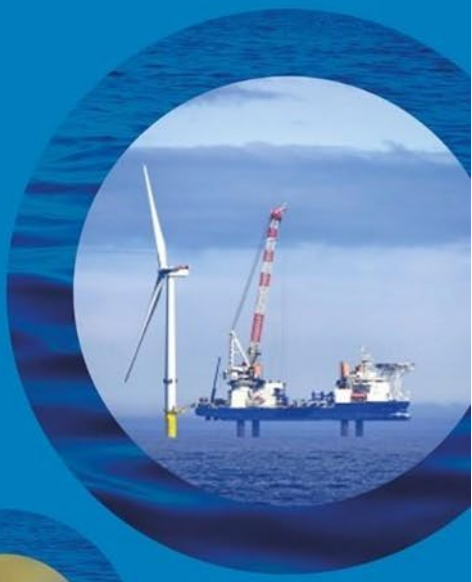
Marine Management Organisation

MMO Stage 3 Site Assessment: Skerries Bank and Surrounds MPA (Draft)



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Contents

Executive Summary

This assessment analyses the impact of anchored nets and lines, bottom towed gear and traps on the designated features moderate energy circalittoral rock, subtidal coarse sediment, subtidal sand and spiny lobster (*Palinurus elephas*), in Skerries Bank and Surrounds Marine Protected Area (MPA). The assessment sets out the evidence considered and analyses the quality of that evidence.

The assessment finds that there is a significant risk of the ongoing use of bottom towed gear on the designated features hindering the achievement of the conservation objectives of the MPA. The Marine Management Organisation (MMO) will therefore introduce management measures to prohibit the use of bottom towed fishing gear in the MMO portion of the MPA.

MMO has also concluded that the continued removal of spiny lobster (*P. elephas*) by any fishing method may result a significant risk of hindering the achievement of the conservation objectives of the MPA. Management measures will therefore be implemented to prohibit the removal of this species from the MMO portion of the MPA using any gear type.

1 Introduction

This assessment considers whether fishing activities are compatible with the conservation objectives of Skerries Bank and Surrounds MPA. The assessment is confined to the portion of the MPA where fishing is regulated by Marine Management Organisation (MMO), this being the area that lies beyond the 6 nautical mile (nm) limit.

This site is designated as a marine conservation zone (MCZ). This assessment uses the best available evidence to review site characteristics and fishing activity to 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 Natural England conservation advice package and Department for Environment, Food and Rural Affairs (Defra) factsheet were used for background on site geography, designations, features and conservation objectives in this assessment:

- Natural England Conservation Advice - Skerries Bank and Surrounds MCZ[1]
- Defra Factsheet - Skerries Bank and Surrounds MCZ[2]

Skerries Bank and Surrounds MPA is located off the South Devon coast in the western English Channel. The MPA is approximately 249 km^2, straddling the 6 nm limit, with approximately 238 km^2 of the site falling inside the 6 nm limit, and the remaining 11 km^2 offshore of 6 nm (**Figure 1**). The site falls within two administrative areas: the 0 to 6 nm portion of the site falls within the District of Devon and Severn Inshore Fisheries and Conservation Authority (IFCA); and the 6 to 12 nm portion of the site (hereafter the 'MMO portion') extends outside of Devon and Severn IFCA District and into the administrative area where the MMO has responsibility.

Extending from the shoreline to depths of about 70 metres (m), the MPA incorporates a range of habitats, and is an important breeding ground for species of flat fish. The intertidal zone consists of a range of rocky reefs characterised by vertical zonation of species assemblages, and coarse sediment habitats with some patches of sand. Inshore, there are large areas of reef dominated by algae and kelp, whilst the offshore area is dominated by a mosaic of subtidal sediments with patches of reef, although the extent of this feature is likely to be underestimated due to overlaying sediment veneers. The sandbank within the site has fine sandy sediments at the peaks which support communities characterised by polychaete worms, whilst the coarser sediment on the flanks of the bank support more diverse communities, including juvenile mussels and brittlestars.

[1] Natural England Conservation Advice Package – Skerries Bank and Surrounds MCZ: designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0015 (Last accessed on: 10 January 2024).

[2] Defra Factsheet - Skerries Bank and Surrounds MCZ: www.gov.uk/government/publications/marine-conservation-zone-2013-designation-skerries-bank-and-surrounds (Last accessed on: 10 January 2024).

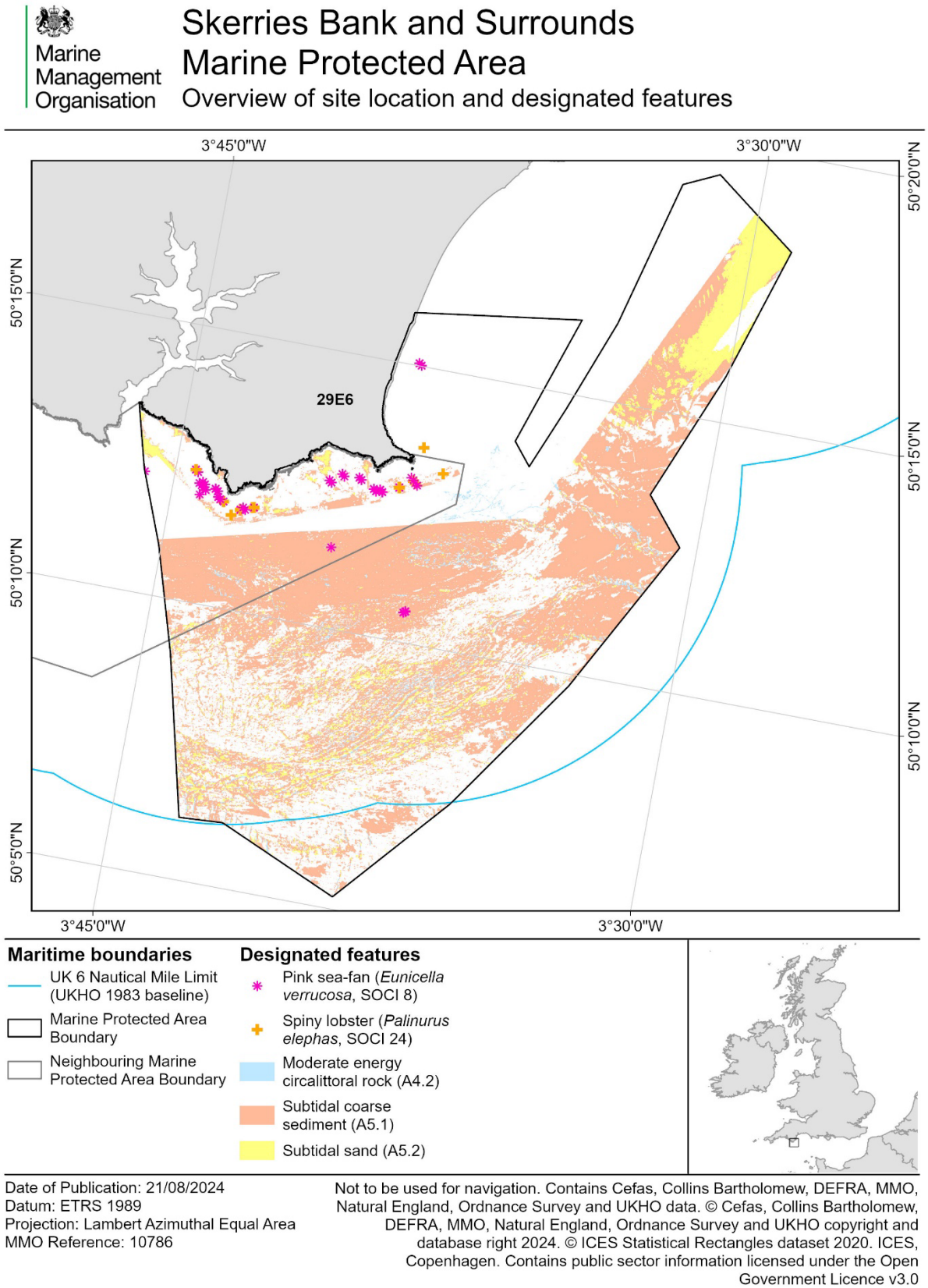

Figure 1: Site overview map.

Skerries Bank and Surrounds MPA was designated as an MCZ in December 2013 to protect the features listed in **Table 1**. The general management approaches for the features of Skerries Bank and Surrounds MPA have been set based on a vulnerability assessment conducted prior to the site's designation.

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

Designated feature	Present beyond 6 nm	General management approach
Subtidal coarse sediment	Yes	Recover to favourable condition
Moderate energy circalittoral rock		
Spiny lobster (*P. elephas*)	No, but the supporting habitat is	
Subtidal sand	Yes	Maintain in favourable condition
Intertidal coarse sediment	No	
Intertidal mixed sediments		
Intertidal sand and muddy sand		
Subtidal mud		
Moderate energy intertidal rock		
Moderate energy infralittoral rock		
High energy intertidal rock		
High energy infralittoral rock		
Pink sea-fan (*Eunicella verrucosa*)		

Three of the 13 designated habitat features of the MPA are found beyond the 6 nm limit, and therefore occur within the portion of the MPA regulated by MMO. These are subtidal coarse sediment, subtidal sand, and moderate energy circalittoral rock. This assessment is confined to the portion of the site regulated by MMO, so the remainder of the assessment focusses on the impacts of fishing activity on these three designated habitat features, as well as the designated species, spiny lobster (*P. elephas*). Spiny lobster (also known as crawfish) is known to be present within the inshore section of the MPA, however, the supporting reef habitat for this species is also present in the offshore portion of the site.

Natural England conducted a marine condition assessment[1] in March 2023 and reported the condition of the moderate energy circalittoral rock and subtidal coarse sediment features as unfavourable or declining. Principal and secondary attributes and supporting processes for these features failed to meet the targets for favourable condition. 'Abrasion/disturbance of the substrate on the surface of the seabed' and 'penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion' were listed as the adverse condition reason pressures for the

subtidal coarse sediment and moderate energy circalittoral rock features respectively, with both features also impacted by the 'removal of non-target species' pressure. The adverse condition reason driver for all pressures was given as fishing.

As part of the same assessment, the condition of subtidal sand was reported as favourable. The 'maintain' target set for this feature does not preclude the need for management, now or in the future, to avoid a significant risk of damage or deterioration to the features of the site.

Natural England's marine condition assessment methodology is currently only applied to 'marine habitat features'; the condition of the spiny lobster feature was therefore not assessed. In the absence of a condition assessment, a vulnerability assessment, which includes sensitivity and exposure information for features and activities in a site, is used as a proxy for condition. More information on this can be found in Natural England's supplementary advice on conservation objectives[1].

A 'recover' approach has been set for the 'population: population size', 'population: recruitment and reproductive capability' and 'presence and spatial distribution of biological communities' attributes of the spiny lobster feature due to evidence that spiny lobster populations in South West England have severely declined due to overfishing, and that anthropogenic pressures could continue to impact species recovery. The Joint Nature Conservation Committee (JNCC) and Natural England suggest that population recovery may rely on management of human activities larger than any individual MPA, due to spiny lobster mobility and uncertainty surrounding the migration patterns and biology of the species (JNCC and Natural England, 2012).

Likewise, a 'maintain' approach has been set for the 'structure and function: biological connectivity', 'supporting habitat: extent and distribution' and 'supporting habitat: food availability (species)' attributes. This is to ensure the connectivity of spiny lobster habitats and an abundant food supply within the site and the wider environment to ensure larval dispersal and recruitment and allow for the offshore migratory movement of the species.

2.2 Scope of this assessment

The scope of this assessment covers fishing activities alone, and relevant activities in combination with fishing. It does not cover areas of this site inshore of 6 nm for which Devon and Severn IFCA is the regulator.

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 described by section 126 of the Marine and Coastal Access Act 2009[3].

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

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.

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

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

For more information about the above evidence sources, please see the MPA Fisheries Assessment Methodology document[4], which describes each type of fishing activity evidence and summarises the strengths and limitations of each source.

[4] MPA Fisheries Assessment Methodology: www.gov.uk/government/publications/stage-3-site-assessments (Last accessed on: 27 August 2024).

Table 2: Fishing activities covered by this assessment present in VMS records (2016 to 2021) and landings data (2016 to 2020) for Skerries Bank and Surrounds MPA,.

Gear type	Gear name	Gear code	Justification
Anchored nets and lines	Gillnets and entangling nets	GEN	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
	Gill nets (not specified)	GN	
	Set gillnet (anchored)	GNS	
	Trammel nets	GTR	
	Longlines (not specified)	LL	
Bottom towed gear	Boat dredges	DRB	Present in VMS records and under 12 m landings data for ICES statistical rectangles that overlap the site.
	Bottom otter trawls	OTB	
	Beam trawls	TBB	
	Hand dredges	DRH	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
	Otter trawls (not specified)	OT	
	Twin otter trawls	OTT	
	Bottom pair trawls	PTB	
	Nephrops trawls	TBN	
Midwater gear	Encircling gillnet	GNC	
	Driftnets	GND	
	Hand fishing	HF	
	Hand-operated pole-and-line	LHP	
	Hook and line (unspecified)	LX	
	Midwater otter trawl	OTM	
	Purse seine (ring net)	PS	
Traps	Pot/Creel	FPO	Present in VMS records and under 12 m landings data for ICES statistical rectangles that overlap the site
	Trap	FIX	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
	Fyke nets	FYK	
Unknown	Miscellaneous gear	MIS	
	Not known	NK	

3.2 Activities and features screened out or in

3.2.1 Activities screened out

This section identifies activities or pressures that are **occurring but do not need to be considered** for Skerries Bank and Surrounds MPA.

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

- **Midwater gears:** although the use of midwater gears does occur within Skerries Bank and Surrounds MPA, there is no feasible pathway for gears of this type to interact with benthic designated features under normal operation. 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 Skerries Bank and Surrounds 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**: 'unknown' and 'miscellaneous' gear has been declared as having been used to land fish from ICES statistical rectangle overlapping the site. The gear codes used to report these landings do not provide any further information relating to the fishing methods used. It is therefore not possible to assess the likelihood of these fishing methods interacting with the seabed and they are not considered further within this assessment.

3.2.2 Features screened out

The following broad scale habitat and species features have been designated within Skerries Bank and Surrounds MPA but are only present inshore of the 6 nm limit which is not regulated by MMO. Therefore, they will not be considered further in this assessment:

- **intertidal coarse sediment;**
- **intertidal mixed sediments;**
- **intertidal sand and muddy sand;**
- **subtidal mud;**
- **moderate energy intertidal rock;**
- **moderate energy infralittoral rock;**
- **high energy intertidal rock;**
- **high energy infralittoral rock; and**
- **pink sea-fan (*E. verrucosa*).**

3.2.3 Features screened in

The remaining features, deemed likely to be present in the MMO regulated area of the site offshore of 6 nm, have been taken forward for further consideration in this assessment. These features are:

- **moderate energy circalittoral rock;**
- **subtidal coarse sediment;**
- **subtidal sand; and**
- **spiny lobster (*P. elephas*)**

While the **spiny lobster** designated feature is only known from direct evidence to be present in the area of the site inshore of 6 nm, this feature is mobile, and its supporting habitat may occur in the MMO regulated section of the MPA offshore of 6 nm. Likewise, the species is widely distributed throughout the inshore and offshore waters of south-west England, so lack of data indicating its presence in the MMO portion of Skerries Bank and Surrounds MPA does not necessarily indicate that it is absent.

Natural England have advised (Pers. Comm., August 2023) that spiny lobster should be screened into Part B of this assessment as the potential implementation of fisheries management measures within the MPA boundaries could be crucial to the species' persistence and/or recovery. Spiny lobster will therefore be taken forward for further 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[5];
- Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear[6]; and
- Stage 3 Fishing Gear MPA Impacts Evidence Traps[7].

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

[5] Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines: www.gov.uk/government/publications/stage-3-impacts-evidence (Last accessed on: 27 August 2024).
[6] Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear: www.gov.uk/government/publications/stage-3-impacts-evidence (Last accessed on: 27 August 2024).
[7] Stage 3 Fishing Gear MPA Impacts Evidence Traps: www.gov.uk/government/publications/stage-3-impacts-evidence (Last accessed on: 27 August 2024).

conservation advice packages, and Natural England 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 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 Skerries Bank and Surrounds MPA to be taken forward to Part B.

Potential pressures	Designated features											
	Moderate energy circalittoral rock			Subtidal coarse sediment			Subtidal sand			Spiny lobster (*P. elephas*)		
	A	B	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 hydrocarbon contamination												
Introduction of light												
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												
Physical change (to another seabed type)												
Physical change (to another sediment type)												
Removal of non-target species												
Removal of target species												
Smothering and siltation rate changes												
Synthetic compound contamination												
Transition elements and organo-metal contamination												
Underwater noise changes												

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 described by section 126 of the Marine and Coastal Access Act 2009[3].

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 Skerries Bank and Surrounds MPA conservation advice package and are shown in **Table 4.**

Table 4: Relevant favourable condition targets for identified pressures.

Features	Attribute	Target	Relevant pressures
Subtidal coarse sediment	Distribution: presence and spatial distribution of biological communities	Recover	• Abrasion /disturbance of the substrate on the surface of the seabed • Changes in suspended solids (water clarity) • Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion • Removal of non-target species • Removal of target species • Smothering and siltation rate changes (light)
	Structure: species composition of component communities		
	Extent and distribution	Maintain	
	Structure: sediment composition and distribution		
	Structure and function: presence and abundance of key structural and influential species	[Maintain OR Recover OR Restore]	
Subtidal sand	Distribution: presence and spatial distribution of biological communities	Maintain	
	Extent and distribution		
	Structure: sediment composition and distribution		
	Structure: species composition of component communities		
	Structure and function: presence and abundance of key structural and influential species	[Maintain OR Recover OR Restore]	

Features	Attribute	Target	Relevant pressures
Moderate energy circalittoral rock	Distribution: presence and spatial distribution of biological communities	Recover	• Abrasion /disturbance of the substrate on the surface of the seabed • Changes in suspended solids (water clarity) • Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion • Removal of non-target species • Removal of target species • Smothering and siltation rate changes (light)
	Structure: species composition of component communities		
	Extent and distribution	Maintain	
	Structure: physical structure of rocky substrate		
	Structure and function: presence and abundance of key structural and influential species	[Maintain OR Recover OR Restore]	
Spiny lobster (*P. elephas*)	Population: population size	Recover	• Removal of non-target species • Removal of target species
	Population: recruitment and reproductive capability		
	Presence and spatial distribution of the species		
	Structure and function: biological connectivity	Maintain	
	Supporting habitat: extent and distribution		
	Supporting habitat: food availability (species)		

4.1 Fisheries access and existing management

Fishing within both the IFCA and MMO portions of Skerries Bank and Surrounds MPA is currently managed via the South Devon Inshore Potting Agreement (IPA), which sets out spatial and temporal restrictions on fishing activity that extend beyond the 6 nm limit. This agreement is currently implemented inshore of 6 nm by Devon and Severn IFCA through the conditions of the Devon and Severn IFCA Mobile Fishing Permit Byelaw[8], and by fishing vessel licence conditions, which apply both inshore and offshore of 6 nm. Although the licence conditions came into effect in 2002, and the IFCA byelaw was implemented on 1 January 2014, the IPA reflects legacy byelaw management measures and informal arrangements for the use of specified fishing gears that have been in place since the 1970s.

The MMO portion of the MPA is subject to fishing management regimes under the IPA, shown in **Figure 2**. For vessels using demersal mobile fishing gears, including dredges, trawls and seines, Area 2 is permanently closed, whilst Zone 3 is seasonally open to permitted vessels using these gears from 1 January to 31 March. In the MMO portion of both Area 2 and Zone 3, scallop dredge and beam trawl equipment must also be kept totally inboard of the boat.

More information on existing fisheries management within the site can be found on the Devon and Severn IFCA website[8]. The Kingfisher fishing restriction map (Seafish, 2023) also contains information on MPA management measures for the portion of the site inshore of 6 nm.

As Skerries Bank and Surrounds MPA lies entirely within the 0 to 12 nm zone, the only non-UK vessels that can operate within the site are French and Belgian vessels using demersal gear in the area of the site offshore of 6 nm, which are licensed by the UK to do so. Use of demersal gear by these vessels is subject to the access restrictions and permit requirements of the IPA, implemented by fishing vessel licence conditions. VMS records indicate that the only non-UK vessels to have fished in Skerries Bank and Surrounds MPA between 2016 and 2021 were French. More information on non-UK vessel access to UK waters can be found on MMO's Single Issuing Authority page[9].

In 2024 a seasonal closure to protect spiny lobster in ICES area 7 was enacted through a fishing vessel licence variation, an extension of this closure is agreed to extend from December 2024 to May 2025. The closures are discussed further in **section 4.4**.

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[8] Devon and Severn IFCA - Current Permit Byelaws and Permit Conditions: www.devonandsevernifca.gov.uk/enforcement-and-legislation/current-permit-byelaws-permit-conditions (Last accessed on: 2 July 2024).

[9] The UK Single Issuing Authority: www.gov.uk/guidance/united-kingdom-single-issuing-authority-uksia (Last accessed on: 23 January 2024).

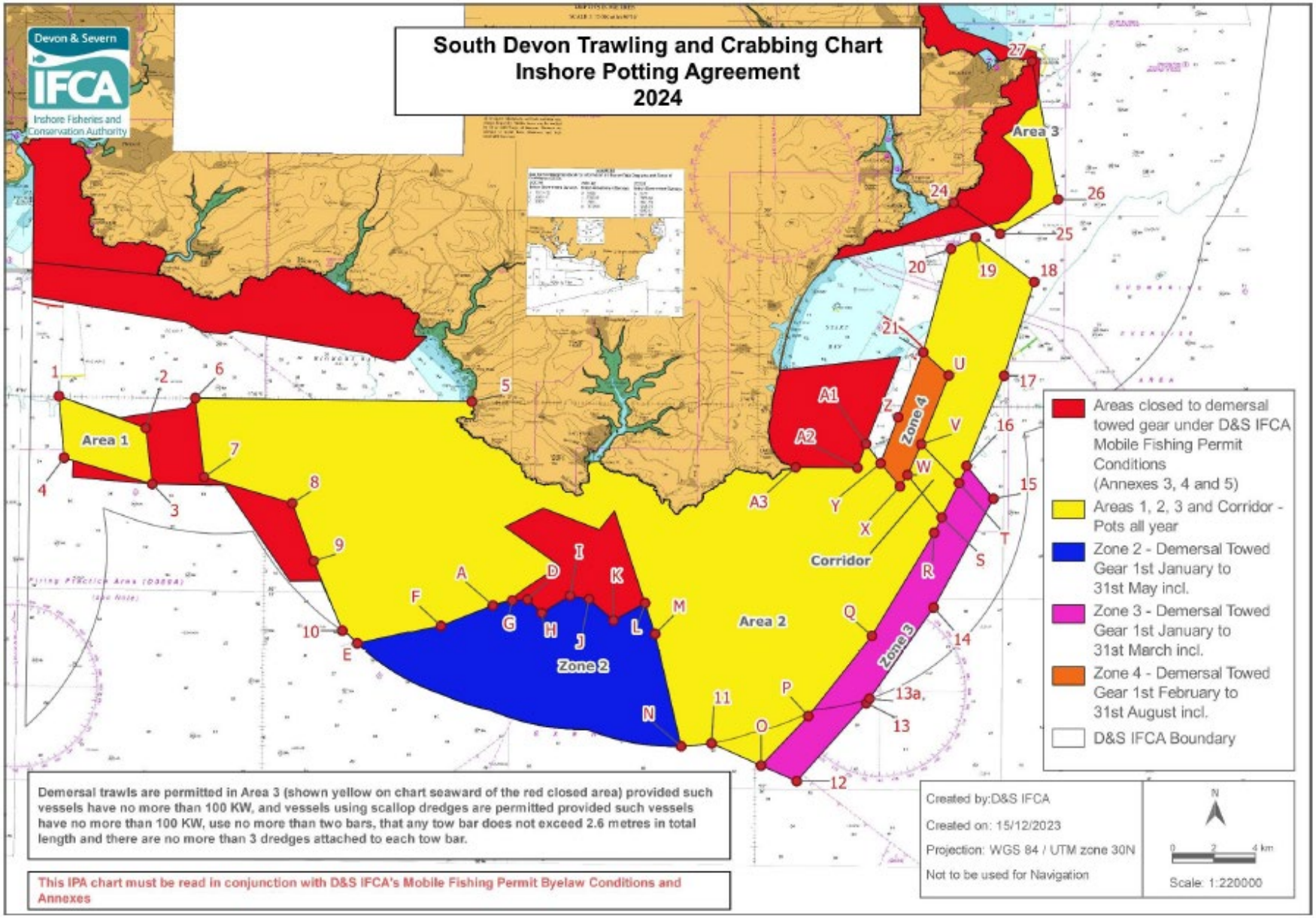

Figure 2: South Devon Inshore Potting Agreement (IPA) chart, 2024.

4.2 Fishing activity summary

Table A1. 1 to **Table A1. 8** in **Annexe 1** display a detailed breakdown of fishing activity within Skerries Bank and Surrounds MPA. The following analysis considers only fishing activities not screened out in Part A of this assessment; midwater and unknown gears are therefore not examined here. Unless otherwise stated, figures cover fishing activity attributed to the site between 2016 and 2021. When discussing weights from landings in this section, figures used are a total of weights from UK and EU member state vessels.

As described in **Section 4.1**, the current level of management in the MPA prohibits the use of bottom towed gear in Area 2, and that fishing using this gear group is subject to a seasonal closure in Zone 3 (**Figure 2**). This means that fishing effort is temporally and spatially condensed for bottom towed gear, with all fishing activity attributed to the site for bottom towed gear limited to a three-month period and the area of the site covered by Zone 3. Within Zone 3, potting effort is likewise temporally condensed, with activity limited to the nine months of the year where demersal activity is restricted.

VMS data show that the most prevalent gears operated by vessels over 12 m within the site were traps, followed by beam trawls, dredges and bottom otter trawls. Landings data for vessels over 12 m support this, with traps accounting for almost 92 % of landings by weight for vessels of this size, averaging approximately 32 tonnes (t) of catch per year. Beam trawl landings make up most of the remainder, with average landings of 2.73 t annually, whilst bottom otter trawls and dredges account for less than 0.5 % of over 12 m landings combined. According to VMS and landings data, anchored nets and lines were not used by the over 12 m fleet in the MMO portion of the site.

SAR analysis for 2016 to 2020 derived from VMS data, indicates that average annual surface SAR values for bottom towed gear activity in C-squares intersecting Skerries Bank and Surrounds MPA ranged between 2.1 and 3.2. An SAR value of 1 means that each area C-square experiences a pass of fishing gear on average once a year.

For vessels under 12 m in length, in the absence of VMS records, landings data have been used to determine activity levels. These data are recorded at ICES rectangle level and have been attributed to Skerries Bank and Surrounds MPA based on the proportion of ICES rectangle 29E6 intersected by the portion of the site offshore of 6 nm (approximately 0.35 %).

Because of this, there are limitations on the accuracy of this data, as it is only possible to estimate how much activity occurred in the MPA based on the average activity across the entire ICES rectangle, rather than at specific locations within the site. Likewise, apportioned landings from bottom towed gear are likely overestimates, as this method of assigning landings to the site does not account for

the spatial and temporal prohibitions on bottom towed gear within the MPA, which are not in place for much of ICES rectangle 29E6.

Nevertheless, as with larger vessels, under 12 m landings data show that the most prevalent gears used within the site were traps, followed closely by demersal trawls. These two gear categories account for approximately 35 % and 34 % of landings respectively, with dredges (8 %) and anchored nets and lines (7 %) accounting for the remaining gears considered here.

Fishing effort days derived from logbooks are, like landings data, apportioned based on the percentage overlap with the site and relevant ICES rectangles and are subject to similar limitations on accuracy, particularly with regard to bottom towed gears. Between 2016 and 2021, fishing effort attributed to the site from UK vessels under 12 m using static gear averaged approximately 11 days of fishing annually, with eight days attributable to traps and three days to anchored nets and lines. Bottom towed gear effort for this vessel group averaged approximately nine days annually, with almost eight of those days attributed to demersal trawls, and the remainder ascribed to dredges.

4.3 Pressures by gear type

The Stage 3 Fishing Gear MPA Impacts Evidence documents for anchored nets and lines[5], bottom towed gear[6] and traps[7] 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.

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.

Impacts from target and non-target removal pressures have been scoped out from this assessment in most cases, as the detail of key structural and influential species is yet to be fully defined and they are assessed more completely within the abrasion and penetration pressures. These pressures may require consideration as a result of any future evidence review, in conjunction with updated conservation advice from Natural England. Where separate consideration of these pressures is required, this has been stated.

For spiny lobster, the pressures removal of target and non-target species have been considered separately in **Section 4.4**.

Relevant biotopes, characteristic of the broadscale habitats found within the site, have been identified in the Natural England commissioned 'Skerries Bank and Surrounds MCZ Biotope Report' (Cefas, 2017). Given the complex mosaic of habitats that make up the site and uncertainty about the exact location of designated habitat features (Ocean Ecology Ltd., 2015), pertinent biotopes found in Area 2 and Zone 3 within the biotope scoping report have been considered here, as potentially present in the offshore portion of the site. The Marine Life Information Network (MarLIN) ratings for sensitivity, resilience and resistance, alongside Natural England's advice on operations[1], were then used to screen for biotopes potentially sensitive to pressures exerted by fishing activity from different gear groups. It is noted that even highly resistant biotopes may not recover from multiple disturbance events where the frequency of abrasion precludes the opportunity for recovery. Identified biotopes and their relevance to the assessment of the site are set out in **Annexe 2**.

4.3.1 Anchored nets and lines

The designated habitat features of Skerries Bank and Surrounds MPA have been considered in relation to the following pressures from anchored nets and lines, which were identified in **Table 3**.

As the designated features 'subtidal coarse sediment' and 'subtidal sand' have similar sensitivities to the pressures identified for anchored nets and lines, these features have been considered together.

- **Moderate energy circalittoral rock:**
    - Abrasion or disturbance of the substrate on the surface of the seabed; and
    - removal of non-target species.
- **Subtidal coarse sediment and subtidal sand:**
    - Abrasion or disturbance of the substrate on the surface of the seabed; and
    - removal of non-target species.

As noted in **section 4.3**, impacts from target and non-target removal pressures have been scoped out from further assessment, as they are assessed more completely within the 'abrasion' and 'penetration' pressures.

Section 4.2 describes fishing activity within Skerries Bank and Surrounds MPA and notes that in the MMO portion of the site, there are no records of this gear category being used by vessels over 12 m in length. Fishing effort and landings data for the under 12 m fleet attributed to the site indicate use of anchored nets and lines, specifically gill nets, trammel nets and longlines. As the fishing activity data for the under 12 m fleet does not indicate where it occurs within the site, MMO considers that the use of anchored nets and lines may be occurring over any of the designated features.

Moderate energy circalittoral rock

Of the 22 biotopes identified in Natural England's conservation advice package for moderate energy circalittoral rock within Skerries Bank and Surrounds MPA, two biotopes were identified in the conclusion of Cefas' biotope scoping report (Cefas, 2017), which according to MarLIN profiles (Tillin and Hiscock, 2016; De-Bastos, Hill, Lloyd, et al., 2023a) and Natural England's advice on operations[1], exhibit 'medium' sensitivity to pressures exerted by this gear group. These biotopes are:

- *'Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock'; and
- 'Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock'.

'U. felina' and 'Brittlestars' were identified from a combination of macrofaunal and particle size analysis of sediment samples, and video and still images and assigned to stations in Area 2, close to the shoreline. These biotopes exhibit medium sensitivity to 'abrasion' and 'removal of non-target species' pressures. '*U. felina'* was found in an area mapped as high energy circalittoral rock, while brittlestars were within an area mapped as subtidal coarse sediment, however the biotope report notes that moderate energy rock habitats are scattered throughout the offshore area of the MPA (Cefas, 2017). MMO therefore considers that either of the biotopes identified might be present in the MMO portion of the site.

The sensitivity assessment of the biotope '*Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock' is based upon the two characterising species, the dahlia anemone, *U. felina* and a sponge, *Ciocalypta penicillus*. The biotope is dominated by the dahlia anemone, which commonly occurs at the interface between rock and sand, where scour levels are highest, and where most species cannot tolerate conditions. The dahlia anemone is poorly studied, and details of its resilience are scant however, individuals that have been damaged are known to regenerate lost or damaged tentacles within a few days, however if bycatch results in all or a significant portion of the population being removed then recovery could be slow. There is no direct evidence available to assess the resilience of *C. penicillus*.

Both characterising species are susceptible to damage or mortality caused by abrasion, and therefore have 'low' resistance to this pressure. *U. felina* and *C. penicillus* may also be removed by nets as bycatch, and populations could be severely impacted if fishing activity is high. Individuals of both species can regenerate damaged portions and, so long as the population (or large parts of it) is not entirely removed, then recovery through reproduction and recolonisation from the remaining population could be occur over a period of two to ten years. However, given the slow growth rates and a brooding reproductive strategy of the dominant species, the dahlia anemone, the resilience and overall sensitivity of the biotope to both abrasion and the removal of non-target species is deemed to be 'medium' (Tillin and Hiscock, 2016).

Sensitivity assessments of the 'Brittlestars' biotope focus on the overlying brittlestar beds, with the dominant brittlestar species being *Ophiothrix fragilis* and *Ophiocomina nigra*. *O. nigra* is more common in the deeper waters and is therefore more likely to be present in the MMO portion of the site; this is a slow growing species with a lifespan of about 14 years. In contrast to *O. fragilis*, whose larval recruits initially settle on the arms of adults, the larvae of *O. nigra* are dominated by single size classes, suggesting that each bed may be settled by a single settlement of juveniles with no subsequent larval recruitment. If large numbers of the population remain then recovery may be rapid through repair of individuals and reaggregation of the remaining adults. However, if all or a large proportion of the population is removed then recovery may take between two and ten years due to the sporadic and intermittent recruitment of larvae – resistance is therefore thought to be 'low' and resilience and sensitivity of this biotope are therefore considered to be 'medium' (De-Bastos, Hill, Lloyd, et al., 2023a).

As detailed in section 7.3 of the anchored nets and lines Impacts Evidence document[5], damage to rock features themselves is unlikely, but gear may snag demersal structures or fragile sessile species. While anchored nets and lines have a comparatively small spatial footprint when considered in relation to other gear groups, abrasion impacts from ground lines and anchors may cause sediment disturbance and damage to epifaunal and epifloral communities, and this damage can be cumulative. The tangling nature of nets can also result in the degradation of ecologically important habitat or habitat forming species such as kelps, sponges and corals.

However, on average, between 2016 and 2021, annual landings within the site using anchored nets and lines totalled 0.58 t, all of which can be attributed to the UK under 12 m fleet, arising from an average of approximately three days of fishing effort. While in a worst-case scenario, all of this activity may have occurred over the moderate energy circalittoral rock, this is unlikely and effort over the scattered rock features is probably much lower. Therefore, although the biotopes '*U. felina'* and 'Brittlestars' both have medium sensitivity to the pressures 'abrasion' and 'removal of non-target species', abrasion caused by anchored nets and lines takes place over a small spatial footprint and the risk of significant impacts from these pressures from this gear group, given the activity levels considered here, is considered to be low.

Given the assessed activity levels and the evidence available for the impact of anchored nets and lines, MMO concludes that the impacts of 'abrasion or disturbance', 'removal of target species' and 'removal of non-target species' from 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 the moderate energy circalittoral rock feature within Skerries Bank and Surrounds MPA.

Subtidal coarse sediment and subtidal sand

Of the 12 biotopes identified in Natural England's conservation advice package[1] for subtidal coarse sediment within Skerries Bank and Surrounds MPA, three biotopes were identified in the conclusion of Cefas' biotope scoping report (Cefas, 2017) as

being present within the site, and are considered relevant to the MMO portion. These biotopes are:

- *'Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel';
- *'Glycera lapidum* in impoverished infralittoral mobile gravel and sand'; and
- *'Mediomastus fragilis, Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel'.

These biotopes were identified from a combination of macrofaunal and particle size analysis of sediment samples, and video and still images in Area 2 and Zone 3 of Skerries Bank and Surrounds MPA. '*M. fragilis*' and '*B. lanceolatum'* were the two most widespread biotopes found in the site, with the former dominating the offshore region and the latter mostly found alongside '*M. fragilis*' in the southern part of the MPA. '*G. lapidum'* was assigned to one station, at the northernmost corner of Zone 3 (Cefas, 2017). MarLIN profiles (Tillin and Watson, 2023a, 2023b, 2023c) and Natural England's advice on operations[1] note that all three biotopes exhibit 'low' sensitivity and 'high' resilience to pressures exerted by this gear group.

Of the 13 biotopes identified in Natural England's conservation advice package[1] for subtidal sand within Skerries Bank and Surrounds MPA, four biotopes were identified in the conclusion of Cefas' biotope scoping report (Cefas, 2017) as being present within the site. Of these, two biotopes are considered relevant to the MMO portion, as the other two biotopes were found in the area of the site inshore of 6 nm, and are found in habitats shallower than 30 m - these have been screened out, due to the depth of the area of the site under consideration here (Tillin and Garrard, 2022; Tillin and Rayment, 2022). These biotopes are:

- *'Echinocyamus pusillus, Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'; and
- '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment'.

The '*Abra alba*' biotope was found to be the fourth most common biotope in the site, and was mostly found in the northeastern portion of Area 2, inshore of 6 nm. '*E. pusillus'* was assigned to stations in the same area of the site, and in the southernmost part of Area 2, close to the MMO portion of the MPA. MarLIN profiles (Tillin, 2022; Tillin and Budd, 2023) and Natural England's advice on operations[1] note that , as with the identified 'subtidal coarse sediment' biotopes, remaining biotopes exhibit 'low' sensitivity and 'high' resilience to pressures exerted by this gear group.

Abrasion impacts are considered likely to be greatest on subtidal mixed and coarse sediments as the coarser habitats often contain populations of sessile epifauna; these impacts occur primarily from footropes and anchors during the hauling of this gear, and during movement along the seabed due to tides, currents, or storms. However, as per section 9.3 of the anchored nets and lines Impacts Evidence document[5], abrasion impacts from this gear type 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.

With regards to the discussion above, given the 'low' sensitivity of identified biotopes, the assessed activity levels and the evidence available for the impact of anchored nets and lines, MMO concludes that the impacts of 'abrasion or disturbance' and 'removal of target species' from the ongoing use of anchored nets and lines at the levels described within Skerries Bank and Surrounds MPA, does not pose a significant risk of hindering the achievement of the conservation objectives of the features 'subtidal coarse sediment' and 'subtidal sand'.

4.3.2 Bottom towed gear

The following features of Skerries Bank and Surrounds MPA have been considered in relation to the pressures of bottom towed gear identified in **Table 3** and are:

Moderate energy circalittoral rock, subtidal coarse sediment and subtidal sand:

- Abrasion or disturbance of the substrate on the surface of the seabed$^{\Delta}$;
- changes in suspended solids (water clarity)*;
- penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion$^{\Delta}$;
- removal of non-target species;
- removal of target species (dredges only); and
- smothering and siltation rate changes (light)*.

As noted in **section 4.3**, impacts from target and non-target removal pressures have been scoped out from further assessment, as they are assessed more completely within the 'abrasion' and 'penetration' pressures. Pressures marked with matching superscript symbols ($^{\Delta}$ and *) have been consolidated due to the similar nature of their impacts on features. Where there are differences between the features or the potential impacts of different gears within each grouping, this has been highlighted.

As described in **section 4.2**, fishing effort is temporally and spatially condensed for bottom towed gear, with all landings limited to a three-month period and the area of the site covered by Zone 3 (**Figure 2**). The majority of bottom towed gear activity between 2016 and 2021 can be attributed to demersal trawls, specifically beam trawls for vessels over 12 m in length and bottom otter trawls for vessels under 12 m, with lower levels of dredge activity from both vessel groups. Likewise, bottom towed gear effort for under 12 m vessels totalled approximately 52 days, with nearly 45 days attributed to demersal trawls, and the remainder ascribed to dredges.

Moderate energy circalittoral rock

As per **section 4.3.1**, of the 22 biotopes identified in Natural England's conservation advice package for moderate energy circalittoral rock within Skerries Bank and Surrounds MPA, two biotopes were identified in the conclusion of Cefas' biotope scoping report (Cefas, 2017), which according to MarLIN profiles (Tillin and Hiscock, 2016; De-Bastos, Hill, Lloyd, et al., 2023a) and Natural England's advice on operations[1], exhibit 'medium' sensitivity and 'low' resistance to pressures exerted by this gear group. These biotopes are:

- *'U. felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock'; and
- 'Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock'.

One additional biotope was recorded in Area 2 of the site, which has been precautionarily included here:

- '*Caryophyllia smithii*, sponges and crustose communities on wave-exposed circalittoral rock'

and while not included in the conclusion of the Cefas report - where combined survey data were used to assign biotopes - the characterising species, *C. smithii*, is a component species of other biotopes identified in Natural England's conservation advice package (**Table A2. 1**). Although characterised as low sensitivity, the resistance of this biotope is 'medium' for 'abrasion' and 'removal of non-target species'. The biotope has therefore been scoped in due to the potential for impact from multiple passes of bottom towed gear, a possibility suggested by the average SAR values for C squares intersecting this site.

As previously noted, biotopes were identified from a combination of macrofaunal and particle size analysis of sediment samples, and video and still images. '*U. felina'* was found in an area mapped as high energy circalittoral rock, while 'Brittlestars' were within an area mapped as subtidal coarse sediment. While of the biotopes under consideration here, only '*C. smithii'* was found in areas of moderate energy circalittoral rock, the biotope report notes that moderate energy rock habitats are scattered throughout the offshore area of the MPA (Cefas, 2017). MMO therefore considers that either of the biotopes identified within other broadscale habitats might be present in the MMO portion of the site.

Both '*U. felina'* and 'Brittlestars' have 'medium' sensitivity to 'abrasion' and 'removal of non-target species' pressures, with 'Brittlestars' additionally exhibiting 'medium' sensitivity to 'smothering and siltation rate changes' from bottom towed gear (Tillin and Hiscock, 2016; De-Bastos, Hill, Lloyd, et al., 2023a). These two biotopes exhibit 'low' resistance to 'abrasion' and 'removal of non-target species', while '*C. smithii'* shows 'medium' resistance to these pressures. As noted above, this is key in understanding the impact of multiple passes of bottom towed gear on the component communities and habitats of designated features.

Most studies assessing bottom towed fishing impacts focus on soft sedimentary habitats (Roberts et al., 2010), with few empirical studies quantifying the impact of fisheries to hard bottom habitats (Defra, 2014). Empirical studies of bottom towed gear on rocky reefs are generally restricted to non-UK habitats and assessing the impacts of experimental trawling (Defra, 2014). Consequently, this assessment uses both direct peer-reviewed evidence and grey literature to review the impacts of bottom towed fishing gear on rocky reef features.

Bottom towed gear can abrade the substrate of rocky reefs, leading to damage and removal of the attached and associated epifauna. Fishing gear components (for example, bridles and sweeps) can snag on rocks, causing abrasion damage and leading to rocks and boulders being rolled, moved, and displaced (Freese et al., 1999; Hall-Spencer et al., 2002; Grieve et al., 2014). Bottom towed gear can also

modify and homogenise the substrate, as soft rocks are broken up (Attrill et al., 2011). Although harder substrate is relatively resistant to physical damage, bottom towed fishing gears can still damage the substrate and its associated communities (Roberts et al., 2010).

Bedrock, boulder, and cobble reef have variable levels of accessibility for bottom towed fishing and thus variable levels of vulnerability to physical damage. Steep rock, uneven ground and boulder reef are generally unsuitable for bottom trawls and dredges due to the risk of gear damage (Howarth and Stewart, 2014). However, rocky reefs can still be damaged if they are located amongst or adjacent to commercially viable fishing grounds (Boulcott and Howell, 2011) or they are fished by towed gears that are designed for rocky habitats, such as rock-hopper trawls (Hartnoll, 1998; Roberts et al., 2010).

Bottom towed gears may indirectly impact rocky reef communities through increased sediment load (Hartnoll, 1998). Suspended material can affect the efficiency of filter feeding species that are frequently found on sublittoral rock habitats (Hartnoll, 1998). Depending on the extent of siltation, moderate and high energy circalittoral rock can have medium-to-high sensitivity to this pressure (Tillin et al., 2010) with increased sediment loading particularly posing a risk to rocky habitats found adjacent to soft sediments subjected to demersal towed fishing (Hartnoll, 1998). However, direct physical impacts are generally considered the highest concern for the impacts of bottom towed fishing on rocky reef habitats (Hall et al., 2008).

Although harder rock substrates are less vulnerable to physical damage, bottom towed gear can substantially impact the fauna and flora associated with sublittoral rock habitats. Towing trawls across rocky substrates can cause damage or death to substantial proportions of large, upright attached species, such as sponges and corals (Løkkeborg, 2005). For example, in the Gulf of Alaska during bottom trawling on pebble, cobble and boulder habitats, 67 % of sponges were damaged during a single trawl pass (Freese et al., 1999). Other species, such as hydroids, anemones, bryozoans, tunicates, and echinoderms are also vulnerable to damage (Freese et al., 1999; Sewell and Hiscock, 2005). Alongside, the removal of erect epifaunal and large sessile species (Sewell and Hiscock, 2005), trawling can lead to habitat homogenisation and reduced biodiversity and habitat complexity (Engel and Kvitek, 1998; Freese et al., 1999; Sewell and Hiscock, 2005; Attrill et al., 2011; Goodwin and Picton, 2011). As shown by Boulcott and Howell (2011), not all epifauna on rocky reefs may be damaged during trawls due to inconsistent contact between the gear and the seabed on uneven ground. However, due to the gear bouncing off the substrate, bottom towed gear can cause incremental damage to benthic communities in rocky habitats, which contrasts to loose sediment habitats where the majority of damage occurs on the first pass (Boulcott and Howell, 2011).

The impacts of bottom towed fishing on rocky reef habitats will depend on several factors, such as gear type, gear design and fishing intensity (Van Dolah et al., 1987; Engel and Kvitek, 1998). Impacts are also likely to be variable due to the wide variety

of structures and communities present (Connor et al., 2022). For example, communities with higher proportions of larger, long-lived, fragile, and sessile epifauna may be the most vulnerable (Roberts et al., 2010; Hiddink et al., 2017). Resistance to damage at a physical level may also vary with substrate type. Additionally, impacts may vary with environmental conditions and topographical variation (Kaiser et al., 2006; Hinz et al., 2011), for example water temperature and depth may affect the recovery of sponges (Van Dolah et al., 1987) and habitats with higher topographical variation may have patchier impact due to the gears bouncing off the substrate, which protects species in crevices (Boulcott and Howell, 2011).

As discussed, the sensitivity of rocky reef habitats is likely to be highly variable due to the wide variety of communities that can be present (Roberts et al., 2010). For example, rocks with erect branching species may have high sensitivity to all bottom towed gear types (even at low levels of fishing intensity), whereas rocks with low-lying and fast-growing fauna may have low sensitivity, albeit to a single gear pass (Hall et al., 2008; Eno et al., 2013). However, generally rocky habitats are considered sensitive to bottom towed fishing gears: a non-quantitative sensitivity assessment developed by Tillin et al. (2010) assessed the sensitivity of MPA features to various pressures. This sensitivity matrix classified moderate and high energy circalittoral rock as having medium or medium to high sensitivity to penetration and abrasion pressures, except for moderate energy circalittoral rock, which had low-to-high sensitivity to surface abrasion. However, it should be noted that even highly resistant biotopes may not recover from multiple disturbance events where the frequency of abrasion precludes the opportunity for recovery.

Recovery rates for the habitats associated with rocky reef will similarly depend on the species present. Recovery rates may vary with life history characteristics, larval longevity, dispersal potential, recruitment, and growth rates (Roberts et al., 2010; Kaiser et al., 2018). Some subtidal rock organisms may have strong regenerative abilities, whereas some sessile species rely on spawning events to recolonise, which can prevent reestablishment if fishing occurs frequently in between spawning events (Roberts et al., 2010). The longevity of species will also be critical to recovery rates, with short-lived fauna (for example, with lifespans of one to three years) potentially recovering from trawling in six months to three years, whereas long lived fauna (for example, with lifespans over ten years) may take up to eight years to recover (Hiddink et al., 2019).

For the identified biotopes in Skerries Bank and Surrounds MPA, this particularly applies to *O. nigra*, the characterising species of the ‘brittlestars’ biotope that is more likely to be present in the MMO portion of the site. While the fragile arms of brittlestars are able to regenerate, as a long-lived epifaunal species with sporadic recruitment, if a significant proportion of a population were lost recovery would require larval recolonization which could take between two and ten years, depending on the footprint, frequency, duration and magnitude of the abrasion pressure exerted by the gear in question (De-Bastos, Hill, Lloyd, et al., 2023a). MarLIN profiles likewise note the sensitivity of infaunal and epifaunal communities in brittlestar beds

to repeated abrasion and penetration from fishing, where removal or displacement of the substrata is possible, leading to potential loss or severe damage to the biotope over time (De-Bastos, Hill, Garrard, et al., 2023).

Likewise, for the '*U. felina'* biotope*,* the brooding and reproductive strategy of the long-lived dahlia anemone (a characterising species) means that removal or mortality of the majority of local individuals to pressures from bottom towed gear and inability of the species to recover, could lead to a predominance of more tolerant, faster reproducing species ultimately leading to reclassification of the biotope (Tillin and Hiscock, 2016). While the characterising slow growing cup coral of the biotope '*C. smithii'* is noted to have good dispersal capability due to the 10-week pelagic stage of its swimming planula following fertilisation, C. smithii may take up to two years to recover if removed (Stamp, Lloyd, et al., 2023)

Smothering, siltation rate and suspended solid changes occur when bottom towed gear connects with the seabed, causing the top layer of the sediment to mix with the surrounding water. Sediments and faunal communities react differently to these pressures depending on grain size, the degree of sediment impaction and frequency/severity of the pressure upon them. For *O. fragilis*, a single event of light, fine material deposition can cause negative effects, with sedimentation affecting ability to feed and filter material, clogging gills and filter mechanisms and impairing respiration - where material is not removed by water movement, this can lead to suffocation (De-Bastos, Hill, Garrard, et al., 2023).

Evidence from the UK provides an indication that rocky reef habitats can recover from the impacts of bottom towed fishing when this pressure is removed. In 2008, the use of bottom towed fishing gear was prohibited in Lyme Bay for the purpose of maintaining and recovering the benthos in this circalittoral rock, boulder, and cobble reef habitat (Attrill et al., 2012). Three years after the closure, species abundance, diversity and richness improved (Attrill et al., 2012) with changes indicating recovery of some epibenthic fauna (Sheehan et al., 2013). However, not all sites in the MPA exhibited recovery trends ((Attrill et al., 2012), potentially due to variation in life-history characteristics (Kaiser et al., 2018), with long-lived species such as pink sea-fan and Ross corals (*Pentapora foliacea*), potentially taking 17 to 20 years to recover, whereas shorter-lived species (such as scallops and dead man's fingers, *Alcyonium digitatum*) taking 2.5 to 6 years to recover.

These findings are potentially reflected in surveys of Skerries Banks and Surrounds MPA. A comparative study of Area 2 and Zone 3 (**Figure 2**) conducted in 2015 by Ocean Ecology Ltd., noted the increased frequency of taxa that experience moderate sensitivity to physical disturbance in Area 2, where bottom towed gear is prohibited, compared to Zone 3, where this prohibition is seasonal, noting that highly sensitive erect sponges found in Area 2 were entirely absent from Zone 3 (Ocean Ecology Ltd., 2015). Likewise, the 'Skerries Bank and Surrounds MCZ Post-survey Site Report' shows the presence of the designated pink sea-fan feature only within the area subject to the demersal gear ban (Defra, 2015). However, as noted in the

comparative study, habitat variability across the site should not be excluded as the cause of epifaunal differences; Ocean Ecology's report nevertheless suggested that continued demersal fishing activity may have perpetuated the greater homogenisation of substrates in Zone 3, alongside possible direct detrimental impacts on sensitive species (Ocean Ecology Ltd., 2015).

Although several factors can affect habitat recovery (for example, environmental changes and other anthropogenic disturbances), the prohibition of bottom towed fishing in Lyme Bay and the subsequent positive change for most species over the following ten years indicates that such fishing activities are incompatible with rocky reef habitats and other areas of substantial hard substrate that have an affinity for species with poor recoverability (Kaiser et al., 2018). Consequently, bottom towed fishing should be entirely avoided in these habitats within MPAs (Kaiser et al., 2018).

While rocky reef habitats are highly variable and some communities (for example, those highly exposed to energy) may be more resilient to bottom towed gear impacts (Defra, 2014), available evidence indicates that bottom towed gear is a risk to the condition of rocky reef and the associated benthic communities. Although hard rocky substrates themselves may be resistant to physical damage, bottom towed gear can damage and remove attached epifauna and alter the habitat by breaking down and moving rocks and boulders. Despite limited empirical studies, the available literature suggests that subtidal rocky habitats are at risk of significant impacts from bottom towed gear (Defra, 2014).

In Skerries Banks and Surrounds MPA, this finding is supported by Natural England's recent condition assessment for the site, which determined through use of proxy data, expert judgement and improved site knowledge. that the moderate energy circalittoral rock feature was in unfavourable condition and 'declining'[1]. Two out of four principal attributes of the feature failed to meet targets, 'Distribution: presence and spatial distribution of biological communities' and 'Structure: species composition of component communities, with the 'adverse condition driver' for both given as 'fishing' alongside the associated pressures 'penetration' and 'removal of non-target species'. The assessment rationale concluded that 'damaging activities are continuing, and this is likely to be leading to a continued decline in the condition. Recovery is possible if suitable management input is made'[1].

As previously discussed, landings from bottom towed gear in the MMO portion of the site averaged approximately 7 t per year between 2016 and 2021, and these landings are confined to a three-month period in Zone 3, as Area 2 is permanently closed to bottom towed gear throughout the year (**Figure 2**). This indicates intensive use of this gear type during the period where demersal gear is permitted. This is also shown in the SAR values in the site, which suggest that on average each C square experiences a pass of bottom towed gear approximately three times a year (**Table A1. 7**). As moderate energy circalittoral rock is scattered throughout the site, bottom towed gear usage within this area has likely exposed this feature to associated pressures to which the substrate is known to be sensitive. Such activity at the levels

described is likely to cause significant damage to the ecological communities associated with this habitat, particularly for the identified biotopes with medium sensitivity to 'abrasion' and 'penetration'. **Given the assessed activity levels and the evidence available for the impact of bottom towed gear, MMO concludes that the impacts of the identified pressures from the ongoing use of bottom towed gear at the levels described, poses significant risk of hindering the achievement of the conservation objectives of the moderate energy circalittoral rock feature within Skerries Bank and Surrounds MPA.**

Subtidal coarse sediment

As described in **section 4.3.1**, of the 12 biotopes identified in Natural England's conservation advice package[1] for subtidal coarse sediment within Skerries Bank and Surrounds MPA, three biotopes were identified in the conclusion of Cefas' biotope scoping report (Cefas, 2017) as being present within the site, and are considered relevant to the MMO portion. These biotopes are:

- *'Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel';
- *'Glycera lapidum* in impoverished infralittoral mobile gravel and sand'; and
- *'Mediomastus fragilis, Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel'.

These biotopes were identified from a combination of macrofaunal and particle size analysis of sediment samples, and video and still images in Area 2 and Zone 3 of Skerries Bank and Surrounds MPA. '*M. fragilis*' and '*B. lanceolatum'* were the two most widespread biotopes found in the site, with the former dominating the offshore region and the latter mostly found alongside '*M. fragilis*' in the southern part of the MPA. '*G. lapidum'* was assigned to one station, at the northernmost corner of Zone 3 (Cefas, 2017).

MarLIN profiles (Tillin and Watson, 2023a, 2023b, 2023c) and Natural England's advice on operations[1] note that while '*M. fragilis*' exhibits 'low' sensitivity and 'high' resilience to pressures exerted by bottom towed gear, '*B. lanceolatum'* shows 'medium' sensitivity to 'penetration' and '*G. lapidum'* has 'medium' sensitivity to 'removal of target species' from dredges. As noted in **section 4.3**, impacts from target removal pressures have been scoped out from this assessment in most cases, as the detail of key structural and influential species is yet to be fully defined and they are assessed more completely within the abrasion and penetration pressures.

The 'penetration' pressure caused by bottom towed gears have both biological and physical impacts to sediment features, varying based on levels of activity and fishing intensity, as described in section 8.4.1 of the bottom towed gear Impacts Evidence document[6]. Physical impacts range from the creation of furrows and berms in the sediment, to the flattening of bottom features such as ripples and the homogenisation of sediments.

Indeed, this homogenisation effect within Skerries Bank and Surrounds MPA may be described in Ocean Ecology's comparative report on substrates found in Area 2 (no bottom towed gear) and Zone 3 (seasonal use of demersal gears). Comparing differences in the sediment types and epifaunal communities between the two areas, the report noted that 'whilst both areas were largely dominated by coarse sediments … there were some subtle differences in the proportions of particle sizes that could potentially be indicative of alterations to the substrate surface attributable to the use of mobile gears in Zone 3', with Area 2 containing sediments with a greater proportion of gravel, in contrast to Zone 3 where there were greater proportions of sand and mud (Ocean Ecology Ltd., 2015). The observed differences in sediment composition and decreased epifaunal community diversity in Zone 3 might be indicative of physical disturbance of the habitat and the wider biological community caused by bottom towed gear. However, the three subtidal coarse sediment biotopes present are not characterised by their epifaunal communities; instead, they are characterised by the sediment composition and the composition of their infaunal communities. As the Ocean Ecology report is based on visual analysis only, on its own it cannot be used to assess the compatibility of using bottom towed fishing gear with achieving the conservation objective for subtidal coarse sediment.

Nevertheless, the species *B. lanceolatum* favours coarser sediments and that higher mud contents may lead to its exclusion from sediment habitats (Tillin and Watson, 2023a). As previously discussed, within the MMO portion of the site the distribution of the biotope '*B. lanceolatum'* loosely corresponds with areas that are permanently closed to bottom towed fishing gear (Cefas, 2017). It is possible that the distribution of this biotope is to some extent influenced by variability in sediments arising from seasonal exposure to bottom towed fishing activity, reflecting impacts of pressures associated with bottom towed gear on designated sedimentary features and their viability as habitats for characteristic biotopes.

Direct biological impacts from bottom towed gear to sediment biotopes include damage and mortality to flora and fauna on the seabed via surface and subsurface abrasion and penetration, as well as long term shifts in biological communities towards smaller, short-lived, opportunistic species that exhibit greater resilience to anthropogenic activity. Communities in subtidal coarse sediment can be particularly sensitive to bottom towed gear activity because they generally contain large proportions of long-lived and sessile epifauna which are easily damaged or removed by the pass of bottom towed gears leading to reduced diversity, abundance and occurrence[6].

Though evidence for sensitivity to below surface abrasion and penetration of the keystone species '*B. lanceolatum*' in that biotope is limited, some robustness is suggested by the species' ability to survive dredging to gather live samples for scientific study, and the species ability to regenerate portions when damaged. In Sardá et al.'s study of the species (2000), recolonisation following dredging in shallow Mediterranean waters was rapid. However these results may differ in UK habitats and the same study found that other species within the '*B. lanceolatum*'

biotope such as *Glycera* spp. are able to recolonise less rapidly, likely due to slower growth rates and longer lifespans (Sardá et al., 2000). Likewise, more fragile species such as *Echinocyamus pusillus*, are likely to experience greater mortality and experience higher sensitivity than '*B. lanceolatum*', though evidence of this is currently limited (Tillin and Watson, 2023a).

High levels of natural disturbance may mean that the effects of 'abrasion' and 'penetration' pressures are limited on the physical structure of sedimentary habitats. However, while the relative resilience of biological communities on sandy sedimentary habitats could be due to natural disturbance, there is also evidence that use of bottom towed gear can result in shifting baselines for biological communities from lower resilience, longer-lived, slower recruiting fauna to more resilient opportunistic, short-lived, faster reproducing species (Hiddink et al., 2017; Plumeridge and Roberts, 2017; Josefson et al., 2018).

The types of bottom towed fishing gear in use within Skerries Bank and Surrounds MPA include bottom otter trawls, beam trawls, nephrops trawls and dredges. These gear types are associated with the 'penetration' pressure to which the '*B. lanceolatum*' biotope has medium sensitivity. Fishing intensity in the seasonally open portion of the site is not unsubstantial, with an average of approximately 6.5 t of catch landed annually during the three-month period that it is open. Of this, approximately 3.6 t is landed by vessels under 12 m, representing 43 % of average annual landings by the under 12 fleet in the MMO portion of the site, indicating that relatively intensive fishing occurs when these grounds are open (**Table A1. 2, Table A1. 3, Table A1. 5** and **Table A1. 6**). This is supported by the estimated fishing effort for under 12 m vessels, that bottom towed gear used offshore of 6 nm accounted for approximately 35 % of annual effort for the period under consideration (**Table A1. 8**). SAR data likewise indicate that C-squares intersecting Skerries Bank and Surrounds MPA may be experiencing between on average two to three passes of bottom towed gear per year (**Table A1. 7**).

Finally, as previously discussed, the recent Skerries Banks and Surrounds MPA Natural England condition assessment for the site determined that the subtidal coarse sediment feature was in unfavourable condition and 'declining'[1]. One out of three principal attributes of the feature failed to meet its target: 'Distribution: presence and spatial distribution of biological communities', with the 'adverse condition driver' given as 'fishing' alongside the associated pressures 'abrasion' and 'removal of non-target species'. The assessment rationale concluded that continued use of bottom towed gear, even seasonally, would not allow for full recovery, stating that 'recolonisation may be achievable for some opportunistic species, but both the smaller and larger species associated with the [subtidal coarse sediment] biotope A5.142 do not have the ability to make a full biomass recovery within the trawled areas', concluding that the recovery period for all associated species would be a minimum of two years[1]. It noted that the confidence level associated with the condition report is 'low' because it was based on expert judgement, based on partial and proxy evidence. However, taken together with the sensitivity assessments of biotopes mapped in this portion of the MPA, along with evidence of modification of

the sediments and potential changes to the epifaunal biological community provided by the Ocean Ecology report, it is reasonable to take a precautionary approach when assessing the risk posed by bottom towed gear.

Given the assessed activity levels and the evidence available for the impact of bottom towed gear, MMO concludes that the impacts of the identified pressures from the ongoing use of bottom towed gear at the levels described, poses a significant risk of hindering the achievement of the conservation objectives of the subtidal coarse sediment feature within Skerries Bank and Surrounds MPA.

Subtidal sand

Of the 13 biotopes identified in Natural England's conservation advice package[1] for subtidal sand within Skerries Bank and Surrounds MPA, four biotopes were identified in the conclusion of Cefas' biotope scoping report (Cefas, 2017) as being present within the site. Of these, two biotopes are considered relevant to the MMO portion, as the other two biotopes were found in the area of the site inshore of 6 nm, and are found in habitats shallower than 30 m - these have been screened out, due to the depth of the area of the site under consideration here (Tillin and Garrard, 2022; Tillin and Rayment, 2022). These biotopes are:

- *'Echinocyamus pusillus, Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'; and
- '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment'.

The '*Abra alba*' biotope was found to be the fourth most common biotope in the site and was mostly found in the northeastern portion of Area 2, inshore of 6 nm (**Figure 2**). '*E. pusillus'* was assigned to stations in the same area of the site, and in the southernmost part of Area 2, close to the MMO portion of the MPA.

MarLIN profiles (Tillin, 2022; Tillin and Budd, 2023) and Natural England's advice on operations[1] note that, these remaining biotopes exhibit 'low' sensitivity and 'high' resilience to all pressures exerted by bottom towed gear, apart from 'removal of target species' for which both have 'medium' sensitivity. As noted in section 4.3, impacts from target removal pressures have been scoped out from this assessment in most cases, as the detail of key structural and influential species is yet to be fully defined and they are assessed more completely within the abrasion and penetration pressures.

When assessing the risk of bottom towed gears hindering the conservation objectives for subtidal coarse sediment, it was the sensitivity of the relevant biotopes to penetration and/or disturbance of the substrate below the surface of the seabed that was the most crucial consideration. In contrast to the subtidal coarse sediment biotopes, all the subtidal sand biotopes that may be present have low sensitivity to penetration, due to the high resilience of the associated biological communities which are either capable of rapid recovery following the pass of bottom towed gear, adapted to frequent disturbance, or robust enough to tolerate associated pressures

(Tillin, 2022; Tillin and Budd, 2023). Consequently, although the landings, effort and SAR data associated with bottom towed gear activity must be assumed to be the same as for subtidal coarse sediments, the impacts of bottom towed gear are likely to be less severe on the subtidal sand biotopes.

The recent Natural England condition assessment for Skerries Banks and Surrounds MPA determined that 'the impact on species composition of component communities is in a range where it is not currently hindering the conservation objectives' of the site, when considering the interaction between bottom towed fishing gear and the subtidal sand feature. The 'maintain' target set for this feature does not however, preclude the need for management, now or in the future, to avoid a significant risk of damage or deterioration to the features of the site. Given that subtidal sand occurs in a mosaic with subtidal coarse sediment, and as management of this feature alone would not be possible, a precautionary approach is suggested to implement management for both features simultaneously.

With regards to the discussion above, given assessed activity levels and the evidence available for the impact of bottom towed gear, MMO concludes that the impacts from the ongoing use of bottom towed gear at the levels described within Skerries Bank and Surrounds MPA, may pose a significant risk of hindering the achievement of the conservation objectives of the feature 'subtidal sand'.

4.3.3 Traps

The designated habitat features of Skerries Bank and Surrounds MPA - moderate energy circalittoral rock, subtidal coarse sediment and subtidal sand - have been considered in relation to the following pressures from bottom towed gear, which were identified in **Table 3**:

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

As noted in **section 4.3**, impacts from target and non-target removal pressures have been scoped out from this assessment in most cases, as the detail of key structural and influential species is yet to be fully defined and they are assessed more completely within the abrasion and penetration pressures.

Section 4.2 describes fishing activity within the site and describes the prevalence of traps in usage by both the under and over 12 m fleet. In landings data for vessels over 12 m, traps accounted for almost 92 % of landings by weight, averaging approximately 32 t of catch per year, while for under 12 m vessels traps constituted approximately 35 % and 3 t of landings on average per year. Within Zone 3 (**Figure 2**), potting effort is temporally condensed, with activity limited to the nine months of the year where demersal activity is restricted.

Moderate energy circalittoral rock

As per **section 4.3.1**, of the 22 biotopes identified in Natural England's conservation advice package for moderate energy circalittoral rock within Skerries Bank and Surrounds MPA, two biotopes were identified in the conclusion of Cefas' biotope scoping report (Cefas, 2017), which according to MarLIN profiles (Tillin and Hiscock, 2016; De-Bastos, Hill, Lloyd, et al., 2023a) and Natural England's advice on operations[1], exhibit 'medium' sensitivity to pressures exerted by this gear group. These biotopes are:

- '*U. felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock'; and
- 'Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock'.

As previously noted, '*U. felina'* and 'Brittlestars' biotopes were identified from a combination of macrofaunal and particle size analysis of sediment samples, and video and still images. 'U. felina' was found in an area mapped as high energy circalittoral rock, while 'Brittlestars' were within an area mapped as subtidal coarse sediment. However, the biotope report notes that moderate energy rock habitats are scattered throughout the offshore area of the MPA (Cefas, 2017). MMO therefore considers that either of the biotopes identified might be present in the MMO portion of the site.

Both identified biotopes have ‘medium’ sensitivity to ‘abrasion’ and ‘removal of non-target species’ pressures from traps (Tillin and Hiscock, 2016; De-Bastos, Hill, Lloyd, et al., 2023a). The characteristics and sensitivities of these biotopes to these pressures have previously been discussed in **section 4.3.1** in relation to anchored nets and lines.

As outlined in the traps Impacts Evidence document[7], traps and associated lines and anchors may cause abrasion of moderate energy circalittoral rock during setting and retrieval of gear, as well as from movement of set gear on the seabed as a result of storms, tides or currents. There is little primary evidence on the physical impact of traps on subtidal sediments, and the footprint of traps is likely to be small (Roberts et al., 2010). The evidence that is available indicates that traps are not likely to be a concern unless used at particularly high levels of intensity, or if particularly sensitive species are present.

Fishing effort and landings data indicate that interactions between traps and the designated features are occurring, so there is a risk of the ‘abrasion and disturbance’ pressure impacting on rock features within the site. However, in contrast to the impacts of bottom towed gear, the abrasive spatial footprint of traps is much lower, with one study (Gall et al., 2020) reporting that in most cases, rope movement is minimal and that the estimated length of the seabed contact area is about 3 m^2 per trap or pot. The likelihood of gear snagging on demersal structures and upright sessile organisms is also lower for traps than it is for anchored nets, meaning that habitat forming species such as kelps, sponges and corals are less likely to be impacted.

While in a worst-case scenario, all trap activity described for the period under consideration may have occurred over the moderate energy circalittoral rock, this is unlikely and effort over the scattered rock features is probably much lower. Therefore, although the biotopes ‘*U. felina’* and ‘Brittlestars’ both have medium sensitivity to the pressures ‘abrasion’ and ‘removal of non-target species’, A combination of the small footprint of this gear group (Roberts et al., 2010), and that that the available evidence shows limited risk of significant impacts from traps on rock habitats, mean that the described activity levels are unlikely to be of a concern.

Given the assessed activity levels and the evidence available for the impact of traps, MMO concludes that the impacts of ‘abrasion or disturbance’, ‘removal of target species’ and ‘removal of non-target species’ from the ongoing use of traps at the levels described, do not pose a significant risk of hindering the achievement of the conservation objectives of the moderate energy circalittoral rock feature within Skerries Bank and Surrounds MPA.

Subtidal coarse sediment and subtidal sand

Relevant characteristic biotopes for the traps gear group, identified in Natural England’s conservation advice package[1] for subtidal coarse sediment and subtidal sand within Skerries Bank and Surrounds MPA and in the conclusion of Cefas’ biotope scoping report (Cefas, 2017), are the same as those set out in **section 4.3.1**

for anchored nets and lines. All identified biotopes and screening criteria are set out in **Annexe 2**;

Relevant biotopes for subtidal coarse sediment have been identified as:

- *'Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel';
- *'Glycera lapidum* in impoverished infralittoral mobile gravel and sand'; and
- *'Mediomastus fragilis, Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel'.

As previously described, '*M. fragilis*' and '*B. lanceolatum'* were the two most widespread biotopes found in the site, with the former dominating the offshore region and the latter mostly found alongside '*M. fragilis*' in the southern part of the MPA. '*G. lapidum'* was assigned to one station, at the northernmost corner of Zone 3 (Cefas, 2017).

MarLIN profiles (Tillin and Watson, 2023a, 2023b, 2023c) and Natural England's advice on operations[1] note that '*M. fragilis*' and '*B. lanceolatum'* exhibit 'low' sensitivity and 'high' resilience to pressures exerted by traps. '*G. lapidum'* has 'medium' sensitivity to 'removal of target species'.

Relevant biotopes for subtidal sand have been identified as:

- *'Echinocyamus pusillus, Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'; and
- '*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment'.

The '*Abra alba*' biotope was found to be the fourth most common biotope in the site and was mostly found in the northeastern portion of Area 2, inshore of 6 nm. '*E. pusillus'* was assigned to stations in the same area of the site, and in the southernmost part of Area 2, close to the MMO portion of the MPA. MarLIN profiles (Tillin, 2022; Tillin and Budd, 2023) and Natural England's advice on operations[1] note that, as with '*G. lapidum'*, remaining biotopes exhibit 'low' sensitivity and 'high' resilience to all pressures exerted by this gear group apart from 'removal of target species' for which they have 'medium' sensitivity.

As described for anchored nets and lines in **section 4.3.1** and the traps Impacts Evidence document[7], in sessile epifauna that characterise these biotopes, while the potential for significant damage by static gears is low, recovery of these habitats may be slower than life history traits of the species present predict (Roberts et al., 2010) and slow recovery from damage could result in significant effects if activity levels are high and sustained for long periods of time (Collie et al., 2009). Nevertheless, for all medium sensitivity biotopes that could be present, MarLIN profiles note that recruitment patterns of species within these biotopes may vary, but nevertheless resilience is likely to be high in all but instances where impacts have caused significant mortality or the removal of the majority of the population of characterising species; the spatial scale of the pressure footprint is large enough to affect recruitment or the frequency of disturbance

is particularly high (Tillin, 2022; Tillin and Budd, 2023; Tillin and Watson, 2023c). While a significant decline at benchmark levels could have a significant impact for the relevant sediment biotopes, given the activity levels described, this is unlikely to occur from trap usage in the site, particularly given the potential for speedy recovery of these biotopes if adjacent populations are able to recolonise the area.

Fishing effort and landings data indicate that interactions between traps and the designated features are occurring, so there is a risk of the 'abrasion and disturbance' pressure impacting on sediments within the site. However, as there are no species with a particular sensitivity to traps likely to be present and there is minimal primary evidence of negative impacts of traps on sediment habitats and the fishing activity assessed here, the evidence that is available indicates that traps are not likely to be a concern.

With regards to the discussion above, given the assessed activity levels and the evidence available for the impact of traps, MMO concludes that the impacts of 'abrasion or disturbance', 'removal of target species' and 'removal of non-target species' from the ongoing use of traps at the levels described, do not pose a significant risk of hindering the achievement of the conservation objectives of the subtidal coarse sediment or subtidal sand features within Skerries Bank and Surrounds MPA.

4.4 Fishing pressures on Spiny Lobster

The relevant pressures on spiny lobster in Skerries Bank and Surrounds MPA from fishing activity were identified in **Table 3** and are 'removal of non-target species' for bottom towed gear, and 'removal of target species' and 'removal of non-target species' for anchored nets and lines and traps. **Section 4.2** sets out fishing activity within Skerries Bank and Surrounds MPA and describes the prevalence of traps and bottom towed gear within the site for both under and over 12 m vessels operating there, with minimal use of anchored nets and lines by under 12 m vessels only.

Spiny lobsters (*P. elephas*), also known as crawfish, are found in the south and west coasts of the British Isles and the Mediterranean and inhabit subtidal rocky habitats at depths of up to 90 m. This can include coastal and offshore areas, and both males and females of the Atlantic population are known to migrate to deeper offshore areas annually. Fecundity is dependent on female size with larger females producing up to five times more eggs than smaller ones. Spiny lobsters produce relatively few eggs compared to other members of the same family but crawfish eggs are generally larger; once hatched, immature larvae drift offshore to develop and grow pelagically and this stage lasts from five months to a year. While this means the species has high potential for wide larval distribution, understanding of larval dispersal and population dynamics are currently lacking (Whomersley et al., 2018), and this long pelagic stage likely contributes to the species' high potential for larval mortality through damage and predation, and to poor recruitment (Gibson-Hall et al., 2020).

Spiny lobster is a designated feature Skerries Bank and Surrounds MPA and the adults are likely to inhabit the rocky reef feature of the MPA as well as the mixed or marginal habitats around the reef structure (Holt and Kielly-Fletcher, 2016). It is therefore assumed that spiny lobster is present in the MPA wherever suitable habitat occurs outside of 6 nm. Whilst spiny lobster were once abundant in coastal habitats in South West England, the species suffered widespread population decline from the 1970s before experiencing a resurgence in the mid-2010s (Bolton, 2018; Gibson-Hall et al., 2020).

Spiny lobster is one of the most important commercial fisheries in the north-east Atlantic Ocean, and fishing methods used to catch crawfish have changed over time from the use of traps and diving to less selective tangle and trammel nets (Gibson-Hall et al., 2020). As previously noted, anchored net and line usage within Skerries Bank and Surrounds MPA is very limited, with only under 12 m vessels estimated to have operated in the site during the period under consideration and averaging less than 0.6 t of landings annually (**Table A1. 5**). However, the species is highly sensitive to both targeted fisheries and the removal of individuals as bycatch (Goñi and Latroutte, 2005). These factors, combined with the episodic nature of successful recruitment, low fecundity when compared to other species in the genus and the low migratory potential of mature individuals, mean that recovery rates can be slow or unreliable. This is supported by the fact that signs of recovery following a catastrophic decline in the north-east Atlantic population during the 1970s were not

seen until about 2014 (Gibson-Hall et al., 2020). While in recent years the population appears to be reestablishing in south-west England, as shown in volunteer reports (Bolton, 2018) and occupancy modelling of crawfish sightings and landings (Jackson, 2021), spiny lobster nevertheless has high potential as a 'boom and bust' fishery, with large landings following recent population growth, followed by potential stock collapse and lengthy recovery.

Indeed, nationally the number of vessels landing spiny lobster into English ports has increased dramatically in recent years, increasing eight-fold from 2005 to 2022 for the under 10 m fleet, and nearly doubling for over 12 m vessels from 2020 to 2022 (MMO, 2023). In response to this, and having considered consultation responses, scientific evidence, socio-economic impacts and relevant legislation and policy IFCAs, and UK Fisheries Administrations (UKFAs) agreed to introduce a closure of the crawfish fishery for all UK and EU vessels in English waters of ICES area 7 from 16 December 2024 to 31 May 2025. This follows a previous closure implemented in 2024, closing the crawfish fishery from 5 February to 30 April 2024. The closure will implemented via a licence condition and prohibited the fishing, retaining on board, storing or landing of crawfish with no bycatch allowance (MMO, 2023). Further information can be found on the South West 7efg Regional Fisheries Group page[10].

Other measures commonly put in place to sustain spiny lobster fisheries include the imposition of minimum size limits for marketed individuals and prohibiting the removal of 'berried' females (Diaz et al., 2016). However, the introduction of size limits may result in the exploitation of larger females – which have been shown to have higher fecundity than smaller specimens (Porcu et al., 2022). The preferential removal of males during periods when similarly sized females are 'berried', as well as sexual dimorphism that means male crawfish are larger, can also lead to reductions in the numbers of sexually compatible males available to large females during subsequent mating seasons, potentially impacting reproduction, and recruitment during subsequent seasons (Diaz et al., 2016).

There is insufficient scientific understanding of the ecology of spiny lobster to quantify how effective site level management of the species can be and the most effective management strategy would likely require a regional approach and consideration of site connectivity in relation to larval distribution (Goñi and Latroutte, 2005; Porcu et al., 2022). In assessing the need for management measures to be implemented to further the conservation objectives for spiny lobster, MMO consulted with Natural England who advised that, on a precautionary basis, spiny lobster should not be removed from an MPA from which they are a designated feature of the site. Natural England states that allowing MPAs where spiny lobster is a designated feature to act as potential refuge areas for the species is intended to give

[10] Regional Fisheries Groups - South West 7efg: www.gov.uk/guidance/regional-fisheries-groups-south-west-7efg#southwest-crawfish-fishery (Last accessed on: 10 June 2024).

populations the best chance of recovery regionally, as well as contributing to recovery of the wider population. Natural England have confirmed that this advice will remain until the evidence base has improved and there is confidence that limited take from certain sites and fisheries might be possible without compromising the conservation objectives for recovery.

With regards to the discussion above, given the assessed activity levels, available evidence and current conservation advice, **MMO concludes that impacts due to the pressures 'removal of target species' and 'removal of non-target species' on the ongoing removal of spiny lobster (*P. elephas*) by any fishing method within Skerries Bank and Surrounds MPA may result in a significant risk of hindering the achievement of the conservation objectives of Skerries Bank and Surrounds MPA.**

4.5 Part B conclusion

The assessment of anchored nets and lines, bottom towed gear, and traps on the moderate energy circalittoral rock, subtidal coarse sediment and subtidal sand features of Skerries Bank and Surrounds MPA has concluded that the ongoing use of bottom towed gear may result a significant risk of hindering the achievement of the conservation objectives of the MPA. Management measures will therefore be implemented for bottom towed gear for Skerries Bank and Surrounds MPA.

Furthermore, MMO has concluded that the continued removal of spiny lobster (*P. elephas*) by any fishing method may also result a significant risk of hindering the achievement of the conservation objectives of the MPA. Management measures will therefore be implemented to prohibit the removal of this species from the MPA using any gear type.

Section 6 contains further details of these measures.

5 Part C - In-combination assessment

Part C 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 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, which have the same 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.

Bottom towed gear was identified in Part B as requiring management to avoid a significant risk of hindering the achievement of the conservation objectives of Skerries Bank and Surrounds MPA. Anchored nets and lines and traps are therefore the only remaining gear groups able to operate within Skerries Bank and Surrounds MPA that interact with the seabed. In-combination effects of these fishing activities with each other, as well as in combination with other relevant activities, will therefore be assessed in Part C.

In accordance with the methodology detailed above, no other relevant activities were identified within Skerries Bank and Surrounds MPA or the applied 5 km buffer.

Table 3 from **section 3.3** was used to identify medium-high risk pressures exerted by fishing activities to identify those which require in-combination assessment (**Table 5**).

Table 5 summarises the pressures exerted by fishing activities and identifies those exerted by all gears (Y: pressure exerted). Activity-pressure interactions are highlighted dark blue to illustrate an in-combination effect. Only fishing activities with no proposed or current fisheries management in place are considered.

Table 5: Pressures exerted by fishing activities.

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

5.1 In-combination pressures

The in-combination pressures exerted by anchored nets and lines and traps will be considered in this section.

5.2 Fishing vs Fishing in-combination pressures

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

As noted in **section 4**, for benthic features, impacts from the removal of target and non-target species pressure are not considered in detail in this assessment. For these features, 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. These pressures may require further consideration as future evidence becomes available, in conjunction with updated conservation advice from JNCC.

Between 2016 and 2021 the estimated annual average fishing effort for Skerries Bank and Surrounds MPA from UK vessels under 12 m using static gear totalled approximately 11 days, with 8 fishing effort days for traps and 3 days for anchored nets and lines (**Table A1. 8**). Between 2016 and 2020, the annual landings average for all under 12 m vessels using either gear group totalled 3.52 t, with 2.94 t for traps and 0.58 t for anchored nets and lines (**Table A1. 5** and **Table A1. 6**). As **section 4.2** describes, the existing management of traps within Zone 3 of the site through a seasonal closure means that potting effort is temporally condensed in this area, with activity limited to nine months of the year (**Figure 2**).

As is also noted in **section 4.2**, all over 12 m vessel fishing activity using static gear within the site can be attributed to traps, with no VMS or landings from vessels using anchored nets and lines. Trap activity within the site from these vessels was also limited, with an annual average of 208 VMS records of vessels using traps within the MPA between 2016 and 2021, and landings averaging 32.21 t annually between 2016 and 2020. (**Table A1. 1 and Table A1. 2**).

The cumulative 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' on the designated features of Skerries Bank and Surrounds MPA. A precise understanding of spatial overlap of these two gear groups is not possible, as VMS data showing the location of fishing activity is only available for over 12 m vessels, which employed traps but not anchored nets and lines during the period under consideration.

Likewise, there are limits on the accuracy of apportioned ICES rectangle level landings data used for under 12 m vessels, which assume that fishing activity occurred evenly across the entirety of ICES rectangle 29E6, only 0.35 % of which is intersected by the MPA. Nevertheless, the combined pressure from these fishing gears, even if fully overlapping, would likely not be at an intensity which could undermine the condition of the features, given the sensitivity of the component biotopes and the activity levels under consideration here.

Traps and anchored net and line activity in combination at the levels described in this assessment are not likely to cause an intensity of fishing within the site that would significantly increase the risk to designated features from abrasion. **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 Skerries Bank and Surrounds MPA at current levels.**

5.3 Part C conclusion

MMO concludes that different fishing gear types in combination, and fishing in combination with other relevant activities will not result in a significant risk of hindering the achievement of the conservation objectives of Skerries Bank and Surrounds MPA.

Further management measures will not therefore be implemented for these gears within the site.

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 of Skerries Bank and Surrounds MPA.

Part B of this assessment concluded that ongoing use of bottom towed gear on the moderate energy circalittoral rock, subtidal coarse sediment and subtidal sand features of Skerries Bank and Surrounds MPA at the activity levels described may hinder the achievement of the conservation objectives of the MPA as a result of the impacts of the pressures abrasion or disturbance, penetration, removal of target and non-target species and smothering and siltation rate changes. Part B also concluded that the achievement of the conservation objectives of the MPA may be hindered by ongoing removal pressures from all gear types in relation to spiny lobster at the activity levels described.

Part C of this assessment concluded that the ongoing use of anchored nets and lines and traps in combination on the moderate energy circalittoral rock, subtidal coarse sediment and subtidal sand features of the site at the activity levels described does not pose a significant risk of hindering the achievement of the conservation objectives of Skerries Bank and Surrounds 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 and the use of all gear types for the removal of spiny lobster in the MMO portion of Skerries Bank and Surrounds MPA.

Figure 3 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[4].

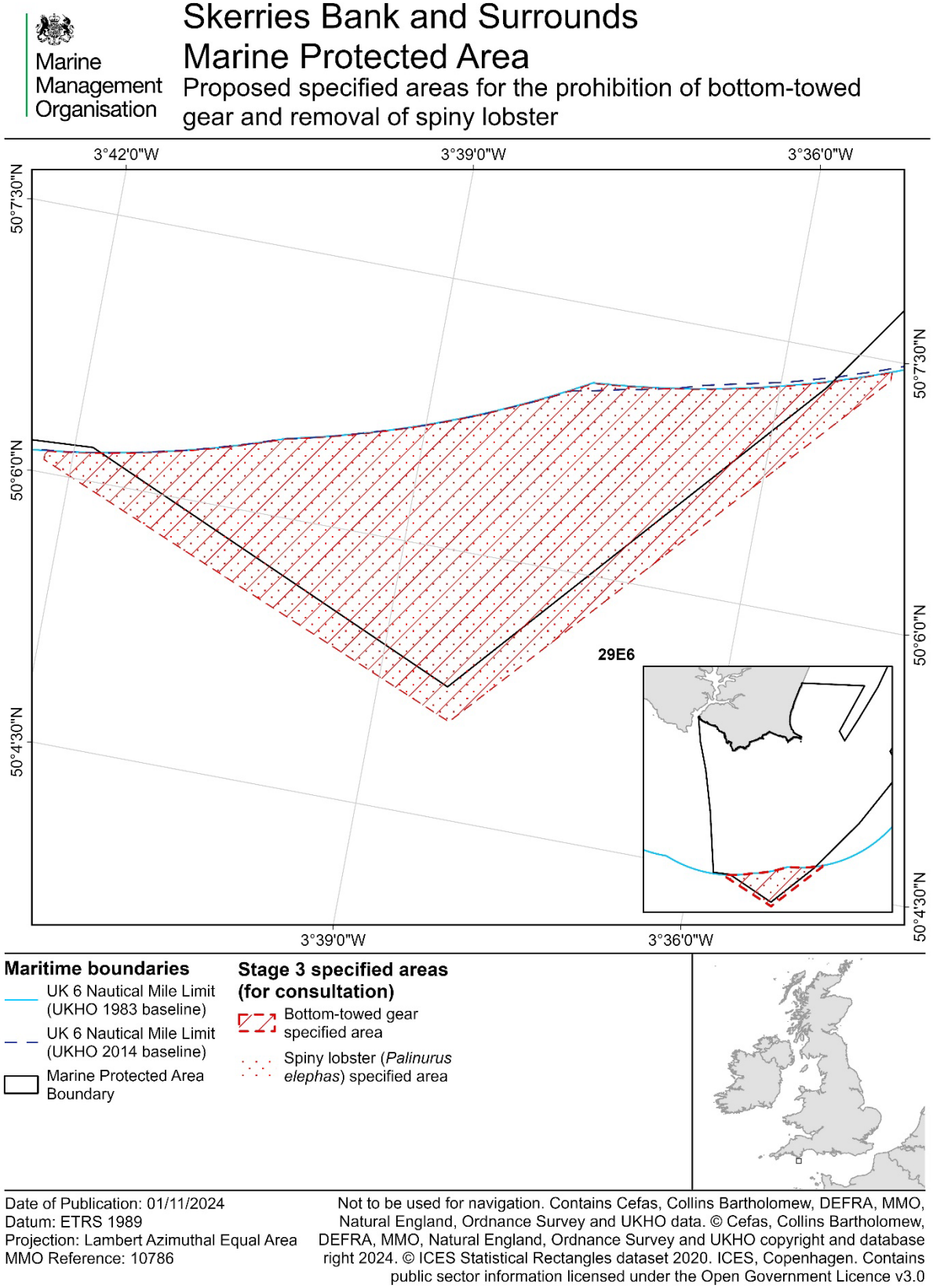

Figure 3: Map of proposed management.

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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Annexe 1: Fishing activity data

Table A1. 1: VMS record count per nation group (UK and EU Member States) 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
Gear group	Gear code	Nation group	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count
Demersal trawl	OTB	EU	3	100	0	0	0	0	0	0	0	0	0	0	3	38	<1
		UK	0	0	3	100	1	100	1	100	0	0	0	0	5	62	<1
	OTB total		**3**	**4**	**3**	**9**	**1**	**3**	**1**	**3**	**0**	**0**	**0**	**0**	**8**	**2**	**1**
	TBB	UK	75	100	30	100	32	100	28	100	78	100	103	100	346	100	58
	TBB total		**75**	**96**	**30**	**91**	**32**	**97**	**28**	**97**	**78**	**100**	**103**	**100**	**346**	**98**	**58**
Demersal trawl total			**78**	**60**	**33**	**16**	**33**	**14**	**29**	**7**	**78**	**25**	**103**	**31**	**354**	**22**	**59**
Dredge	DRB	UK	1	1	0	0	0	0	16	100	7	100	0	0	24	100	4
	DRB total		**1**	**1**	**0**	**0**	**0**	**0**	**16**	**100**	**7**	**100**	**0**	**0**	24	100	4
Dredge total			**1**	**1**	**0**	**0**	**0**	**0**	**16**	**4**	**7**	**2**	**0**	**0**	**24**	**1**	**4**
Traps	FPO	UK	52	100	172	100	198	100	368	100	225	100	233	100	1,248	100	208
	FPO total		**52**	**100**	**172**	**100**	**198**	**100**	**368**	**100**	**225**	**100**	**233**	**100**	1,248	100	208
Traps total			**52**	**40**	**172**	**84**	**198**	**86**	**368**	**89**	**225**	**73**	**233**	**69**	**1,248**	**77**	**208**
Grand total			**131**		**205**		**231**		**413**		**310**		**336**		**1,626**		**271**

Table A1. 2: UK live weight landings tonnage (t) estimates by gear from vessels over 12 m in length in the MMO section of Skerries Bank and Surrounds MPA (2016 to 2021). All numbers are rounded to two decimal places.

Gear group	Gear code	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average
Demersal trawl	OTB	0	0.32	0.17	<0.01	0	0	0.49	0.08
	TBB	5.03	1.92	3.14	0.91	1.51	3.90	16.40	2.73
Demersal trawl total		**5.03**	**2.24**	**3.31**	**0.91**	**1.51**	**3.90**	**16.90**	**2.82**
Dredge	DRB	0.06	0	0	0.12	0.02	0	0.20	0.03
Dredge total		**0.06**	0	0	**0.12**	**0.02**	0	**0.20**	**0.03**
Traps	FPO	18.79	52.95	46.54	33.74	17.25	23.96	193.23	32.21
Traps total		**18.79**	**52.95**	**46.54**	**33.74**	**17.25**	**23.96**	**193.23**	**32.21**
Grand total		**23.88**	**55.19**	**49.85**	**34.78**	**18.78**	**27.85**	**210.33**	**35.06**

Table A1. 3:EU27 live weight landings tonnage (t) estimates by gear from vessels over 12 m in length in the MMO section of Skerries Bank and Surrounds MPA (2016 to 2021). All numbers are rounded to two decimal places.

Gear group	Gear code	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average
Demersal trawl	OTB	0.33	0	0	0	0	0	0.33	0.06
Demersal trawl total		**0.33**	**0**	**0**	**0**	**0**	**0**	**0.33**	**0.06**
Grand total		**0.33**	**0**	**0**	**0**	**0**	**0**	**0.33**	**0.06**

Table A1. 4: Percentage of ICES rectangle area intersected by the MMO section of Skerries Bank and Surrounds MPA.

ICES rectangle	Percentage overlap (%)
29E6	0.35

Table A1. 5: UK live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for the MMO section of Skerries Bank and Surrounds MPA (2016 to 2021). All numbers are rounded to two decimal places.

Gear group	Gear code	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average
Anchored net / line	GEN	0.01	0.04	0	0	0	0	0.06	0.01
	GN	0.59	0.55	0.55	0.64	0.65	0.39	3.37	0.56
	GNS	<0.01	0.01	<0.01	<0.01	0.01	<0.01	0.02	<0.01
	GTR	<0.01	<0.01	<0.01	0	0	0	<0.01	<0.01
	LL	<0.01	0	0	0	0	0	<0.01	<0.01
Anchored net / line total		**0.61**	**0.60**	**0.55**	**0.65**	**0.66**	**0.40**	**3.45**	**0.58**
Demersal trawl	OT	3.06	1.40	0	0	0	0	4.45	0.74
	OTB	<0.01	2.44	2.44	3.04	1.81	1.74	11.47	1.91
	OTT	0.11	0.18	0.11	0.13	0.15	0.22	0.89	0.15
	PTB	0	0	0	0	<0.01	0	<0.01	<0.01
	TBB	0	0	0.06	0.23	0.19	0.12	0.60	0.10
	TBN	0	0	0	0.03	0	0	0.03	<0.01
Demersal trawl total		**3.17**	**4.02**	**2.60**	**3.42**	**2.15**	**2.09**	**17.45**	**2.91**
Dredge	DRB	0.58	0.48	0.79	0.77	0.67	0.91	4.21	0.70
	DRH	<0.01	<0.01	0	0	0	0	<0.01	<0.01
Dredge total		**0.58**	**0.49**	**0.79**	**0.77**	**0.67**	**0.91**	**4.22**	**0.70**
Midwater gill drift	GND	0.03	0.02	<0.01	<0.01	<0.01	<0.01	0.05	0.01
Midwater gill drift total		**0.03**	**0.02**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.05**	**0.01**

Gear group	Gear code	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average
Midwater gill encircling	GNC	<0.01	0.01	0	<0.01	0	0	0.02	<0.01
Midwater gill encircling total		<0.01	**0.01**	**0**	**<0.01**	**0**	**0**	**0.02**	**<0.01**
Midwater surrounding	PS	0.02	<0.01	0	0	0	0	0.02	<0.01
Midwater surrounding total		**0.02**	**<0.01**	**0**	**0**	**0**	**0**	**0.02**	**<0.01**
Midwater hook / lines	HF	0.03	0.02	0	0	0	0	0.05	0.01
	LHP	0.30	0.26	0.23	0.26	0.21	0.25	1.51	0.25
	LX	<0.01	<0.01	0.01	0.03	0.01	0.01	0.06	0.01
Midwater hook / lines total		**0.33**	**0.29**	**0.25**	**0.29**	**0.22**	**0.25**	**1.62**	**0.27**
Midwater trawl	OTM	1.21	1.11	1.31	0.86	0.72	0.16	5.38	0.90
Midwater trawl total		**1.21**	**1.11**	**1.31**	**0.86**	**0.72**	**0.16**	**5.38**	**0.90**
Traps	FIX	0.27	0.11	0	0	0	0	0.38	0.06
	FPO	4.46	3.20	2.64	2.41	1.91	2.65	17.26	2.88
	FYK	<0.01	<0.01	0	0	0	0	<0.01	<0.01
Traps total		**4.73**	**3.31**	**2.64**	**2.41**	**1.91**	**2.65**	**17.64**	**2.94**
Unknown	MIS	0	0.02	0.06	0.08	0.06	0.02	0.25	0.04
	NK	0	<0.01	0	0	0	0	<0.01	<0.01
Unknown total		**0**	**0.02**	**0.06**	**0.08**	**0.06**	**0.02**	**0.25**	**0.04**
Grand total		**10.66**	**9.86**	**8.21**	**8.49**	**6.40**	**6.47**	**50.09**	**8.35**

Table A1. 6: EU27 live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for the MMO section of Skerries Bank and Surrounds MPA (2016 to 2021).

Gear group	Gear code	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average
All gears	N/A	0	0	0	0	0	0	0	0
All gears total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Grand total		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table A1. 7: Mean annual surface and subsurface SAR values for C-squares intersecting the MMO section of Skerries Bank and Surrounds MPA (2016 to 2020). All numbers are rounded to two decimal places.

Gear group	SAR Category	2016	2017	2018	2019	2020
Demersal trawl	Surface	2.94	3.20	3.06	2.92	2.10
	Subsurface	0.74	0.57	0.59	0.72	0.47
Dredge	Surface	0.04	0.01	0.02	0.06	0.03
	Subsurface	0.04	0.01	0.02	0.06	0.03
Bottom towed gear total	Surface	2.98	3.21	3.08	2.99	2.13
	Subsurface	0.78	0.58	0.60	0.78	0.50

Table A1. 8: Fishing effort (days) recorded by UK vessels under 12 m in length, separated by gear type for the MMO section of Skerries Bank and Surrounds MPA that intersects ICES rectangle 29E6 (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). All numbers are rounded to two decimal places.

Gear type	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average
Demersal trawl	7.44	9.25	7.27	8.44	6.08	6.33	44.80	7.47
Dredge	1.02	0.79	1.39	1.28	1.04	1.40	6.92	1.15
Bottom towed gear total	**8.45**	**10.03**	**8.66**	**9.72**	**7.12**	**7.73**	**51.72**	**8.62**
Midwater gill drift	0.29	0.19	0.01	0.01	0.02	0.01	0.54	0.09
Midwater gill encircling	<0.01	<0.01	0	<0.01	0	0	0.01	<0.01
Midwater hooks/lines	3.72	4.53	3.99	4.62	3.81	3.78	24.46	4.08
Midwater surrounding	0.08	<0.01	0	0	0	0	0.08	0.01
Midwater trawl	0.22	0.28	0.30	0.18	0.15	0.05	1.19	0.20
Midwater gear total	**4.32**	**5.01**	**4.31**	**4.82**	**3.99**	**3.85**	**26.28**	**4.38**
Anchored nets and lines	3.40	3.13	2.48	2.84	2.86	2.23	16.93	2.82
Traps	9.70	8.69	8.32	8.74	6.96	8.30	50.71	8.45
Static gear total	**13.10**	**11.82**	**10.80**	**11.58**	**9.82**	**10.53**	**67.64**	**11.27**
Unknown gear	0	0.09	0.34	0.54	0.38	0.11	1.47	0.24
Unknown gear total	**0**	**0.09**	**0.34**	**0.54**	**0.38**	**0.11**	**1.47**	**0.25**
Grand total	**25.87**	**26.94**	**24.10**	**26.66**	**21.30**	**22.22**	**147.11**	**24.52**

Annexe 2: Biotope screening

Table A2. 1: Moderate energy circalittoral rock biotopes.

Biotope name	Found in site survey?	Location in site in survey	Viable habitat in MMO portion of site?	Sensitivity to relevant pressures
Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock (De-Bastos, Hill, Lloyd, et al., 2023a)	Yes	Area 2	Yes	Medium sensitivity to abrasion and removal of non-target species from all gear groups and to smothering and siltation rate changes from bottom towed gear
***Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock (Tillin and Hiscock, 2016)**	Yes	Area 2	Yes	Medium sensitivity to abrasion and removal of non-target species from all gear groups
Alcyonium digitatum and faunal crust communities on vertical circalittoral bedrock (Readman and Williams, 2021)	No	N/a	Perhaps - max depth 50 m	Medium sensitivity to removal of non-target species from all gears
Alcyonium digitatum, Pomatoceros triqueter, algal and bryozoan crusts on wave-exposed circalittoral rock (Stamp and Williams, 2021)	No	N/a	Perhaps - max depth 50 m	Medium sensitivity to removal of non-target species from all gear groups
Brittlestars overlying coralline crusts, *Parasmittina trispinosa* and *Caryophyllia smithii* on wave-exposed circalittoral rock (De-Bastos, Williams, et al., 2023)	No	N/a	Perhaps - max depth 50 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups and to smothering and siltation rate changes from bottom towed gear

Biotope name	Found in site survey?	Location in site in survey	Viable habitat in MMO portion of site?	Sensitivity to relevant pressures
Caryophyllia smithii and sponges with *Pentapora foliacea, Porella compressa* and crustose communities on wave-exposed circalittoral rock (Readman, Williams, et al., 2023)	No	N/a	Perhaps - max depth 50 m	Medium sensitivity to removal of non-target species from all gear groups
Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock (Stamp and Tyler-Walters, 2016)	No	N/a	Perhaps - max depth 50 m	Medium sensitivity to removal of non-target species from all gear groups
Sabellaria spinulosa encrusted circalittoral rock (H.M. Tillin, Marshall, Gibb, Lloyd, et al., 2023a)	No	N/a	Perhaps - max depth 50 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups, and to penetration from bottom towed gear
Sabellaria spinulosa with a bryozoan turf and barnacles on silty turbid circalittoral rock (H.M. Tillin, Marshall, Gibb, Lloyd, et al., 2023b)	No	N/a	Perhaps - max depth 50 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups, and to penetration from bottom towed gear
Caryophyllia smithii, sponges and crustose communities on wave-exposed circalittoral rock (Stamp, Lloyd, et al., 2023)	Yes	Area 2	Perhaps - max depth 50 m	Low or no sensitivity
Faunal and algal crusts with *Pomatoceros triqueter* and sparse *Alcyonium digitatum* on exposed to moderately wave-exposed circalittoral rock (Stamp, 2016)	No	N/a	Perhaps - max depth 50 m	Low or no sensitivity

Biotope name	Found in site survey?	Location in site in survey	Viable habitat in MMO portion of site?	Sensitivity to relevant pressures
Caryophyllia smithii with faunal and algal crusts on moderately wave-exposed circalittoral rock (Stamp, Williams, et al., 2023)	No	N/a	No – max depth 30 m	Low or no sensitivity
Circalittoral faunal communities in variable salinity (Readman, Lloyd, et al., 2023a)	No	N/a	No – max depth 30 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups
Flustra foliacea on slightly scoured silty circalittoral rock (Readman, Lloyd, et al., 2023e)	No	N/a	No - max depth 30 m	Medium sensitivity to removal of target species from all gear groups
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock (Tyler-Walters et al., 2022)	No	N/a	No - max depth 30 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups, and to smothering and siltation rate changes from bottom towed gear
Sabellaria spinulosa, didemnid and small ascidians on tide-swept moderately wave-exposed circalittoral rock (H.M. Tillin, Marshall, Gibb, Williams, et al., 2023)	No	N/a	No – max depth 30 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups, and to penetration from bottom towed gear
Sabellaria reefs on circalittoral rock (H.M. Tillin, Gibb, et al., 2023)	No	N/a	No – max depth 30 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups, and to penetration from bottom towed gear

Biotope name	Found in site survey?	Location in site in survey	Viable habitat in MMO portion of site?	Sensitivity to relevant pressures
Cushion sponges and hydroids on turbid tide-swept sheltered circalittoral rock (Readman, Lloyd, et al., 2023c)	No	N/a	No – max depth 20 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups
Cushion sponges and hydroids on turbid tide-swept variable salinity sheltered circalittoral rock (Readman, Lloyd, et al., 2023d)	No	N/a	No – max depth 20 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups
Cushion sponges, hydroids and ascidians on turbid tide-swept sheltered circalittoral rock (Readman, Lloyd, et al., 2023b)	No	N/a	No – max depth 20 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups
Piddocks with a sparse associated fauna in sublittoral very soft chalk or clay (Tillin and Hill, 2016)	No	N/a	No - max depth 20 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups, and to smothering and siltation rate changes from bottom towed gear
Polydora sp. tubes on moderately exposed sublittoral soft rock (De-Bastos, Hill, Lloyd, et al., 2023c)	No	N/a	No - max depth 20 m	Medium sensitivity to abrasion and removal of non-target species from all gear groups, and to penetration from bottom towed gear

Table A2. 2: Subtidal coarse sediment biotopes.

Biotope name	Found in site survey?	Location in site in survey	Viable habitat in MMO portion of site?	Sensitivity to relevant pressures
***Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel** (Tillin and Watson, 2023a)	Yes	Area 2, Zone 3 and MMO portion of site	Yes	Medium sensitivity to penetration from bottom towed gear
***Glycera lapidum* in impoverished infralittoral mobile gravel and sand** (Tillin and Watson, 2023b)	Yes	Zone 3, subtidal coarse sediment	Yes	Medium sensitivity to removal of target species from traps and dredges
Mediomastus fragilis, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel (Tillin and Watson, 2023c)	Yes	Throughout site, including MMO portion	Yes	Low or no sensitivity
Neopentadactyla mixta in circalittoral shell gravel or coarse sand (Tyler-Walters et al., 2023)	No	N/a	Perhaps - max depth 50 m	Medium sensitivity to changes in suspended solids and penetration from bottom towed gear, and to removal of non-target species from all gear groups
Pomatoceros triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (Tyler-Walters et al., 2024)	No	N/a	Perhaps - max depth 50 m	Low or no sensitivity
Sparse fauna on highly mobile sublittoral shingle (cobbles and pebbles) (Tillin, 2023a)	No	N/a	Perhaps - max depth 50 m	Not sensitive

Biotope name	Found in site survey?	Location in site in survey	Viable habitat in MMO portion of site?	Sensitivity to relevant pressures
Protodorvillea kefersteini and other polychaetes in impoverished circalittoral mixed gravelly sand (Tillin and Watson, 2023e)	No	N/a	No – max depth 30 m	Low or no sensitivity, or no evidence
Cumaceans and *Chaetozone setosa* in infralittoral gravelly sand (Tillin, 2016)	No	N/a	No – max depth 20 m	Low sensitivity, or no evidence
Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand and mixed gravelly sand (McQuillan and Tillin, 2006)	No	N/a	No – max depth 20 m	Low or no sensitivity
Hesionura elongata and *Microphthalmus similis* with other interstitial polychaetes in infralittoral mobile coarse sand (Marshall et al., 2023)	No	N/a	No – max depth 20 m	Medium sensitivity to penetration from bottom towed gear
Moerella spp. with venerid bivalves in infralittoral gravelly sand (Tillin and Watson, 2023d)	No	N/a	No – max depth 20 m	Medium sensitivity to removal of target species from traps and dredges
Sublittoral coarse sediment in variable salinity (estuaries) (Tillin, 2023b)	No	N/a	Estuarine habitat	Low or no sensitivity

Table A2. 3: Subtidal sand biotopes.

Biotope name	Found in site survey?	Location in site in survey	Viable habitat in MMO portion of site?	Sensitivity to relevant pressures
***Echinocyamus pusillus, Ophelia borealis* and *Abra prismatica* in circalittoral fine sand** (Tillin, 2022)	Yes	Throughout site, including MMO portion	Yes	Medium sensitivity to removal of target species from dredges
***Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (Tillin and Budd, 2023)**	Yes	Area 2, far northeast of the site	Yes	Medium sensitivity to removal of target species from traps and dredges
Echinocardium cordatum and *Ensis* spp. in lower shore and shallow sublittoral slightly muddy fine sand (De-Bastos, Hill, Lloyd, et al., 2023b)	No	N/a	No – max depth 30 m	Medium sensitivity to penetration from bottom towed gear; to removal of target species from traps and dredges; and to abrasion and removal of non-target species from all gear groups.
Fabulina fabula and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand (Tillin and Rayment, 2022)	Yes	Inshore of 6 nm on subtidal sediment	No – max depth 30 m	Medium sensitivity to removal of target species from traps and dredges
Spisula subtruncata and *Nephtys hombergii* in shallow muddy sand (H. M Tillin et al., 2023)	No	N/a	No – max depth 30 m	Medium sensitivity to removal of target species from traps and dredges

Biotope name	Found in site survey?	Location in site in survey	Viable habitat in MMO portion of site?	Sensitivity to relevant pressures
Amphiura brachiata with *Astropecten irregularis* and other echinoderms in circalittoral muddy sand (De-Bastos, Lloyd, et al., 2023)	No	N/a	No – max depth 20 m	Medium sensitivity to penetration from bottom towed gear, and to abrasion and removal of non-target species from all gear groups
Infralittoral mobile clean sand with sparse fauna (Tillin et al., 2019)	No	N/a	No – max depth 20 m	Low or no sensitivity
Nephtys cirrosa and *Macoma balthica* in variable salinity infralittoral mobile sand (Tillin and Ashley, 2022)	No	N/a	No – max depth 20 m	Low or no sensitivity
Sertularia cupressina and *Hydrallmania falcata* on tide-swept sublittoral sand with cobbles or pebbles (Readman and Garrard, 2019)	No	N/a	No – max depth 20 m	Low or no sensitivity
Arenicola marina in infralittoral fine sand or muddy sand (Tyler-Walters and Garrard, 2019)	No	N/a	No – max depth 10 m	Medium sensitivity to removal of non-target species from all gear groups and removal of target species from traps and dredges
Nephtys cirrosa and *Bathyporeia* spp. in infralittoral sand (Tillin and Garrard, 2022)	Yes	Inshore of 6 nm on subtidal sediment	No – max depth 10 m	Low or no sensitivity
Infralittoral mobile sand in variable salinity (estuaries) (Tillin and Ashley, 2018)	No	N/a	Estuarine habitat	Low or no sensitivity
Sublittoral sand in variable salinity (estuaries) (Ashley, 2016)	No	N/a	Estuarine habitat	Low or no sensitivity