this review to avoid repetition, due to the similar nature of their impacts on sediment habitats.

Section 4.2 describes the fishing activity within South of Celtic Deep MPA and indicates that beam trawls and bottom otter trawls were the most prevalent gears used within the site with an annual average of 696 VMS records distributed across the whole site. Mean surface SAR values for bottom towed gear activity for C-squares intersecting South of Celtic Deep MPA was 2 in 2019 and 2020. An SAR value of 1 means that each C-Square experiences a pass of fishing gear on average once a year. The mean surface SAR of 2 indicates that each C-square experienced on average 2 passes of fishing gear for the years 2019 and 2020.

Abrasion or disturbance and penetration of the substrate on the surface of the seabed

As outlined in **Table A2. 2**, three subtidal coarse sediment biotopes were identified as having medium sensitivity to penetration pressures. Four subtidal mixed sediments biotopes have been identified as having medium sensitivity to abrasion and penetration, as outlined in **Table A2. 3**. Five subtidal sand biotopes were identified as having medium sensitivity to penetration, as outlined in **Table A2. 4**, four of which also have medium sensitivity to the abrasion pressure**.** It is also worth noting that although ocean quahog (*A. islandica*) is not a designated feature of the site, one occurrence of the species was recorded during a survey as being potentially present over the subtidal sand feature.

As described in section 8.4.1 of the bottom towed gear Impacts Evidence document[9], abrasion and penetration pressures from bottom towed gear can result in both physical and biological impacts on subtidal sediment features. Physical impacts include the creation of furrows and berms in the sediment from the trawl doors associated with bottom otter trawls; and the flattening of bottom features such as ripples and irregular topography by beam trawls and demersal seines. Physical impacts are unlikely, however, to significantly impact the large-scale topography of

sediment features. Of more concern are the impacts to the biological structure of sediment habitats. Impacts to biological communities through damage and mortality of flora and fauna via surface and subsurface abrasion and penetration varies based on the levels of fishing activity and intensity, however the first pass of bottom towed gear over the seabed will remove the most sensitive components of the feature. This can lead to long term shifts in biological communities towards smaller, short-lived, opportunistic species that exhibit greater resilience to anthropogenic activity.

Demersal trawls can cause collision, crushing and uprooting as animals encounter or pass under the gear. Initial reductions in biomass, species richness and diversity, as well as changes in community structure are considered likely to be greatest on subtidal coarse sediments compared to subtidal sand. As outlined in section 8.5.1 of the bottom towed gear Impacts Evidence document[9], the first pass of a trawl has the largest initial impact on biomass and production in sediments whereas in areas of high trawling intensity, further increasing trawling intensity can have smaller additional effects on biomass and production (Hiddink et al., 2006). Direct mortality due to otter trawling is considerable but has been found to be lower than that caused by beam trawling for a number of burrowing species, however research has shown that otter trawls remove, on average, around 6 % of faunal biomass per pass with the first trawl pass having the most significant impact.

Changes in suspended solids (water clarity) and smothering and siltation rate changes (light)

Table A2. 2 to **Table A2. 4** of Annex 2 details the list of biotopes that may be found within the sediment features which may be sensitive to the changes in suspended solids (water clarity) and smothering and siltation rate changes pressures. One subtidal coarse sediment biotope was identified as having medium sensitivity to changes in suspended solids (water clarity). Three subtidal mixed sediments' biotopes were identified as having medium sensitivity to smothering and siltation rate changes (light).

As discussed in section 8.4.2 of the bottom towed gear Impacts Evidence document[9], the contact of bottom towed gear on the seabed causes the top layers of sediment to mix with the water, particularly around and behind the gear. Small particles are then entrapped in the ambient water, creating a suspension of particles, which will then settle. The amount of suspended sediment will depend on a number of contributing factors such as turbulence, gear type, sediment type, sediment grain size and the degree of sediment compaction. The larger the amount of entrainment of sediment, the greater the impact to vulnerable biological communities. Research on the effects of sediment suspension by otter trawls demonstrated that activity over sandy substrates can cause a sediment concentration increase behind the gear of up to 0.43 cm^3 per litre and an estimated 41.3 kg of sediment can be suspended by all otter trawl components (ground gear and trawl doors) per metre. Resuspended sediment and the resulting increase in turbidity may be a risk to organisms that are

vulnerable to increased levels of sediment particles in the water column and creates the potential for impacts via smothering. Research used to inform the bottom towed gear Impacts Evidence document[9] indicates that sedentary, filter or suspension feeders, such as bivalves, have low resistance to smothering, whereas mobile epifauna appear highly resilient and resistant.

The site's potential dominance of biotopes with low sensitivity to the relevant pressures from bottom towed gear may be the result of decades of bottom towed fishing activity that have shifted baselines for biological community structures towards more resilient, endemic fauna. The first pass of a trawl has the largest and most damaging initial impact on biomass and production of sediments, causing high levels of mortality. Subsequent passes have additional effects and repeated passes allow little time for species to recover. This contributes to a shift in the biological community, removing the most sensitive species while allowing resilient organisms to remain, suggesting that infrequent trawling may be sufficient to maintain a community in an altered state.

Bottom towed gears contact a much larger area of the seabed than static gears meaning that they have an impact on a spatial scale much larger than anchored nets and lines or traps. Despite the site's dominance of low sensitivity biotopes, the mean SAR values in 2019 and 2020 for demersal trawls indicate there is a risk of the relevant pressures hindering the achievement of the conservation objectives for the sediment features of the site. The site may contain sensitive species and its dominance of low sensitivity biotopes may be a result of decades of bottom towed fishing activity that have shifted community baselines. The observation of an ocean quahog individual in the site indicates the potential for the site to support sensitive, long-lived bivalves.

Therefore, MMO conclude that the ongoing use of bottom towed gear at the activity levels described does pose a significant risk of hindering the achievement of the conservation objectives of South of Celtic Deep MPA.

4.3.3 Traps

The features of South of Celtic Deep MPA (moderate energy circalittoral rock, subtidal coarse sediment, subtidal mixed sediments, and subtidal sand) have been considered in relation to the relevant pressures from traps. This pressure was identified in **Table 4** as abrasion or disturbance of the substrate on the surface of the seabed.

Impacts on these features relating to abrasion or disturbance of the substrate on the surface of the seabed occur primarily during the setting and retrieval of traps and their associated ropes, weights and anchors, as well as by their movement over the seabed during rough weather.

Due to their static nature, traps and anchored nets and lines exert similar pressures on the biotopes associated with the different features of the site, therefore the biotopes identified in Annex 2 as having medium sensitivity to abrasion in the anchored nets and lines section (**section 4.3.1**) also apply here for the traps section.

Section 4.2 describes the fishing activity within South of Celtic Deep MPA and indicates that there was hardly any trap activity in the site for the period considered.

Moderate energy circalittoral rock

As described in section 7.3 of the traps Impacts Evidence document[10]**,** abrasion impacts from this gear type are unlikely to impact the rock substrate itself but may impact biological communities associated with this feature. Recoverability of many of the species listed in the biotopes is good as they reach sexual maturity quickly, can reproduce asexually to aid recovery of damaged populations, and can undertake resting stages that are very resistant of environmental perturbation. The site is also subject to moderate hydrodynamic energy of the Western Channel and Celtic Sea, so it is likely that these biological communities are acclimatised to some level of natural disturbance.

The potential for impact will depend on the intensity of fishing activity taking place. A study assessing the sensitivity of different seabed habitats to existing fishing activities, across a range of potential fishing intensities, showed that rock with erect and branching species has high sensitivity to traps at heavy and moderate fishing intensity (Eno et al., 2013). This study was based on the best information available, which may or may not have been supported by empirical evidence from well-designed experimental studies (Eno et al., 2013) and the overarching conclusion from the literature available is that rocky reef features are estimated to have low sensitivity to all but heavy levels of fishing intensity from static fishing gear.

Subtidal coarse sediment; subtidal mixed sediments; subtidal sand

As described in section 9.4 of the traps Impacts Evidence document[10], there is limited primary evidence on the impacts of static gears on sediment habitats. However, available literature suggests that static gears are unlikely to significantly impact the physical structure of the sediment, have a relatively low impact on benthic communities in comparison to towed gears and are likely to be of limited concern to subtidal sand habitats. Impacts on biological communities could become a concern if activity reaches a particularly high level of intensity, or particularly sensitive species are present, as there is the potential for damage to fragile epifauna as the level of fishing activity and therefore density level of anchors and ropes increases. Although no primary evidence is available on the impact of traps on subtidal sand specifically, sensitivity assessments indicate that the impact of traps is of limited concern due to the generally high energy environments where subtidal sand occurs and the likely greater impact of natural disturbance in these environments compared to the level of pressure exerted by traps.

The site is subject to the high hydrodynamic energy of the Western Channel and Celtic Sea, therefore it is likely that biological communities that dominate the site are acclimatised to some level of disturbance and will therefore have a degree of resilience to abrasion pressures. Sediment biotopes also generally have greater recoverability rates to abrasion from static gears like traps as opposed to bottom towed gears because the spatial footprint of static gears is so much smaller. It is also less likely for the same area of sediment to be repeatedly impacted by a trap, allowing more time for the biotopes to recover between exposure to the abrasion pressure.

Given the low intensity of trap activity within the site, combined with the low scale of footprint for impacts from traps, and the likelihood that the biotopes within the site already have some resilience to the hydrodynamic activity in the site, it is unlikely that the ongoing use of traps over the designated features will pose a significant risk of hindering the achievement of the conservation objectives of South of Celtic Deep MPA.

Therefore, MMO conclude that the ongoing use of traps at the described activity levels does not pose a significant risk of hindering the achievement of the conservation objectives of South of Celtic Deep MPA.

4.4 Part B conclusion

The assessment of anchored nets and lines, bottom towed gears, and traps on the moderate energy circalittoral rock, subtidal coarse sediment, subtidal mixed sediments and subtidal sand features of South of Celtic Deep MPA has concluded that:

- the ongoing use of anchored nets and lines and traps does not pose a significant risk of hindering the achievement of the conservation objectives of the MPA; and
- there is a significant risk of the ongoing use of bottom towed gears hindering the achievement of the conservation objectives of the MPA.

Management measures will therefore be implemented for bottom towed gears. **Section 6** contains further details of these measures.

5 Part C - In-combination assessment

This section assesses the impacts of fishing activities in-combination with relevant activities taking place. This includes the following:

- fishing interactions assessed in Part B but which were not considered, alone, to pose a significant risk of hindering the achievement of the conservation objectives; and
- other activities: such as marine development infrastructure plans and projects that occur in the MPA.

ArcGIS software has been used to check relevant activities that occur within, or adjacent to, the assessed site where there could be a pathway for impact. To determine relevant activities to be included in this part of the assessment, a distance of 5 km was selected as suitable to capture any potential way in which the activity could impact the benthic features of the site in combination with effects of the fishing activities assessed. A 5 km buffer was therefore applied to the site boundary to identify relevant activities. This assessment considers the in-combination impacts of marine licensable activities that are ongoing or upcoming, and with medium to high-risk pressure impact pathways as permitted fishing activity. As the models were run using ArcGIS in August 2023, any licences that ended before this date were screened out of the assessment.

The North Sea Transition Authority (NSTA) is responsible for regulating the oil, gas and carbon storage industries, and as such these activities fall outside of MMO's marine licensing remit. Oil, gas and carbon storage industry activities are not currently considered in this draft assessment, as information on the potential pressures exerted by associated activities is currently under review, and the likelihood of these activities resulting in an in-combination significant risk of hindering the achievement of the site's conservation objectives with fishing is expected to be very low. Following formal consultation, relevant oil, gas and carbon storage industry activities that could impact the site in-combination with the effects of assessed fishing activities will be included before finalising this assessment, alongside marine licence applications submitted after August 2023.

There may be operational and historic submarine cables within this MPA, these cables are already in-situ and are unlikely to have any residual abrasion/removal pressure in-combination with the assessed fishing activity. Any abrasion/removal pressure from submarine cable operation and maintenance activity will be temporary with limited seabed impacts and is therefore unlikely to have significant in-combination effects with assessed fishing.

Bottom towed gears were identified in Part B as requiring management to avoid posing a significant risk of hindering the achievement of the site conservation objectives. Anchored nets and lines and traps are the only remaining fishing

activities occurring within South of Celtic Deep MPA that interact with the seabed. In-combination effects of these fishing activities as well as these activities in-combination with other relevant activities will be assessed in this section.

In accordance with the methodology detailed above, ArcGIS identified one project, within the 5 km buffer applied. **Table 5** shows this activity and the relevant category from the JNCC Pressures-Activities Database (PAD)[12].

Table 5: Summary of marine licensable activities and associated PAD categories.

Marine licence case reference number[13]	PAD Category	Description
MLA/2022/00239	Anchorage and moorings: Construction	Installation of 4 sets of floating buoy FLiDAR/seabed mooring with upward looking ADCP at a maximum of four locations to collect metocean data (wave and currents). Known as the Celtic Sea Metocean survey. Area of search 3 overlaps with South of Celtic Deep MPA; specific locations for installation within these areas will be identified prior to deployment. Inside the site boundary. **Possible in-combination effects.**

[12] JNCC Pressures-Activities Database (PAD**):** hub.jncc.gov.uk/assets/97447f16-9f38-49ff-a3af-56d437fd1951)

[13] Detail on the marine licence activity can be viewed on the public register of marine licence applications and decisions, searching by the marine licence case reference number: Marine case management system - Public register - MCMS (marinemanagement.org.uk) URL: www.marinelicensing.marinemanagement.org.uk/mmofox5/fox/live/MMO_PUBLIC_REGISTER

The PAD and **Table 3** from **section 3.3**, were used to identify medium-high risk pressures exerted by fishing and non-fishing activities to identify those which require in-combination assessment (**Table 6**).

Table 6 summarises the pressures exerted by fishing and non-fishing activities and identifies those exerted by both (Y: pressure exerted). Activity-pressure interactions are highlighted dark blue to illustrate an in-combination effect. Only fishing activity with no proposed or current fisheries management in place are considered.

Table 6: Pressures exerted by fishing and non-fishing activities.

	Non-fishing activities	Fishing activities	
Potential pressures	**Anchorage and moorings: Construction**	**Anchored nets and lines**	**Traps**
Abrasion or disturbance of the substrate on the surface of the seabed	Y	Y	Y
Removal of non-target species		Y	Y
Removal of target species		Y	Y

5.1 In-combination pressure sections

Fisheries vs fisheries in-combination pressures will be considered in this section. The pressures exerted by the non-fishing activity will also be considered in-combination with the anchored nets and lines and traps fishing pressures.

5.2 Fishing vs fishing in-combination pressures

5.2.1 Abrasion and disturbance of the substrate on the surface of the seabed and removal or target and non-target species

As noted in Part B (**Section 4.3.1** nets and lines and **Section 4.3.3** traps), impacts from the removal of target and non-target species pressure is not being considered in detail in this assessment. In-combination impacts from the removal of target and non-target species pressures are more fully assessed under the pressure abrasion, as the detail of key structural and influential species is yet to be fully defined. Therefore, the removal pressures are not considered further in this in-combination assessment. The pressures may require further consideration as future evidence becomes available, in conjunction with updated conservation advice from JNCC and Natural England.

The annual average VMS records for over 12 m vessels within the MPA totalled 135 for anchored nets and lines; there were no VMS recordings or landings for over 12 m vessels using traps within the site between 2016 and 2021. For under 12 m vessels,

between 2016 and 2020, the annual average fishing effort estimated to have been derived from the MPA was 0.02 days for traps, 1.04 days for anchored nets and lines (Annex 1, calculated from **Table A1. 8**). For the same period (2016-2020), the total fishing effort (under 12s) estimated to have been derived from the MPA were 6.32 days (0.11 days for traps, 6.21 days for anchored nets and lines (Annex 1, calculated from **Table A1. 8**)). The fishing effort data is further supported by the estimated live weight landings for under 12 m vessels that equal an annual average of 1.24 tonnes, 0.01 tonnes for traps and 1.23 tonnes for anchored nets and lines, between 2016 and 2020 (**Section 4.2**).

The combined impacts from anchored nets and lines and traps could potentially increase the risk of negative effects from the pressure abrasion and disturbance of the substrate on the surface of the seabed. However, there are no VMS recordings or landings for over 12 m vessels using traps and annual average under 12 m effort for this gear is very low (0.02 days). This, combined with the low annual average landings recorded for under 12 m vessels (0.01 tonnes), indicates that the use of traps within the site is minimal. Without VMS records it is not possible to observe where in the site this activity is taking place however, due to the limited traps effort, significant spatial overlap between traps and anchored nets and lines is unlikely. As the described levels of anchored nets and lines activity alone has been assessed to not pose a risk to the conservation objectives of the site, the addition of such low trap activity is unlikely to have a significant in-combination effect.

Therefore, MMO concludes that the combined pressures from anchored nets and lines and traps will not result in a significant risk of hindering the achievement of the conservation objectives for the South of Celtic Deep MPA at the levels described.

5.3 Fishing vs non-fishing activities in-combination pressures

5.2.1 Abrasion and disturbance of the substrate on the surface of the seabed

The designated features of the South of Celtic Deep MPA are sensitive to physical damage through surface abrasion and disturbance of the substrate from anchored nets and lines and traps during gear deployment, movement of the gear on the seabed due to tidal movements and storm activity, and as the gear is dragged along the seabed during retrieval.

Activities associated with the installation of floating buoy moorings which might cause abrasion or disturbance of the seabed relate to anchorage of buoys. The four sets of buoys will be in-situ for a period of up to 12 months, with occasional maintenance visits planned in that period. These anchoring solutions can smother or impede the growth of biological communities within their footprint and have the potential to cause localised physical damage through abrasion and scouring of the

substrate in which they are located, particularly in the highly hydrodynamic conditions of the Celtic Sea and Western Channel.

As detailed in **section 5.2.1** abrasion and disturbance of seabed surface substrate, at described activity levels anchored nets and lines and traps are not considered to be causing significant pressure through abrasion and disturbance. It is possible that activities linked to the gravity based mooring solution, in-combination with anchored nets and lines and traps may increase the potential for this pressure to have negative cumulative effects on the designated features of the MPA. However, it is expected that the buoys and their mooring frames will have a small footprint on the seabed and therefore the total area impacted from the deployment of the buoys is minimal. Due to the small spatial scale of the seabed footprint, the limited number of buoys and the temporary nature of the works it is unlikely there would be a significant risk of hindering the achievement of the conservation objectivise. Therefore, the scale of in-combination impacts from abrasion and disturbance of the substrate on the surface of the seabed between anchored nets and lines and traps and non-fishing activity is considered insignificant.

Therefore, MMO concludes that the combined pressures from anchored nets and lines and traps and other relevant activities will not result in a significant risk of hindering the achievement of the conservation objectives for the South of Celtic Deep MPA.

5.4 Part C conclusion

MMO concludes that fishing in-combination with other relevant activities will not result in a significant risk of hindering the achievement of the conservation objectives for the South of Celtic Deep MPA.

Further management measures will not therefore be implemented for fishing activities currently occurring within the MPA.

6 Conclusion and proposed management

Part A of this assessment concluded that bottom towed gear, anchored nets and lines and traps are capable of affecting (other than insignificantly) the designated features subtidal coarse sediments, subtidal mixed sediments and subtidal sand of South of Celtic Deep MPA.

Part B of this assessment concluded that ongoing use of bottom towed gear on the features subtidal coarse sediments, subtidal mixed sediments and subtidal sand may hinder the achievement of the conservation objectives of the MPA as a result of the impacts of abrasion or disturbance. Part B also concluded that the ongoing use of anchored nets and lines and traps at the described levels does not pose a significant risk of hindering the achievement of the conservation objectives.

Part C of this assessment concluded that combined pressures from anchored nets and lines and traps and other relevant activities do not pose a significant risk of hindering the achievement of the conservation objectives of the MPA.

To ensure that fishing activities do not result in a significant risk of hindering the conservation objectives of the MPA, MMO will implement a byelaw to prohibit the use of bottom towed gear throughout South of Celtic Deep MPA.

Figure 2 shows the proposed management area in line with the conclusions set out above.

The boundaries of the proposed management area include an appropriate buffer zone to prevent direct damaging physical interactions between fishing activities and the designated features to be protected. The rationale for determining buffer size can be found in in Annex 2 of the Stage 3 MPA Site Assessment Methodology document[7].

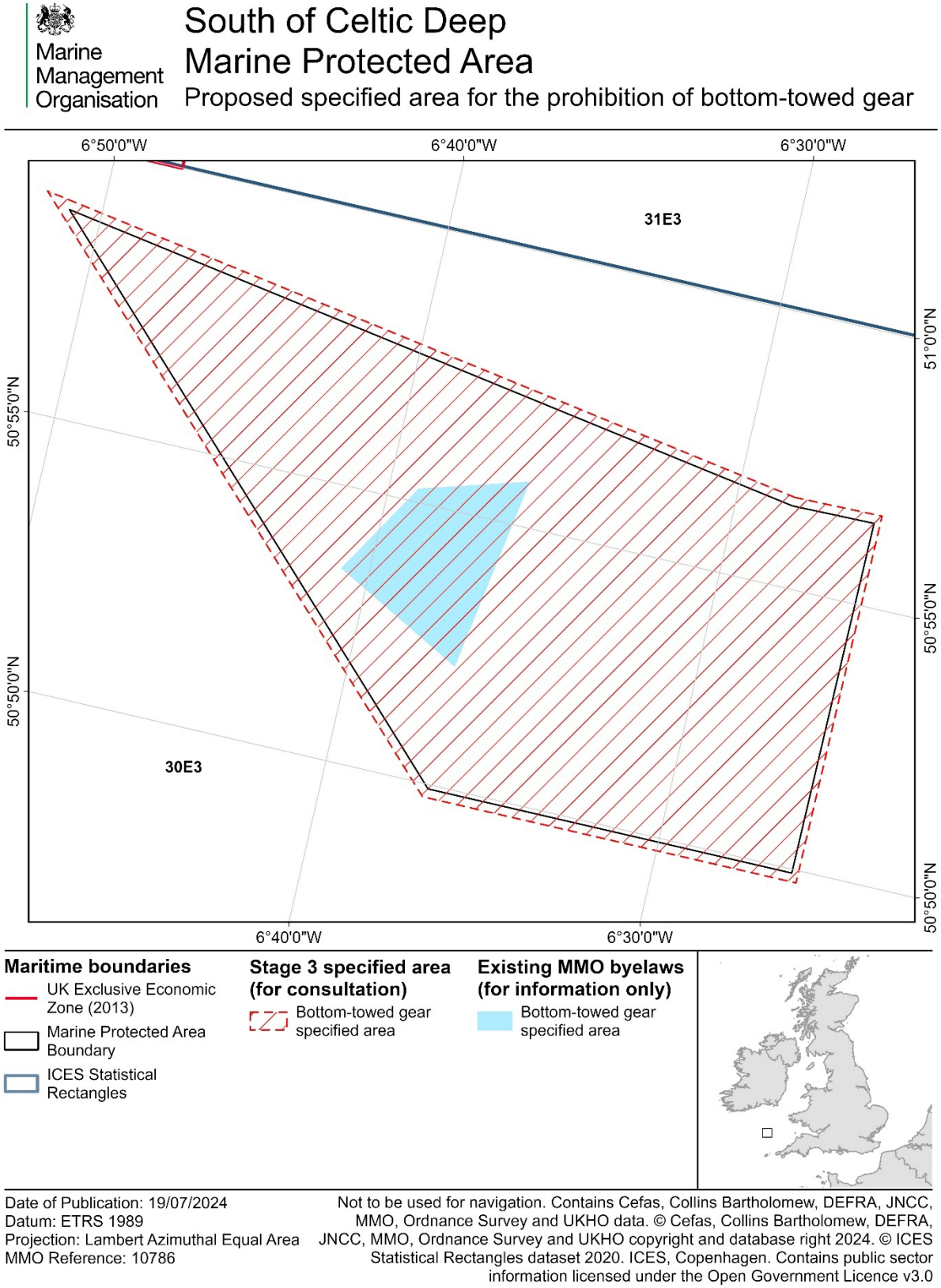

Figure 2: Map of proposed management.

7 Review of this assessment

MMO will review this assessment every five years, or earlier if significant new information is received. Such information could include:

- updated conservation advice;
- updated advice on the condition of the site's feature(s);
- significant increase in activity levels.

To coordinate the collection and analysis of information regarding activity levels, and to ensure that any required management is implemented in a timely manner, a monitoring and control plan will be implemented for this site. This plan will be developed in line with MMO's Monitoring and Control Plan framework.

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Annexes

Annex 1: Fishing activity data

Table A1. 1: VMS record count per nation group (UK and EU Member State) and proportional activity (%), per gear, per gear group, per year (2016 to 2021), totals and annual average (2016 to 2021). All numbers are rounded to the nearest whole number.

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Annual average (2016 to 2021)
Gear group	**Gear code**	**Nation group**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**
Anchored nets and lines	GN	UK	16	100	82	100	9	100	15	100	17	100	83	100	222	100	37
	GN total		**16**	**22**	**82**	**42**	**9**	**29**	**15**	**7**	**17**	**9**	**83**	**67**	**222**	**27**	**37**
	GNS	EU Member State	0	0	1	1	0	0	2	9	0	0	0	0	3	1	1
	GNS	UK	46	100	106	99	5	100	20	91	37	100	38	100	252	99	42
	GNS total		**46**	**64**	**107**	**55**	**5**	**16**	**22**	**11**	**37**	**20**	**38**	**31**	**255**	**32**	**43**
	GTN	EU Member State	0	0	0	0	0	0	0	0	0	0	3	100	3	100	1
	GTN total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**3**	**0**	**1**
	GTR	EU Member State	10	100	4	100	17	100	168	100	126	98	0	0	325	99	54
	GTR	UK	0	0	0	0	0	0	0	0	2	2	0	0	2	1	0

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Annual average (2016 to 2021)
Gear group	**Gear code**	**Nation group**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**
	GTR total		**10**	**14**	**4**	**2**	**17**	**55**	**168**	**82**	**128**	**70**	**0**	**0**	**327**	**40**	**55**
	LLS	EU Member State	0	0	0	0	0	0	1	100	1	100	0	0	2	100	0
	LLS total		**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**0**	**0**	**2**	**0**	**0**
Anchored nets/lines total			**72**	**14**	**193**	**28**	**31**	**4**	**206**	**22**	**183**	**16**	**124**	**10**	**809**	**15**	**135**
Demersal seine	SDN	EU Member State	0	0	1	100	0	0	0	0	0	0	0	0	1	100	0
	SDN total		**0**	**0**	**1**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**13**	**0**
	SPR	EU Member State	1	100	0	0	0	0	0	0	0	0	0	0	1	100	0
	SPR total		**1**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**13**	**0**
	SX	EU Member State	0	0	0	0	0	0	6	100	0	0	0	0	6	100	1
	SX Total		**0**	**0**	**0**	**0**	**0**	**0**	**6**	**100**	**0**	**0**	**0**	**0**	**6**	**75**	**1**
Demersal seine total			**1**	**0**	**1**	**0**	**0**	**0**	**6**	**1**	**0**	**0**	**0**	**0**	**8**	**0**	**1**
Demersal trawl	OTB	EU Member State	178	100	157	100	89	100	490	100	510	100	399	100	1,823	100	304
	OTB total		**178**	**42**	**157**	**33**	**89**	**12**	**490**	**73**	**510**	**65**	**399**	**37**	**1,823**	**44**	**304**

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Annual average (2016 to 2021)
Gear group	**Gear code**	**Nation group**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**
	OTT	EU Member State	4	100	0	0	0	0	4	100	2	100	3	100	13	100	2
	OTT total		**4**	**1**	**0**	**0**	**0**	**0**	**4**	**1**	**2**	**0**	**3**	**0**	**13**	**0**	**2**
	TBB	EU Member State	155	65	183	58	553	83	124	69	235	86	663	99	1,913	82	319
	TBB	UK	84	35	132	42	110	17	57	31	37	14	4	1	424	18	71
	TBB total		**239**	**57**	**315**	**67**	**663**	**88**	**181**	**27**	**272**	**35**	**667**	**62**	**2,337**	**56**	**390**
Demersal trawl total			**421**	**80**	**472**	**68**	**752**	**86**	**675**	**72**	**784**	**69**	**1,069**	**89**	**4,173**	**78**	**696**
Dredge	DRB	EU Member State	27	100	8	100	75	100	2	100	81	100	0	0	193	100	32
	DRB total		**27**	**100**	**8**	**100**	**75**	**100**	**2**	**100**	**81**	**100**	**0**	**0**	**193**	**100**	**32**
Dredge total			**27**	**5**	**8**	**1**	**75**	**9**	**2**	**0**	**81**	**7**	**0**	**0**	**193**	**4**	**32**
Midwater - surrounding	PS	EU Member State	0	0	0	0	0	0	0	0	2	100	0	0	2	100	0
	PS total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**100**	**0**	**0**	**2**	**100**	**0**
Midwater - surrounding total			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**2**	**0**	**0**

			2016		2017		2018		2019		2020		2021		Total (2016 to 2021)		Annual average (2016 to 2021)
Gear group	**Gear code**	**Nation group**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**
Midwater Hooks and lines	LHP	EU Member State	0	0	0	0	0	0	1	100	5	1	0	0	6	100	1
	LHP total		**0**	**0**	**0**	**0**	**0**	**0**	**1**	**50**	**5**	**100**	**0**	**0**	**6**	**43**	**1**
	LLD	EU Member State	0	0	0	0	7	100	1	100	0	0	0	0	8	100	1
	LLD total		**0**	**0**	**0**	**0**	**7**	**100**	**1**	**50**	**0**	**0**	**0**	**0**	**8**	**57**	**1**
Midwater hooks/lines total			**0**	**0**	**0**	**0**	**7**	**1**	**2**	**0**	**5**	**0**	**0**	**0**	**14**	**0**	**2**
Midwater Trawl	OTM	EU Member State	5	100	18	100	5	100	44	100	86	100	2	100	160	100	27
	OTM total		**5**	**100**	**18**	**100**	**5**	**100**	**44**	**100**	**86**	**100**	**2**	**100**	**160**	**100**	**27**
Midwater trawl total			**5**	**1**	**18**	**3**	**5**	**1**	**44**	**5**	**86**	**8**	**2**	**0**	**160**	**3**	**27**
Unknown	NK	EU Member State	1	100	0	0	0	0	0	0	1	100	2	100	4	100	1
	NK total		**1**	**100**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**100**	**2**	**100**	**4**	**100**	**1**
Unknown total			**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**2**	**0**	**4**	**0**	**1**
Grand total			**527**	**1**	**692**	**1**	**870**	**1**	**935**	**1**	**1,142**	**2**	**1,197**	**2**	**5,363**	**1**	**894**

Table A1. 2: UK live weight landings tonnage (t) estimates by gear from vessels over 12 m in length in the MMO section of South of Celtic Deep MPA (2016 to 2020). All numbers are rounded to the nearest two decimal places.

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Anchored Net/Line	GN	4.54	26.87	1.77	2.54	1.32	37.04	7.41
Anchored Net/Line	GNS	7.81	55.37	0.26	5.27	2.45	71.16	14.23
Anchored Net/Line	GTR	0	0	0	0	0.49	0.49	0.10
Anchored Net/Line Total		**12.35**	**82.23**	**2.03**	**7.81**	**4.26**	**108.69**	**21.74**
Demersal trawl	TBB	19.06	22.97	13.41	7.25	3.71	66.40	13.28
Demersal trawl Total		**19.06**	**22.97**	**13.41**	**7.25**	**3.71**	**66.40**	**13.28**
Grand Total		**31.41**	**105.20**	**15.44**	**15.07**	**7.97**	**175.09**	**35.02**

Table A1. 3: EU27 live weight landings tonnage (t) estimates by gear from vessels over 12 m in length in the MMO section of South of Celtic Deep MPA (2016 to 2020). All numbers are rounded to two decimal places.

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Anchored Net/Line	GTR	0.03	0	0	0	0	0.03	0.01
Anchored Net/Line Total		**0.03**	**0**	**0**	**0**	**0**	**0.03**	**0.01**
Demersal Seine	SDN	0	0	0	0	0	0	0
Demersal Seine Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Demersal trawl	OTB	15.74	13.46	7.79	44.19	65.78	146.96	29.39
Demersal trawl	OTT	2.29	0	0	1.51	0.56	4.36	0.87

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Demersal trawl	TBB	23.42	26.79	70.91	15.04	28.20	164.36	32.87
Demersal trawl Total		**41.45**	**40.25**	**78.70**	**60.74**	**94.54**	**315.68**	**63.14**
Dredge	DRB	0.04	0	0	0	0	0.04	0.01
Dredge Total		**0.04**	**0**	**0**	**0**	**0**	**0.04**	**0.01**
Midwater Hook/Lines	LLD	0	0	8.69	1.15	0	9.84	1.97
Midwater Hook/Lines Total		**0**	**0**	**8.69**	**1.15**	**0**	**9.84**	**1.97**
Midwater Trawl	OTM	0	7.60	9.80	0	0	17.41	3.48
Midwater Trawl Total		**0**	**7.60**	**9.80**	**0**	**0**	**17.41**	**3.48**
Grand Total		**41.52**	**47.85**	**97.19**	**61.89**	**94.54**	**343.00**	**68.60**

Table A1. 4: Percentage of each ICES rectangle intersected by the MMO section of South of Celtic Deep MPA.

ICES rectangle	Percentage overlap (%)
30E3	7.10

Table A1. 5: UK live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for the MMO section of South of Celtic Deep MPA (2016 to 2020). All numbers are rounded to two decimal places.

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Anchored Net/Line	GN	0.26	1.50	1.28	1.00	1.00	5.04	1.01
Anchored Net/Line	GNS	0.13	0.14	0.36	0.36	0	0.99	0.20
Anchored Net/Line	GTR	0	0.13	0	0	0	0.13	0.03
Anchored Net/Line Total		**0.39**	**1.77**	**1.64**	**1.36**	**1.00**	**6.16**	**1.23**
Demersal trawl	OT	0	0	0	0	0	0	0
Demersal trawl Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Midwater - Gill Encircling	GNC	0	0	0	0	0.24	0.24	0.05
Midwater - Gill Encircling Total		**0**	**0**	**0**	**0**	**0.24**	**0.24**	**0.05**
Midwater Hook/Lines	LX	0	0	0	0	0	0	0
Midwater Hook/Lines Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Traps	FPO	0	0.01	0	0	0	0.01	<0.01
Traps Total		**0**	**0.01**	**0**	**0**	**0**	**0.01**	**<0.01**
Grand Total		**0.39**	**1.78**	**1.64**	**1.36**	**1.24**	**6.41**	**1.28**

Table A1. 6: EU27 live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for the MMO section of South of Celtic Deep MPA (2016 to 2020). All numbers are rounded to two decimal places.

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Dredge	DRB	0	0	0	0	0	0	0
Dredge Total		**0**	**0**	**0**	**0**	**0**	**0**	**0**
Traps	FPO	0	0	0	0.03	0	0.03	0.01
Traps Total		**0**	**0**	**0**	**0.03**	**0**	**0.03**	**0.01**
Grand Total		**0**	**0**	**0**	**0.03**	**0**	**0.03**	**0.01**

Table A1. 7: Mean annual surface and subsurface SAR values for C-squares intersecting the MMO section of South of Celtic Deep MPA (2016 to 2020).

Gear group	SAR category	2016	2017	2018	2019	2020
Demersal Seines	Surface	0	0	0	0.03	0.03
	Subsurface	0	0	0	<0.01	<0.01
Dredges	Surface	0	0	0	0	0
	Subsurface	0	0	0	0	0
Demersal Trawls	Surface	0.86	0.86	0.68	1.98	2.22
	Subsurface	0.25	0.25	0.38	0.27	0.30
Bottom Towed Gear	Surface	0.86	0.86	0.68	2.00	2.24

Gear group	SAR category	2016	2017	2018	2019	2020
	Subsurface	0.25	0.25	0.38	0.27	0.30

Table A1. 8: Fishing effort (days) recorded by UK vessels under 12 m in length, separated by gear type for the area of South of Celtic Deep MPA that intersects the marine portion of ICES rectangle 30E3 (2016 to 2021). ICES rectangle level data has been apportioned to the MPA based on the percentage area of the ICES rectangle that intersects the MPA (Table A1. 4).

Gear group	Fishing effort (days at sea)							
	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average (2016 to 2021)
Midwater gill encircling	0	0	0	0	0.21	0	0.21	0.04
Midwater gear total	**0**	**0**	**0**	**0**	**0.21**	**0**	**0.21**	**0.04**
Traps	0	0.04	0	0	0	0.07	0.11	0.02
Anchored nets and lines	0.71	1.67	1.42	1.35	0.92	0.14	6.21	1.04
Static gear total	**0.71**	**1.70**	**1.42**	**1.35**	**0.92**	**0.21**	**6.32**	**1.05**
MPA total	**0.71**	**1.70**	**1.42**	**1.35**	**1.14**	**0.21**	**6.53**	**1.09**

Annex 2: Biotope information

Table A2. 1: Moderate energy circalittoral rock biotopes that may be found within South of Celtic Deep MPA with at least medium sensitivity to the abrasion/disturbance and penetration of the substrate on the surface of the seabed.

Biotope	Sensitivity	Justification
Brittlestars overlying coralline crusts, *Parasmittina trispinosa* and *Caryophyllia smithii* on wave-exposed circalittoral rock (De-Bastos, Williams and Hill, 2023)	Abrasion: Medium	Included in the assessment as may be found up to 50 m depth
Caryophyllia smithii and *Swiftia pallida* on circalittoral rock (Readman et al., 2023)	Abrasion: Medium	
Caryophyllia smithii, *Swiftia pallida* and *Alcyonium glomeratum* on wave-sheltered circalittoral rock (Readman, Lloyd and Watson, 2023a)	Abrasion: Medium	
Caryophyllia smithii, *Swiftia pallida* and large solitary ascidians on exposed or moderately exposed circalittoral rock (Readman, Lloyd and Watson, 2023b)	Abrasion: Medium	
Urticina felina and sand-tolerant fauna on sand-scoured or covered circalittoral rock (Tillin and Hiscock, 2016)	Abrasion: Medium	
Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock (De-Bastos, Hill, Lloyd, *et al.*, 2023a)	Abrasion: Medium	
Sabellaria spinulosa encrusted circalittoral rock (Tillin, Marshall, Gibb, Lloyd, *et al.*, 2023a)	Abrasion: Medium	
Sabellaria spinulosa with a bryozoan turf and barnacles on silty turbid circalittoral rock (H. M. Tillin *et al.*, 2023b)	Abrasion: Medium	
Sabellaria spinulosa, didemnid and small ascidians on tide-swept moderately wave-exposed circalittoral rock (Tillin, Marshall, Gibb, Williams, *et al.*, 2023)	Abrasion: Medium	Excluded from assessment as normally found shallower than 50 m depth

Biotope	Sensitivity	Justification
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock (Tyler-Walters, Mainwaring and Williams, 2022)	Abrasion: Medium	
Musculus discors beds on moderately exposed circalittoral rock (Tyler-Walters, 2023)	Abrasion: Medium	

Table A2. 2: Subtidal coarse sediment biotopes that may be found within South of Celtic Deep MPA and their sensitivities to relevant pressures.

Biotope	Sensitivity
Sparse fauna on highly mobile sublittoral shingle (cobbles and pebbles) (Tillin, 2023)	Abrasion: Not sensitive Penetration: Not sensitive Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Not sensitive
Moerella spp. with venerid bivalves in infralittoral gravelly sand (Tillin and Watson, 2023e)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): Low Smothering and siltation rate changes (light): Low
Hesionura elongata and *Microphthalmus similis* with other interstitial polychaetes in infralittoral mobile coarse sand (Marshall, Ashley and Watson, 2023)	Abrasion: Low Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Low
Glycera lapidum in impoverished infralittoral mobile gravel and sand (Tillin and Watson, 2023c)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Low

Biotope	Sensitivity
Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand (McQuillan, Tillin and Watson, 2023)	Abrasion: Not sensitive Penetration: Not sensitive Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Not sensitive
Spirobranchus triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (Tyler-Walters and Tillin, 2023)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Not sensitive
Mediomastus fragilis, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel (Tillin and Watson, 2023d)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): Low Smothering and siltation rate changes (light): Low
Protodorvillea kefersteini and other polychaetes in impoverished circalittoral mixed gravelly sand (Tillin and Watson, 2023g)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): No evidence
Neopentadactyla mixta in circalittoral shell gravel or coarse sand (Tyler-Walters, Durkin and Watson, 2023)	Abrasion: Not sensitive Penetration: Medium Changes in suspended solids (water clarity): Medium Smothering and siltation rate changes (light): Not sensitive
Branchiostoma lanceolatum in circalittoral coarse sand with shell gravel (Tillin and Watson, 2023a)	Abrasion: Low Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Low
Scallops on shell gravel and sand with some sand scour (European Environment Agency, 2019)	No assessment available
Glycera lapidum, *Thyasira* spp. and *Amythasides macroglossus* in offshore gravelly sand (Tillin and Watson, 2023b)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): Not sensitive

Biotope	Sensitivity
	Smothering and siltation rate changes (light): Low
Hesionura elongata and *Protodorvillea kefersteini* in offshore coarse sand (Tillin and Ashley, 2016)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): No evidence Smothering and siltation rate changes (light): No evidence

Table A2. 3: Subtidal mixed sediments biotopes that may be found within South of Celtic Deep MPA and their sensitivities to relevant pressures.

Biotope	Sensitivity
Venerupis senegalensis, *Amphipholis squamata* and *Apseudes latreilli* in infralittoral mixed sediment (Tillin and Rayment, 2001)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): Low Smothering and siltation rate changes (light): Low
Cerianthus lloydii and other burrowing anemones in circalittoral muddy mixed sediment (Perry and Watson, 2024)	Abrasion: Medium Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Medium
Cerianthus lloydii with *Nemertesia* spp. and other hydroids in circalittoral muddy mixed sediment (Perry and Watson, 2023)	Abrasion: Medium Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Medium
Kurtiella bidentata and *Thyasira* spp. in circalittoral muddy mixed sediment (De-Bastos, Marshall and Watson, 2023)	Abrasion: Low Penetration: Low

Biotope	Sensitivity
	Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Not sensitive
Flustra foliacea and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment (Readman and Watson, 2024)	Abrasion: Medium Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Not sensitive
Ophiothrix fragilis and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment (De-Bastos, Hill, Garrard, *et al.*, 2023)	Abrasion: Medium Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Medium
Polychaete-rich deep *Venus* community in offshore gravelly muddy sand (Tillin and Watson, 2023f)	Abrasion: Low Penetration: Low Changes in suspended solids (water clarity): Low Smothering and siltation rate changes (light): Low

Table A2. 4: Subtidal sand biotopes that may be found within South of Celtic Deep MPA and their sensitivities to relevant pressures.

Biotope	Sensitivity
Echinocardium cordatum and *Ensis* spp. in lower shore and shallow sublittoral slightly muddy fine sand (De-Bastos, Hill, Lloyd, *et al.*, 2023b)	Abrasion: Medium Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Not sensitive
Acrocnida brachiata with Astropecten irregularis and other echinoderms in circalittoral muddy sand (De-Bastos, Lloyd and Watson, 2023)	Abrasion: Medium Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Low
Maldanid polychaetes and *Eudorellopsis deformis* in deep circalittoral sand or muddy sand (Ashley, 2016)	Abrasion: Medium Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Not sensitive
Owenia fusiformis and *Amphiura filiformis* in offshore circalittoral sand or muddy sand (De-Bastos, 2023)	Abrasion: Medium Penetration: Medium Changes in suspended solids (water clarity): Not sensitive Smothering and siltation rate changes (light): Low
Semi-permanent tube-building amphipods and polychaetes in sublittoral sand (De-Bastos, Rayment, *et al.*, 2023)	Abrasion: Low Penetration: Medium Changes in suspended solids (water clarity): Low Smothering and siltation rate changes (light): Low