

Marine Management Organisation

# MMO Stage 3 Site Assessment: East of Haig Fras MPA (Draft)

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# Title: MMO Stage 3 Site Assessment: East of Haig Fras MPA (Draft) Contents

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# **Executive Summary**

This assessment analyses the impact of anchored nets and lines and traps on the designated features high energy circalittoral rock, moderate energy circalittoral rock, subtidal coarse sediment/subtidal mixed sediments mosaic, subtidal sand, subtidal mud, sea-pen and burrowing megafauna communities and fan mussel (*Atrina fragilis*) in East of Haig Fras Marine Protected Area (MPA) to determine whether a significant risk of hindering the conservation objectives of the site can be excluded. The assessment sets out the evidence considered and analyses the quality of that evidence.

The assessment finds that the ongoing use of anchored nets and lines and traps at the levels described will not result in a significant risk of hindering the achievement of the conservation objectives of the MPA. Management measures will not therefore be implemented for anchored nets and lines and traps for East of Haig Fras MPA.

# **1** Introduction

This assessment considers whether fishing activities are compatible with the conservation objectives of East of Haig Fras MPA.

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

# 2 Site information

## 2.1 Overview

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

- JNCC Site Information East of Haig Fras MCZ<sup>1</sup>
- Defra Factsheet East of Haig Fras MCZ<sup>2</sup>

East of Haig Fras MPA is located in the Western Channel and Celtic Sea 67 km northwest of Land's End and covers an area of approximately 400 km<sup>2</sup> (**Figure 1**). The site's depth ranges from 50 to 100 m, however most of the site is between 80 and 100 m deep. The site extends between the 12 nautical mile (nm) and 200 nm limit and is situated on a plateau on the UK continental shelf. Fishing activity in the site is regulated by MMO. JNCC is the relevant Statutory Nature Conservation body for the site.

East of Haig Fras MPA was designated as an MCZ in 2013. The designated features and their general management approaches are set out below in **Table 1**.

East of Haig Fras MPA protects six different habitat types, found in varying proportions throughout the site, and two features of conservation importance. The site was designated in 2013 for moderate energy circalittoral rock, subtidal coarse sediment/mixed sediments mosaic, subtidal mud and subtidal sand. However, three additional features were added to the designation in May 2019: fan mussel Atrina fragilis, high energy circalittoral rock and sea-pen and burrowing megafauna communities. The seabed in this site is heterogeneous, consisting of a mosaic of small patches of habitat that blend into each other. Ridges composed of subtidal coarse and mixed sediments run north-east to south-west through the site and are topped with rocky substrates, including boulders and cobbles. Sponges, anemones and hydroids have been recorded on coarser sediments and rocky substrates. Mobile sand or mud separate the sediment ridges, with sandy habitat being more prevalent in the north-west of the site. Pea urchins and brittlestars are commonly found living in and on the sediment, whilst the site is also home to a broad diversity of polychaete worm species. Additionally, the site is also known to support numerous fish species such as scaldfish, megrim and red gurnard.

<sup>2</sup> Fact Sheet – East of Haig Fras MCZ:

<sup>&</sup>lt;sup>1</sup> JNCC Site Information – East of Haig Fras MCZ: <u>incc.gov.uk/our-work/east-of-haig-fras-mpa/</u> (last accessed 27June 2023)

assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\_d ata/file/914511/mcz-east-haig-fras-2019.pdf (last accessed 27 June 2023)

The general management approaches for the features of East of Haig Fras MPA have been set based on a vulnerability assessment.

JNCC consider that the activities listed below are capable of significantly affecting the qualifying features of the site<sup>3</sup>:

- fishing benthic trawling;
- other man-made structures: Telecommunication cables.

There is no feature condition assessment available for this site; in its absence a vulnerability assessment, which includes sensitivity and exposure information for features and activities in a site, is used as a proxy for condition. More information on this can be found in JNCC's <u>supplementary advice on conservation objectives</u><sup>4</sup>.

<sup>&</sup>lt;sup>3</sup> JNCC Conservation Advice Statements – East of Haig Fras MCZ: <u>data.jncc.gov.uk/data/aea3f991-28c1-4201-b99c-8f6fca7af930/EHF-4-</u> <u>ConservationStatements-V2.0.pdf</u> (last accessed 27 June 2023)

<sup>&</sup>lt;sup>4</sup> JNCC supplementary advice on conservation objectives – East of Haig Fras MCZ: <u>data.jncc.gov.uk/data/aea3f991-28c1-4201-b99c-8f6fca7af930/EHF-3-SACO-</u> <u>V2.0.pdf</u>



# East of Haig Fras Marine Protected Area

Management Overview of site location and designated features



Projection: Lambert Azimuthal Equal Area MMO Reference: 10786

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Figure 1: Site overview map.

 Table 1: Designated features and general management approaches.

Designated feature	General management approach
High energy circalittoral rock Moderate energy circalittoral rock Subtidal coarse sediment/subtidal mixed sediments mosaic Subtidal sand Subtidal mud Sea-pen and burrowing megafauna communities	<ul> <li>Recover to a favourable condition</li> <li>Favourable condition in this context means the: <ul> <li>extent is stable or increasing; and</li> <li>structures and functions, quality, and the composition of characteristic biological communities are such as to ensure that they remain in a condition which is healthy and not deteriorating.</li> </ul></li></ul>
Fan mussel <i>Atrina fragilis</i>	<ul> <li>Recover to a favourable condition</li> <li>Favourable condition in this context means the: <ul> <li>quality and extent of its habitat is stable or increasing; and</li> <li>population structure allows numbers to be maintained or increased.</li> </ul> </li> </ul>

### 2.2 Scope of this assessment

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

Bottom towed gear interactions with the features high energy circalittoral rock and moderate energy circalittoral rock have not been included in this assessment as they have already been addressed in the MMO Stage 2 assessment of East of Haig Fras MPA and prohibited by the MMO Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2023<sup>5</sup>. Stage 2 assessed the impacts of fishing using bottom towed gears on rock, and rocky and biogenic reef in 13 MPAs. These features were chosen for Stage 2 as they are some of the most sensitive to the impacts of bottom towed gears.

<sup>&</sup>lt;sup>5</sup> MMO Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2023: <u>www.gov.uk/government/publications/marine-protected-areas-bottom-towed-fishing-gear-byelaw-2023</u> (last accessed 06/02/2024)

# **3** Part A - Identified pressures on the MPA

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

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

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

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

## 3.1 Activities taking place

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

<sup>&</sup>lt;sup>6</sup> www.legislation.gov.uk/ukpga/2009/23/section/126

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

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

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

# Table 2: Fishing activities covered by this assessment present in VMS records(2016 to 2021) and landings data (2016 to 2020) for East of Haig Fras MPA.

Gear type	Gear name	Gear code	Justification
	Trammel net	GTR	Present in VMS records and
	Set gillnet (anchored)	GNS	under 12 m vessel landings data
Anchored nets and lines	Gill nets (not specified)	GN	for ICES statistical rectangles that overlap the site.
	Longlines (demersal)	LLS	Present in VMS data.
	Twin bottom otter trawl	ΟΤΤ	
	Beam trawl	TBB	Dresent in V/MS date
	Pair trawls - bottom	РТВ	Present in VMS data.
Bottom towed gear	Nephrops trawls	TBN	
5	Bottom otter trawl	OTB	Present in VMS records and
	Towed dredge	DRB	under 12 m vessel landings data for ICES statistical rectangles that overlap the site.
	Purse seine (ring net)	PS	
	Midwater otter trawl	ОТМ	Present in VMS data.
Midwater gear	Longlines (pelagic)	LLD	

<sup>&</sup>lt;sup>7</sup> Stage 3 MPA Site Assessment Methodology document:

<sup>&</sup>lt;u>www.gov.uk/government/publications/stage-3-site-assessments</u> (last accessed 13 September 2024)

Gear type	Gear name	Gear code	Justification
	Hand-operated pole- and-line	LHP	Present in under 12 m vessel landings data for ICES statistical
	Encircling gillnet	GNC	rectangles that overlap the site.
Traps	Pot/Creel	FPO	Present in under 12 m vessel landings data for ICES statistical rectangles that overlap the site.
Miscellaneous	Not known	NK	Present in VMS data.

#### 3.2 Pressures, features and activities screened out

This section identifies activities or pressures that are **occurring but do not need to be considered** for East of Haig Fras MPA.

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

- Bottom towed gear interactions with the features high energy circalittoral rock and moderate energy circalittoral rock: these interactions have not been included in this assessment as they have already been addressed in the Stage 2 assessment of East of Haig Fras MPA and prohibited by the MMO Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2023<sup>5</sup>. This byelaw prohibited the use of bottom towed gear across the entire of East of Haig Fras MPA to protect the high energy circalittoral rock and moderate energy circalittoral rock features. Therefore the interactions between bottom towed gear and the remaining features of the site are not considered further in this assessment.
- **Midwater gears:** although the use of midwater gears does occur within East of Haig Fras 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 East of Haig Fras 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**: 'not known gear' has been declared as having been used to land fish from this ICES statistical rectangle. The gear code used to report these landings does not provide any further information relating to the fishing method used. It is therefore not possible to assess the likelihood of this fishing method interacting with the seabed and it is not considered further within this assessment.

### 3.3 Pressures to be taken forward to Part B

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

- Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines<sup>8</sup>
- Stage 3 Fishing Gear MPA Impacts Evidence Traps<sup>9</sup>.

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

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

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

<sup>&</sup>lt;sup>8</sup> Stage 3 Fishing Gear MPA Impacts Evidence Anchored Nets and Lines: <u>www.gov.uk/government/publications/stage-3-impacts-evidence</u> (last accessed 15 August 2024).

<sup>&</sup>lt;sup>9</sup> Stage 3 Fishing Gear MPA Impacts Evidence Traps:

<sup>&</sup>lt;u>www.gov.uk/government/publications/stage-3-impacts-evidence</u> (last accessed 15 August 2024).

 Table 3. Sensitivity to potential pressures from fishing activities on designated features of East of Haig Fras MPA.

	Designated features													
Potential pressures		Sea-pen and burrowing megafauna communities		Fan mussel		High energy circa-littoral rock		Moderate energy circa- littoral rock		Subtidal coarse sediment and subtidal mixed sediments mosaic		Subtidal mud		tidal nd
	Α	Т	Α	Т	Α	Т	Α	Т	Α	Т	Α	Т	Α	Т
Abrasion or disturbance of the substrate on the surface of the seabed														
Barrier to species movement														
Changes in suspended solids (water clarity)														
Deoxygenation														
Hydrocarbon and polycyclic aromatic hydrocarbon (PAH) contamination														
Introduction of light														
Introduction of microbial pathogens														
Introduction or spread of invasive non-indigenous species														
Litter														
Nutrient enrichment														
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														

		Designated features												
Potential pressures		Sea-pen and burrowing megafauna communities		an ssel	High energy circa-littoral rock		Moderate energy circa- littoral rock		Subtidal coarse sediment and subtidal mixed sediments		Subtidal mud		Subtida sand	
	Α	Т	Α	Т	Α	Т	Α	Т	Α	Т	Α	Т	Α	Т
Transition elements and organo-metal contamination														
Underwater noise changes														
Visual disturbance														

# 4 Part B - Fishing activity assessment

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

**Table 3** shows the fishing activities and pressures identified in Part A which havebeen included for assessment in Part B. The most relevant attributes of thedesignated features that could be compromised by fishing pressures were identifiedusing the East of Haig Fras MPA conservation advice package and are shown in**Table 4**.

Table	4: Relevant	favourable	condition	targets fo	r identified	pressures.
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Attribute	Target	Relevant pressures
Extent and distribution: presence and spatial distribution of biological communities Structure and function: presence and abundance of key structural and influential species Supporting processes: sedimentation rate	Recover to favourable condition	<ul> <li>abrasion or disturbance of the substrate on the surface of the seabed</li> <li>removal of non-target species</li> <li>removal of target species</li> </ul>

#### 4.1 Fisheries access and existing management

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

More information on non-UK vessel access to UK waters can be found on MMO's <u>Single Issuing Authority</u> page<sup>10</sup>.

East of Haig Fras MPA is subject to the following relevant legislative restrictions that are applicable to fisheries occurring in the site:

• Marine Protected Areas Bottom Towed Fishing Gear Byelaw 2023<sup>5</sup> – prohibiting the use of bottom towed gear within East of Haig Fras MPA.

<sup>&</sup>lt;sup>10</sup> The UK Single Issuing Authority: <u>www.gov.uk/guidance/united-kingdom-single-issuing-authority-uksia</u> (last accessed 26 July 2023).

## 4.2 Fishing activity summary

**Table A1. 1** to **Table A1. 8** in Annex 1 display a detailed breakdown of fishing activity within East of Haig Fras MPA. Of the fishing activities not screened out in Part A of this assessment or already subject to management, the most prevalent gears operating within the site are anchored nets and lines.

#### Anchored nets and lines

There was an annual average of 185 VMS records for over 12 m vessels using anchored nets and lines in the site between 2016 and 2021. These vessels landed approximately 46.95 tonnes on average per year between 2016 and 2020 across gillnets (unspecified), gillnets (anchored) and trammel nets. Under 12 m vessels using anchored nets and lines landed approximately 1.57 tonnes per year on average between 2016 and 2020. Under 12 m landings are recorded at ICES rectangle level and have been attributed to the MPA based on the proportion of the ICES rectangle it overlays.

East of Haig Fras MPA covers 5.13 % of ICES rectangle 29E3 and 5 % of ICES rectangle 30E3. Fishing effort days are derived from logbooks and is collected at ICES rectangle and then apportioned accordingly. Annual average fishing effort recorded by UK vessels under 12 m in length using anchored nets and lines between 2016 and 2021 for the area of East of Haig Fras MPA that intersects ICES rectangles 29E3 and 30E3 was 1.56 days. VMS density records also indicate that this gear type occurs widely across the whole site, but greater intensity is shown in the southeast.

#### Traps

There were no VMS records for vessels using traps within the site. Under 12 m landings data indicate that there is trap activity occurring within the site; all under 12 m vessels deploying traps within the site landed approximately 1.88 tonnes per year on average between 2016 and 2020. Annual average fishing effort recorded by UK vessels under 12 m in length using traps between 2016 and 2021 for the area of East of Haig Fras MPA that intersects ICES rectangles 29E3 and 30E3 was 4.30 days.

#### 4.3 Pressures by gear type

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

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

In the context of MPA assessment, the pressures removal of target and non-target species refer to any damage, loss, or removal of species defined as a designated feature or integral to the integrity of a designated feature (for example key structural or influential species). This may occur through intentional or unintentional catch associated with the act of commercial fishing.

Impacts from target and/or 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 JNCC. Where separate consideration of these pressures is required, this has been stated, but generally includes the following:

MPAs with certain designated species features or designated features that may contain key commercially targeted species have been highlighted as requiring separate consideration of the removal pressures. This includes MPAs with an active Nephrops fishery, where the habitat sea-pen and burrowing megafauna communities is a designated feature, or where fan mussels, ocean quahog, spiny lobster and pink sea-fan are a designated species feature.

The designated features in this site, sea-pens and burrowing megafauna communities and fan mussels, may be sensitive to removal of target and/or nontarget species pressures. Removal of target species in this case is most relevant to Nephrops, as part of the burrowing megafauna element of the sea-pen and burrowing megafauna communities feature, commonly targeted using bottom towed gears. There are instances of fishing for Nephrops using traps (creels), however this is an uncommon fishing practice, generally limited to the Scottish inshore fleets and potentially a small number of English inshore vessels. Nephrops creel fisheries are not known to occur within East of Haig Fras MPA. Removal of this species is not possible through the use of anchored nets and lines. In relation to removal of nontarget species, designated species such as fan mussels are not considered sensitive, as removal of bivalves is highly unlikely through the use of static gear types. In addition, due to the selectivity of traps for the target species and high probability of survival for any unwanted species caught and discarded, the impact of removal of non-target species on key burrowing megafauna species such as Nephrops is also not considered to be significant. As such, these features are more fully assessed within the abrasion and penetration pressures.

JNCC contracted Seastar Survey Ltd to complete a community analysis of offshore MCZ grab and video data to establish biotopes within several offshore MPAs in the financial year 2013/2014 (Allen, Axelsson and Dewey, 2016). **Table 5** displays the European Nature Information System (EUNIS) level 4 habitats and EUNIS level 5 biotopes recorded in East of Haig Fras MPA during this survey. Three individuals of the feature of conservation importance (FOCI), fan mussel (*Atrina fragilis*), were also observed in video footage during this survey (Eggleton and Downie, 2017). Several taxa considered indicative of the FOCI sea-pen and burrowing megafauna were observed in the site (Clare *et al.*, 2020). One instance of the FOCI pink sea-fan (*Eunicella verrucosa*) was also observed but is not a designated feature of the site (Clare *et al.*, 2020).

Table 5. EUNIS level 4 habitats and EUNIS level 5	biotopes recorded in East of
Haig Fras MPA and their sensitivities to relevant p	pressures.

Biotope	Sensitivity
<i>Phakellia ventilabrum</i> and axinellid sponges on deep, wave-exposed circalittoral rock (Readman, Lloyd and Watson, 2023f)	Abrasion: High Removal of target species: High Removal of non-target species: High
Offshore circalittoral coarse sediment	MarLIN does not cover sensitivity information for Level 4 habitats
<i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand (Tillin, 2022) / Offshore circalittoral mixed sediments	Removal of target species: Medium
Offshore circalittoral sand	MarLIN does not cover sensitivity information for Level 4 habitats
Offshore circalittoral mud / Offshore circalittoral mixed sediments	MarLIN does not cover sensitivity information for Level 4 habitats
Polychaete-rich deep Venus community in offshore gravelly mud (Tillin and Watson, 2023)	Low or no sensitivity to relevant pressures

Further information about the biotopes in the site was provided by the Biotope Presence-Absence spreadsheet of JNCC Report No.647 (Tillin et al., 2020), which listed EUNIS biotopes that were present, likely to be present, or absent from each UK offshore bioregion based on survey data, environmental information, species records, literature and expert judgement. Biotopes were screened out if they were not located in the same region as East of Haig Fras MPA (Western Channel and Celtic Sea), and if they were not found at the depth range for the site (50 to 100 m). Information about the depth range of each biotope was listed in the Biotope Database of JNCC Report No. 647 (Tillin et al., 2020). Biotope sensitivity data was then extracted from The Marine Life Information Network<sup>11</sup> (MarLIN, 2024) to outline biotopes sensitivity for the appropriate pressure.

As outlined in **section 4.2**, the use of anchored nets and lines by over 12 m vessels was observed widely across the whole site, with greater intensity in the southeast. As the landings data for the under 12 m fleet does not indicate where this activity occurs within East of Haig Fras MPA, the use of anchored nets and lines may be occurring over all of the features of the site.

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

#### 4.3.1 Anchored nets and lines

The following features of East Haig of Fras MPA have been considered in relation to pressures from anchored nets and lines:

# High energy circalittoral rock; moderate energy circalittoral rock; subtidal coarse sediment; subtidal mixed sediments; subtidal sand; subtidal mud; seapen and burrowing megafauna communities; fan mussel.

The relevant pressures on the features of East of Haig Fras MPA (outlined above) from anchored nets and lines were identified in **Table 4** and are:

• abrasion or disturbance of the substrate on the surface of the seabed.

#### High and moderate energy circalittoral rock

As described in section 7.3 of the anchored nets and lines Impacts Evidence document<sup>8</sup>, while impacts from abrasion from this gear type may cause disturbance of the sediment veneer and damage to epifaunal/epifloral biological communities, physical damage to the rock substrate itself is considered unlikely. Sensitivity assessments suggest there is the potential for static gear such as anchored nets and lines to cause damage to rocky reefs and sensitive epifauna. Although targeted research on the impacts of netting on reefs is extremely limited, there are some literature reviews that state that high levels of netting and associated anchoring can damage reefs and the associated communities through cumulative damage over time.

The potential for impact will depend on the intensity of fishing activity taking place, with increasing activity increasing the likelihood of weights and ropes associated with nets and lines damaging, entangling, or removing epifaunal species. Epifaunal and epifloral communities' recovery following gill netting activity is not well understood, however, as with other gears, the likely impact of nets and lines on rocky reef will

<sup>&</sup>lt;sup>11</sup> The Marine Life Information Network: <u>www.marlin.ac.uk/</u> (last accessed 15 August 2024)

vary based on several factors including gear type, fishing intensity, habitat, and environmental variables. A study assessing the sensitivity of different seabed habitats to existing fishing activities, across a range of potential fishing intensities, showed that rock with erect and branching species has high sensitivity to anchored nets and lines at light, moderate and heavy fishing intensity (Eno et al., 2013). This study was based on the best information available, which may or may not have been supported by empirical evidence from well-designed experimental studies (Eno et al., 2013) and the overarching conclusion from the literature available is that rocky reef features are estimated to have low sensitivity to all but heavy levels of fishing intensity from static fishing gear.

**Table A2 1** outlines the biotopes that may be found within the high energy circalittoral rock feature of the site, and that have high or medium sensitivity to the abrasion pressure. Two biotopes have been identified as having high sensitivity to abrasion whilst the remaining five have medium sensitivity. The highly sensitive biotope *Phakellia ventilabrum* and axinellid sponges on deep, wave-exposed circalittoral rock contains species with slow growth rates, recruitment and recovery, resulting in very low resilience to abrasion impacts (Readman, Lloyd and Watson, 2023f). This biotope was observed in the site during surveys in 2013/2014 (Allen, Axelsson and Dewey, 2016).

The other highly sensitive biotope *Eunicella verrucosa* and *Pentapora foliacea* on wave-exposed circalittoral rock contains the pink sea-fan *E. verrucosa*, which is very slow growing and has slow recovery following disturbance (Readman, Jackson, *et al.*, 2023). One instance of the pink sea-fan was observed within the site in 2015 (Clare *et al.*, 2020).

The biotopes with medium sensitivity to the impacts of abrasion from anchored nets and lines tend to contain species with high resilience, and their recoverability is considered good as they reach sexual maturity quickly, can reproduce asexually to aid recovery of damaged populations, and can undertake resting stages that are very resistant of environmental perturbation. Many of the taxa observed during surveys, such as hydrozoan and bryozoan turf with associated sponges and cup corals (*Caryophyllia* spp.) form part of these biotopes (Clare *et al.*, 2020).

**Table A2 2** in Annex 2 lists the biotopes that may be found within the moderate energy circalittoral rock feature of the site and those identified as having medium sensitivity to abrasion pressures. The characterising fauna of many of these biotopes were observed during surveys of the site (Eggleton and Downie, 2017). This included encrusting bryozoans and sponges, hydrozoan turf, tubiculous polychaetes belonging to the family *Serpulidae*, the cup coral *Caryophyllia* spp. and the branching colonies of the bryozoan *Porella* sp.

Despite the confirmed presence of several sensitive components of the high and moderate energy circalittoral rock features, East of Haig Fras MPA is subject to moderate tidal currents flowing on a west to east axis, so it is likely that these biological communities are acclimatised to some level of natural disturbance. It should also be noted that the sensitivities of particular species and biotopes to removal via abrasion were predominantly linked to studies using bottom towed gears rather than anchored nets and lines.

Based on the low risk of abrasion or disturbance impacts to the majority of high energy circalittoral rock biotopes and to the moderate energy circalittoral rock biotopes due to depth ranges, good resilience and recoverability of these biotopes, and the likelihood that these biotopes already have some resilience to described levels of anchored nets and lines in the site, it is unlikely that the described use of anchored nets and lines will pose a significant risk of hindering the achievement of the conservation objectives for high and moderate energy circalittoral rock in East of Haig Fras MPA.

# Subtidal coarse sediment; subtidal mixed sediments; subtidal sand; subtidal mud

**Table A2 3**, **Table A2 4** and **Table A2 5** of Annex 2 outlines the biotopes that may be found within the subtidal mixed sediments, subtidal sand and the subtidal mud of the site, and that have high or medium sensitivity to the abrasion pressure. All of the subtidal coarse sediments identified had low or no sensitivity to abrasion and so have not been considered further in this section.

For subtidal mixed sediments, seven biotopes have been identified which could be present in the site. Four of these biotopes were identified as having medium sensitivity to abrasion. For the subtidal sand feature, 14 biotopes have been identified which could be present in the site, four of which have medium sensitivity. For the subtidal mud feature, seventeen biotopes have been identified which could be present in the site, thirteen of which have medium sensitivity to abrasion.

Abrasion impacts are greater on subtidal mixed sediments and subtidal coarse sediment compared to subtidal sand and subtidal mud, as the coarser habitats often contain populations of sessile epifauna. Section 9.3 of the anchored nets and lines Impacts Evidence document<sup>8</sup>, indicates that anchored nets and lines are unlikely to negatively impact the extent or distribution of any sediment feature or structure and function of the ecosystem in a significant manner. Subtidal sediment habitats are considered resilient to all but intense fishing activity using anchored nets and lines on species rich sediment habitats or those with long-lived bivalves.

As described in section 9.4 of the anchored nets and lines Impacts Evidence document<sup>8</sup>, there is limited information on the impacts of static gears on sand habitats, however available literature suggests that static gears such as anchored nets and lines have a relatively low impact on benthic communities in comparison to towed gears and are likely to be of limited concern to subtidal sand habitats. The impact of demersal nets and lines will likely be greatest on any epifauna present with resistance varying by species.

Section 9.4 of the anchored nets and lines Impacts Evidence document<sup>8</sup> combines relevant research and finds that 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 due to the static nature and relatively small footprint of the gear. Potential impacts of abrasion or disturbance of the substrate on the surface of the seabed on the features of the site are more likely to occur during the hauling of gear or the movement of gear along the seabed due to strong tides, currents, or storm activity. There is limited information on the impacts of static gears on subtidal mud habitats, however static gears are more likely to cause a negative impact on softer sediments, such as subtidal mud and muddy sands, rather than coarse sediments (De-Bastos, 2023). Sensitivity of erect epifauna to abrasion impacts from anchored nets and lines in subtidal mud habitats is likely to be species dependent. Many of the subtidal mud biotopes identified as sensitive to this pressure are related to the impacts of bottom towed gear rather than static gear. This is because most of the sensitive species within these biotopes can burrow into the sediment for protection (such as Nephrops, also known as Nephrops norvegicus) or can quickly recover from damaged appendages (such as brittlestars).

Overall, given the good rates of resilience and recoverability of the biotopes present on the feature and the likelihood that these biotopes already have some resilience to the described anchored nets and line levels in the site, there is a low risk of impacts to this feature at the levels described relating to abrasion or disturbance. The site is also subject to moderate hydrodynamic energy of the Western Channel and Celtic Sea, so it is likely that these biological communities are acclimatised to some level of natural disturbance. It is unlikely that the ongoing use of anchored nets and lines will pose a significant risk of hindering the achievement of the conservation objective of East of Haig Fras MPA.

#### Sea-pen and burrowing megafauna communities

**Table A2 6** outlines the sea-pen and burrowing megafauna communities' biotopes with high or medium sensitivity to abrasion that may be present in the site. Taxa indicative of the FOCI 'sea-pen and burrowing megafauna communities' (for example, *Callianassa subterranea, Goneplax rhomboides* and *Virgularia mirabilis*) were directly observed in the site. Burrows were also observed in densities sufficient for the classification of this FOCI at eight stations, and at three stations the sea-pen *V. mirabilis* was observed.

As described in section 4.3 of the anchored nets and lines Impacts Evidence document<sup>8</sup>, there is currently not enough literature available to detail the impacts of the relevant pressures, 'abrasion or disturbance of the substrate on the surface of the seabed' for this gear type. Therefore, evidence regarding traps will be used as a proxy due to similarities in their static nature and impact.

The burrowing crustaceans present in the sea-pen and burrowing megafauna communities feature may include Nephrops, which is an important, commercially

targeted species. In European waters, more than 95 % of Nephrops are taken using single or multi-rig trawlers and less than 5 % by traps (Ungfors *et al.*, 2013). Burrowing megafauna, such as Nephrops are generally considered less sensitive to abrasion and penetration impacts from static gears than sea-pens due to their motility and ability to burrow into the sediment and move from areas of disturbance. Sea-pens are fixed and unable to move from potential disturbance episodes Therefore, this assessment focuses on the most sensitive component of this designated feature, sea-pens. In many cases, however, sea-pens can bend or retract into their burrows.

As described in section 9.5 of the anchored nets and lines Impacts Evidence document<sup>8</sup>, a study considering three species of sea-pens noted that species which cannot retract into the sediment and/or are more rigid are likely to be less tolerant to disturbance caused by potting but no lasting effects on the substrate were observed during the study. Some species of sea-pens, however, are able to reinsert themselves into the sediment even if uprooted. While these studies considered the impact of traps, the ability of sea-pens to flex under pressure, reinsert following uprooting, and retract into the sediment, will similarly aid in their resilience to demersal nets, lines and their associated anchors. The potential for impact will be dependent on the intensity of fishing activity taking place with increasing activity increasing the likelihood of weights and ropes associated with nets and lines damaging, entangling, or removing epifaunal species.

The sea-pen *Virgularia mirabilis*, was observed in East of Haig Fras MPA and is able to rapidly retract into a burrow when disturbed, thus reducing the likelihood of damage or mortality from anchored nets and lines fishing activity. Using the evidence regarding traps as a proxy suggests that anchored nets and lines are unlikely to significantly impact sea-pen and burrowing megafauna communities.

Based on the rationale above, given the good rates of resilience and recoverability in the biotopes present, there is a low risk of impacts to this feature relating to abrasion or disturbance of the substrate on the surface of the seabed. It is also likely that these biological communities are acclimatised to some level of natural disturbance, therefore the ongoing use of anchored nets and lines at the levels described will not pose a significant risk of hindering the achievement of the conservation objective of East of Haig Fras MPA.

#### Fan Mussel (Atrina fragilis)

Fan mussel typically live in the sublittoral fringe, in subtidal mud, sandy mud or gravel habitats. As outlined in section 5.3.1 of the anchored nets and lines Impacts Evidence document<sup>8</sup>, abrasion towards sediment habitats will be more significant for bottom towed gears; however, impacts from anchored nets and lines are still possible through interactions between the seabed and the gear itself including associated lines and anchors.

Fan mussel is shown to have high sensitivity to the abrasion and removal of nontarget species pressures, however, studies indicate that the anchored nets and lines gear type is unlikely to have significant impacts on fan mussel, as interactions with the associated seabed are likely to be minimal.

Overall, there is a low risk of impacts to this feature at the activity levels described. The site is also subject to moderate hydrodynamic energy of the Western Channel and Celtic Sea, so it is likely that these biological communities are acclimatised to some level of natural disturbance. It is unlikely that the ongoing use of anchored nets and lines will pose a significant risk of hindering the achievement of the conservation objective of East of Haig Fras MPA.

Therefore, MMO concludes that the ongoing use of anchored nets and lines at the levels described does not pose a significant risk of hindering the achievement of the conservation objectives of East of Haig Fras MPA.

#### 4.3.2 Traps

The following features of East Haig of Fras MPA have been considered in relation to pressures from traps:

# High energy circalittoral rock; moderate energy circalittoral rock; subtidal coarse sediment; subtidal mixed sediments; subtidal sand; subtidal mud; seapen and burrowing megafauna communities; fan mussel.

The relevant pressures on the features of East of Haig Fras MPA (outlined above) from traps were identified in **Table 4** and are:

• abrasion or disturbance of the substrate on the surface of the seabed.

**Section 4.2** describes the fishing activity within East of Haig Fras MPA and indicates that traps are the second most frequently deployed gear in the site with under 12 m vessels landing approximately 1.88 tonnes per year on average between 2016 and 2020. Although, trap activity has demonstrated a gradual decrease from 3.21 tonnes in 2016 to 1.23 tonnes in 2020.

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

#### High and moderate energy circalittoral rock

Traps and anchored nets and lines fishing gear exert similar pressures on the biotopes associated with the circalittoral rock features of the site, therefore the biotopes identified as having medium sensitivity to abrasion in the anchored nets and lines section (**section 4.3.1**) also apply here for the traps section.

As described in the traps Impacts Evidence document<sup>9</sup>, most of the literature before 2015 has suggested that traps are unlikely to significantly impact rocky reef biotopes.

However, more recent studies suggest that traps will have negative impacts on the biological functions of reef habitats at increased spatial and temporal densities. Studies show that upright and branching species that protrude from the reef (such as sponges or bryozoans) were found to be particularly vulnerable to damage from the hauling of pots. Repeated trap activity could damage biological communities associated with these biotopes through cumulative impact. However, it should be noted that sensitivity to removal via abrasion was predominantly linked to studies using bottom towed gears rather than static gear types such as traps.

No fishing activity was identified in VMS counts or landings data for vessels over 12 m to better understand spatial distribution and extent of fishing activity using this gear type, however under 12 m vessels landings data identified relatively small annual average landings between the data reporting period of 2016 to 2020, equating to 1.88 tonnes across all vessels operating this gear type. However, there is limited confidence in the spatial distribution of effort by vessels under 12 m, therefore uncertainties exist as to how much of this effort is occurring over this feature.

As described in section 7.3 of the traps Impacts Evidence document<sup>9</sup>, abrasion impacts from this gear type are unlikely to impact the rock substrate itself but may impact biological communities associated with this feature. Two of the biotopes identified as possibly being present in the MPA have high sensitivity to the impacts of abrasion. MarLIN<sup>11</sup> identified that, given their slow growth rate and lack of observed recovery or recruitment in some axinellids, any perturbation resulting in mortality is likely to result in negligible recovery within 25 years for *Phakellia ventilabrum* and axinellid sponges on deep, wave-exposed circalittoral rock resulting in very low resilience to abrasion impacts (Readman, Lloyd and Watson, 2023f). Similarly, for Eunicella verrucosa and Pentapora foliacea on wave-exposed circalittoral rock, MarLIN<sup>11</sup> identified that whilst bryozoans tend to be fast-growing fauna that are capable of self-regeneration, dispersal of the larvae is limited and whilst it is likely that the bryozoan turfs would regenerate rapidly for most levels of damage, Eunicella *verrucosa* is slow growing and recovery is likely to be slow following perturbation (Readman, Jackson, et al., 2023). Any perturbation resulting in mortality is likely to result in negligible recovery within 25 years resulting in very low resilience to abrasion impacts.

The remaining high energy circalittoral rock biotopes are considered to have medium sensitivity to the impacts of abrasion. Resilience of these species is high and recoverability is considered to be good as they reach sexual maturity quickly, can reproduce asexually to aid recovery of damaged populations, and can undertake resting stages that are very resistant of environmental perturbation. This site is also subject to high hydrodynamic energy of the Western Channel and Celtic Sea, so it is likely that these biological communities are acclimatised to some level of natural disturbance.

Based on the low risk of abrasion or disturbance impacts on the majority of high energy circalittoral rock biotopes and on the moderate energy circalittoral rock biotopes due to depth ranges, good resilience and recoverability of these biotopes, and the likelihood that these biotopes already have some resilience to described levels of traps in the site, it is unlikely that the described use of traps will pose a significant risk of hindering the achievement of the conservation objectives for high and moderate energy circalittoral rock in East of Haig Fras MPA.

# Subtidal coarse sediment; subtidal mixed sediments; subtidal sand; subtidal mud

Traps and anchored nets and lines fishing gear exert similar pressures on the biotopes associated with the sediment features of the site, therefore the biotopes identified as having medium sensitivity to abrasion in the anchored nets and lines section (**section 4.3.1**) also apply here for the traps section.

As described in section 9.4 of the traps Impacts Evidence document<sup>9</sup>, abrasion impacts from this gear type are unlikely to be a concern unless they occur where particularly sensitive species are present or when fishing occurs at damaging levels of intensity.

Recoverability of many of the species listed in the biotopes is good as they reach sexual maturity quickly, can reproduce asexually to aid recovery of damaged populations, and can undertake resting stages that are very resistant of environmental perturbation. The site is also subject to moderate hydrodynamic energy of the Western Channel and Celtic Sea, so it is likely that these biological communities are acclimatised to some level of natural disturbance.

There is limited primary evidence to indicate lasting impacts on sediment features from traps, however traps are considered of limited concern due to the generally high energy environments where these subtidal sediment features occur and the likely greater impact of natural disturbance in these environments compared with potting. Overall, given minimal levels of trap activity are occurring in the site, traps are unlikely to adversely affect these features outlined in this section, at the levels described, and therefore are unlikely to pose a significant risk of hindering the conservation objectives of East of Haig Fras MPA.

#### Sea-pen and burrowing megafauna communities

Traps and anchored nets and lines fishing gear exert similar pressures on sea-pen and burrowing megafauna communities, therefore the narrative in the anchored nets and lines section also applies here for the traps section.

As described in section 4.3.1 of the traps Impacts Evidence document<sup>9</sup>, abrasion and penetration impacts from traps are possible through the interaction between the seabed and the gear itself, including associated lines and anchors. Of the five biotopes outlined for sea-pens in **Table A2 6** in Annex 2, two have indicated high

sensitivity to abrasion impacts of traps, whilst the remaining three have medium sensitivity.

Burrowing megafaunas, such as Norwegian lobster *Nephrops norvegicus* are generally considered less sensitive to abrasion and penetration impacts than seapens due to their motility and ability to move from areas of disturbance. Sea-pens, although able to retract into their burrows and bend in some instances, are fixed and unable to move from potential disturbance episodes. Therefore, this assessment focuses on the most sensitive component of this designated feature, sea-pens.

There is limited direct evidence of the impacts of static gears such as traps on the physical environment that sea-pen and burrowing megafauna communities inhabit. There is potential for impacts on the biological communities, however recovery from impacts has been demonstrated, such as sea-fans bending and sea-pens reinserting themselves following uprooting. Although studies have observed no lasting effects on the substrate, it remains unknown whether they would suffer from potential long-term effects if repeatedly uprooted. *Virgularia mirabilis* is able to retract into a burrow into which the whole colony can withdraw when disturbed, thus reducing the likelihood of damage or mortality from fishing activity. Overall, literature suggests that traps are unlikely to significantly impact sea-pen and burrowing megafauna communities. Given the limited trap fishing activity undertaken between 2016 and 2020, any interaction between these and the designated features is likely to be minimal. Overall, traps are unlikely to pose a significant risk of hindering the conservation objectives of East of Haig Fras MPA.

#### Fan Mussel (Atrina fragilis)

Traps and anchored nets and lines fishing gear exert similar pressures on the fan mussel feature, therefore the narrative in the anchored nets and lines section also applies here for the traps section.

As described in section 5.3.1 of the traps Impacts Evidence document<sup>9</sup>, traps are not generally considered a fishing activity that penetrates the seabed, and abrasion and penetration towards sediment habitats will be more significant in bottom towed gears. Studies have suggested that traps are unlikely to have lasting and detrimental impacts on fan mussel.

Given the limited traps fishing activity being undertaken at the site, any interaction between traps and the feature is likely to be minimal Overall, there is a low risk of impacts on this feature at the activity levels described. It is unlikely that the ongoing use of traps at the levels described will pose a significant risk of hindering the achievement of the conservation objective of East of Haig Fras MPA.

Therefore, MMO conclude that the ongoing use of traps at the levels described does not pose a significant risk of hindering the achievement of the conservation objectives of East of Haig Fras MPA.

## 4.4 Part B conclusion

An assessment of anchored nets and lines and traps on the following features of East of Haig Fras MPA has concluded that the ongoing use of anchored nets and lines and traps will not result in a significant risk of hindering the achievement of the conservation objectives of the MPA.

- High energy circalittoral rock and moderate energy circalittoral rock;
- Subtidal coarse/subtidal mixed sediments mosaic, subtidal sand; subtidal mud;
- Sea-pen and burrowing megafauna communities; and
- Fan mussel (Atrina fragilis).

Management measures will not therefore be implemented for anchored nets and lines and traps for East of Haig Fras MPA.

# **5** Part C - In-combination assessment

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

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

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

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

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

Bottom towed gears were identified in Part B as requiring management to avoid posing a significant risk of hindering the achievement of the site conservation objectives. Anchored nets and lines and traps are the only remaining fishing activities occurring within East of Haig Fras MPA that interact with the seabed. Incombination effects of these fishing activities as well as these activities incombination with other relevant activities will be assessed in this section.

In accordance with the methodology detailed above, ArcGIS identified one project, within the 5 km buffer applied. **Table 6** shows this activity and the relevant category from the JNCC Pressures-Activities Database (PAD)<sup>1</sup>.

PAD Category	Description
Anchorage and moorings: Construction	Installation of 4 sets of floating buoy FLiDAR/seabed mooring with upward looking ADCP at a maximum of four locations to collect metocean data (wave and currents). Known as the Celtic Sea Metocean survey. Areas of search, 3 and 4 overlap with the 5 km buffer of East of Haig Fras MPA; specific locations for installation within these areas will be identified prior to deployment. Outside the site boundary. No direct or indirect pressure pathway for impact and therefore, no in-combination effects possible.
	PAD Category Anchorage and moorings: Construction

Table 6: Summary of marine licensable activities and associated PADcategories.

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

**Table 7** summarises the pressures exerted by fishing and non-fishing activities and identifies those exerted by both (Y: pressure exerted). Activity-pressure interactions are highlighted dark blue to illustrate an in-combination effect. Only fishing activity with no proposed or current fisheries management in place are considered.

 Table 7: Pressures exerted by fishing and non-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 pressure sections

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

#### **5.2 Fishing vs Fishing in-combination pressures**

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

As noted in Part B (Section 4.3.1 nets and lines and Section 4.3.2 traps), impacts from the removal of target and non-target species pressure is not being considered in detail in this assessment. In-combination impacts from the removal of target and non-target species pressures are more fully assessed under the pressure abrasion, as the features fan mussel and sea-pen and burrowing megafauna communities are considered not to be at significant risk from these pressures via static gear use in this site (Section 4.3). Therefore, the removal pressures are not considered further in this in-combination assessment. The pressures may require further consideration as future evidence becomes available, in conjunction with updated conservation advice from JNCC and Natural England.

The annual average VMS records for over 12 m vessels within the MPA totalled 185 (anchored nets and lines). There were no VMS records for over 12 m vessels using traps within the MPA. For under 12 m vessels, between 2016 and 2020, the annual average fishing effort estimated to have been derived from the MPA via traps and anchored nets and lines was 5.86 days (4.30 days for traps, 1.56 days for anchored nets and lines, Annex 1, calculated from **Table A1.8**). For the same period (2016-2020), the total fishing effort (under 12s) estimated to have been derived from the MPA were 35.15 days (25.82 days for traps, 9.33 days for anchored nets and lines (Annex 1, calculated from **Table A1.8**)). The fishing effort data is further supported by the estimated live weight landings for under 12 m vessels that equal an annual

average of 3.45 tonnes, 1.88 tonnes for traps and 1.57 tonnes for anchored nets and lines, between 2016 and 2020 (Section 4.2).

The combined impacts from anchored nets and lines and traps could potentially increase the risk of negative effects from the pressure abrasion and disturbance of the substrate on the surface of the seabed. Anchored nets and lines activity alone has been assessed as bearing no significant risk to the conservation objectives of the site, considering annual average landings of 46.96 tonnes for the over 12 m fleet and 1.57 tonnes for the under 12 m fleet with low annual average fishing effort (1.56 days). For traps, there are no VMS recordings for over 12 m vessels, and fishing effort for this gear by under 12 m vessels is low (4.30 days) landing only 1.89 tonnes annually. As such with such low trap activity, any additional in-combination impact is considered insignificant.

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

## **5.3 Fishing vs non-fishing activities in-combination pressures**

#### 5.3.1 Abrasion and disturbance of the substrate on the surface of the seabed

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

Activities associated with the installation of floating buoy moorings which might cause abrasion or disturbance of the seabed relate to anchorage of buoys. These will be in-situ for a period of up to 12 months, with occasional maintenance visits planned in that period. These anchoring solutions can smother or impede the growth of biological communities within their footprint and have the potential to cause localised physical damage through abrasion and scouring of the substrate in which they are located, particularly in the highly hydrodynamic conditions of the Celtic Sea and Western Channel.

As detailed in **section 5.2.1** abrasion and disturbance of seabed surface substrate, at described activity levels anchored nets and lines and traps are not considered to be causing significant pressure through abrasion and disturbance. It is possible that activities linked to the gravity based mooring solution, in-combination with anchored nets and lines and traps may increase the potential for this pressure to have negative cumulative effects on the designated features of the MPA. However, the buoys and gravity based mooring solutions will be installed adjacent to and not within the boundary of the MPA. Therefore, there are no medium to high-risk pressure pathways associated with these marine licensable activities that could have an

impact on the designated features within the site boundary and are therefore not considered further in this in-combination assessment.

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

### 5.4 Part C conclusion

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

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

# 6 Conclusion and proposed management

Part A of this assessment concluded that anchored nets and lines and traps are capable of affecting (other than insignificantly) the designated features of East of Haig Fras MPA.

Part B of this assessment concluded that ongoing use of anchored nets and lines and traps on the sedimentary features, high and moderate energy circalittoral rock, fan mussel and sea-pen and burrowing megafauna communities feature of East of Haig Fras MPA does not pose a significant risk of hindering the achievement of the conservation objectives of the MPA.

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

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

# 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); and
- 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.

# 8 References

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# Annex 1: Fishing activity data

Table A1. 1: VMS record count per nation group (UK and EU Member State (EU)) 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.

			201	16	20	17	20	18	20	19	20	20	20	21	To (201 202	tal 6 to 21)	Average (2016 to 2021)
Gear group	Gear code	Nation group	Count	%	Count	%	Count										
	GN	UK	53	100	35	100	74	100	67	100	48	100	13	100	290	100	48
	GN To	otal	53	28	35	21	74	45	67	30	48	27	13	7	290	26	48
	GNS	EU	1	1	0	0	0	0	1	1	0	0	0	0	2	0	0
	GNS	UK	101	99	95	100	85	100	155	99	128	100	154	100	718	100	120
Anchored	GNS 1	Fotal	102	53	95	57	85	52	156	69	128	71	154	86	720	65	120
Net/Line	GTR	UK	37	100	37	100	3	100	0	0	4	100	12	100	93	100	16
	GTR 1	otal	37	19	37	22	3	2	0	0	4	2	12	7	93	8	16
	LLS	EU	0	0	0	0	2	100	3	100	0	0	0	0	5	100	1
	LLS T	otal	0	0	0	0	2	1	3	1	0	0	0	0	5	0	1
Anchored Net/L	ine Tot	al	192	19	167	16	164	16	226	26	180	33	179	25	1,108	21	185
	ОТВ	EU	610	100	707	100	648	100	540	100	314	100	495	100	3,314	100	552
	ОТВ 1	otal	610	76	707	82	648	77	540	83	314	85	495	92	3,314	82	552
	ΟΤΤ	EU	0	0	1	100	12	100	4	100	0	0	0	0	17	100	3
Demersal trawl	ОТТ Т	otal	0	0	1	0	12	1	4	1	0	0	0	0	17	0	3
	РТВ	EU	0	0	0	0	0	0	0	0	0	0	1	100	1	100	0
	РТВ Т	otal	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
	твв	EU	38	20	9	6	9	5	10	9	8	15	33	85	107	15	18

			201	16	20	17	20	18	20	19	20	20	20	21	To (201 202	tal 6 to 21)	Average (2016 to 2021)
Gear group	Gear code	Nation group	Count	%	Count	%	Count										
	TBB	UK	151	80	149	94	174	95	96	91	46	85	6	15	622	85	104
	TBB	Total	189	24	158	18	183	22	106	16	54	15	39	7	729	18	122
	TBN	EU	0	0	0	0	0	0	0	0	0	0	1	100	1	100	0
	TBN <sup>·</sup>	Total	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Demersal trawl	Total		799	78	866	84	843	83	650	74	368	67	536	75	4,062	78	677
Dredge	DRB	EU	20	100	0	0	0	0	2	100	3	100	0	0	25	100	4
Diedge	DRB	Total	20	100	0	0	0	0	2	100	3	100	0	0	25	100	4
Dredge Total			20	2	0	0	0	0	2	0	3	1	0	0	25	0	4
Midwater -	PS	EU	0	0	0	0	1	100	0	0	0	0	0	0	1	100	0
surrounding	PS To	otal	0	0	0	0	1	100	0	0	0	0	0	0	1	100	0
Midwater - surro	oundin	g Total	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
Midwater	LLD	EU	0	0	0	0	10	100	0	0	0	0	0	0	10	100	2
Hook/Lines	LLD 1	Fotal	0	0	0	0	10	100	0	0	0	0	0	0	10	100	2
Midwater Hook/	Lines	Total	0	0	0	0	10	1	0	0	0	0	0	0	10	0	2
Midwater Trawl	ОТМ	EU	8	100	2	100	0	0	0	0	0	0	0	0	10	100	2
	ОТМ	Total	8	100	2	100	0	0	0	0	0	0	0	0	10	100	2
Midwater Trawl	Total		8	1	2	0	0	0	0	0	0	0	0	0	10	0	2
Linknown	NK	EU	1	100	0	0	0	0	0	0	0	0	0	0	1	100	0
	NK T	otal	1	100	0	0	0	0	0	0	0	0	0	0	1	100	0
Unknown Total			1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Grand Total			1,020	1	1,035	1	1,018	1	878	1	551	1	715	1	5,217	1	870

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

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
	GN	8.51	13.94	28.41	29.95	9.07	89.87	17.97
Anchored Net/Line	GNS	18.46	33.29	22.00	38.22	24.37	136.35	27.27
	GTR	3.96	3.26	0.41	0	0.86	8.50	1.70
Anchored Net/Line To	otal	30.93	50.49	50.83	68.17	34.30	234.73	46.95
Demersal trawl	TBB	34.48	30.06	44.18	27.86	21.01	157.59	31.52
Demersal trawl Total		34.48	30.06	44.18	27.86	21.01	157.59	31.52
Grand Total		65.41	80.55	95.01	96.04	55.31	392.32	78.46

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

Gear group	Gear	2016	2017	2018	2019	2020	Total	Average
Gear group	code	2010	2011	2010	2013	2020	(2016 to 2020)	(2016 to 2020)
Anchored Net/Line	GNS	0.01	0	0	0	0	0.01	<0.01
Anchored Net/Line To	tal	0.01	0	0	0	0	0.01	<0.01
	OTB	51.48	53.45	46.82	43.07	32.90	227.72	45.54
Demersal trawl	OTT	0	0.1	0.76	0.78	0	1.64	0.33
	TBB	5.30	1.28	1.15	1.21	0.98	9.93	1.99
Demersal trawl Total		56.78	54.84	48.74	45.07	33.88	239.30	47.86
Dredge	DRB	0.03	0	0.00	0	0	0.03	0.01
Dredge Total		0.03	0	0.00	0	0	0.03	0.01
Midwater Hook/Lines	LLD	0	0	8.67	0	0	8.67	1.73
Midwater Hook/Lines	Total	0	0	8.67	0	0	8.67	1.73
Midwater Trawl	OTM	0	0.84	0	0	0	0.84	0.17
Midwater Trawl Total		0	0.84	0	0	0	0.84	0.17
Grand Total		56.81	55.68	57.41	45.07	33.88	248.85	49.77

Table A1. 4: Percentage of each ICES rectangle intersected by the MMO section of East of Haig Fras MPA.

ICES rectangle	Percentage overlap (%)
29E3	5.13
30E3	5.00

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

Coor group	Gear	2046	2017	2040	2040	2020	Total	Average
Gear group	code	2010	2017	2010	2019	2020	(2016 to 2020)	(2016 to 2020)
	GEN	0	0	0	0	0	0	0
Anchored Net/Line	GN	0.18	1.73	1.37	0.86	1.02	5.16	1.03
	GNS	0.43	0.17	0.82	0.29	0	1.71	0.34
	GTR	0	0.53	0.45	0	0	0.98	0.2
Anchored Net/Line Total		0.62	2.43	2.64	1.14	1.02	7.86	1.57
Domorsal trawl	OT	0	0	0	0	0	0	0
Demersartrawi	OTB	0	0	0.02	0	0	0.02	0.01
Demersal trawl Total		0	0	0.02	0	0	0.02	0.01
Dredge	DRB	0	0	0.02	0	0	0.02	0.01
Dredge Total		0	0	0.02	0	0	0.02	0.01
Midwater - Gill Encircling	GNC	0	0	0	0	0.18	0.18	0.04
Midwater - Gill Encircling	Total	0	0	0	0	0.18	0.18	0.04
Midwator Hook/Linos	LHP	0.05	0.03	0.05	0.12	0.02	0.27	0.05
	LX	0	0	0	0	0	0	0
Midwater Hook/Lines Total		0.05	0.03	0.05	0.12	0.02	0.27	0.05
Traps	FPO	3.21	1.42	2.03	1.49	1.23	9.39	1.88
Traps Total		3.21	1.42	2.03	1.49	1.23	9.39	1.88
Grand Total		3.87	3.89	4.77	2.75	2.45	17.74	3.55

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

Gear group	Gear code	2016	2017	2018	2019	2020	Total (2016 to 2020)	Average (2016 to 2020)
Dredge	DRB	0	0	0	0	0	0	0
Dredge Total		0	0	0	0	0	0	0
Traps	FPO	0	0	0	0.02	0	0.02	<0.01
Traps Total		0	0	0	0.02	0	0.02	<0.01
Grand Total		0	0	0	0.02	0	0.02	<0.01

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

Gear group	SAR category	2016	2017	2018	2019	2020	Total
Demersal	Surface	0	0	0	0	0	0
Seines	Subsurface	0	0	0	0	0	0
Drodgos	Surface	0	0	0	0	0	0
Dieuges	Subsurface	0	0	0	0	0	0
Demersal	Surface	1.26	1.31	1.34	1.12	0.75	5.78
Trawls	Subsurface	0.21	0.21	0.25	0.19	0.11	0.97
Bottom	Surface	1.26	1.31	1.34	1.12	0.75	5.78
Towed Gear	Subsurface	0.21	0.21	0.25	0.19	0.11	0.97

Table A1. 8: Fishing effort (days) recorded by UK vessels under 12 m in length, separated by gear type for the area of East of Haig Fras MPA that intersects ICES rectangles 29E3 and 30E3 (2016 to 2021). ICES rectangle level data has been apportioned to the MPA based on the percentage area of the ICES rectangle that intersects the MPA (Table A1. 4).

			Fi	shing effort	days at se	a)		
Gear group	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average (2016 to 2021)
Demersal trawl	0	0	0.05	0	0	0	0.05	0.01
Dredge	0	0	0.05	0	0	0	0.05	0.01
Bottom towed gear total	0	0	0.10	0	0	0	0.10	0.02
Midwater gill encircling	0	0	0	0	0.25	0.03	0.28	0.05
Midwater hooks and lines	0.26	0.21	0.21	0.41	0.10	0.15	1.33	0.22
Midwater gear total	0.26	0.21	0.21	0.41	0.36	0.18	1.61	0.27
Anchored nets and lines	0.71	2.90	2.75	1.10	0.96	0.92	9.33	1.56
Traps	7.03	3.52	3.26	3.39	4.70	3.93	25.82	4.30
Static gear total	7.74	6.41	6.01	4.49	5.66	4.85	35.15	5.86
MPA total	8.00	6.62	6.31	4.90	6.01	5.03	36.87	6.15

# **Annex 2: Biotope information**

Table A2 1: High energy circalittoral rock biotopes that may be found within East of Haig Fras MPA with high or medium sensitivity to the abrasion/disturbance of the substrate on the surface of the seabed pressure.

Biotope	Sensitivity
Bryozoan turf and erect sponges on tide-swept circalittoral rock (Readman, Lloyd and Watson, 2023a)	Abrasion: Medium
<i>Phakellia ventilabrum</i> and axinellid sponges on deep, wave-exposed circalittoral rock (Readman, Lloyd and Watson, 2023f)	Abrasion: High
<i>Eunicella verrucosa</i> and P <i>entapora foliacea</i> on wave- exposed circalittoral rock (Readman, Jackson, <i>et al.</i> , 2023)	Abrasion: High
Mixed turf of bryozoans and erect sponges with <i>Dysidia fragilis</i> and <i>Actinothoe sphyrodeta</i> on tide-swept wave- exposed circalittoral rock (Readman, Lloyd and Watson, 2023e)	Abrasion: Medium
Mixed turf of bryozoans and erect sponges with <i>Sagartia elegans</i> on tide-swept circalittoral rock (Readman, Lloyd and Watson, 2023d)	Abrasion: Medium
Sparse sponges, <i>Nemertesia</i> spp., and <i>Alcyonidium</i> <i>diaphanum</i> on circalittoral mixed substrata (Readman, Lloyd and Watson, 2023g)	Abrasion: Medium
Sponges and anemones on vertical circalittoral bedrock (Readman, Lloyd and Watson, 2023h)	Abrasion: Medium

Table A2 2: Moderate energy circalittoral rock biotopes that may be found within East of Haig Fras MPA with medium sensitivity to the abrasion/disturbance of the substrate on the surface of the seabed pressure.

Biotope	Sensitivity	Depth Range
Brittlestars overlying coralline crusts, <i>Parasmittina trispinosa</i> and <i>Caryophyllia</i> <i>smithii</i> on wave-exposed circalittoral rock (De-Bastos, Williams and Hill, 2023)	Abrasion: Medium	
<i>Caryophyllia smithii</i> and <i>Swiftia pallida</i> on circalittoral rock (Readman, Durkin, <i>et al.</i> , 2023)		10 to 20 m, 20 to 30 m
<i>Caryophyllia smithii</i> , <i>Swiftia pallida</i> and <i>Alcyonium glomeratum</i> on wave- sheltered circalittoral rock (Readman, Lloyd and Watson, 2023b)	Abrasion: Medium	30 to 50 m.
<i>Caryophyllia smithii</i> , <i>Swiftia pallida</i> and large solitary ascidians on exposed or moderately exposed circalittoral rock (Readman, Lloyd and Watson, 2023c)		
<i>Urticina felina</i> and sand-tolerant fauna on sand-scoured or covered circalittoral rock (Tillin and Hiscock, 2016)		0 to 5 m, 5 to 10m, 10 to 20 m, 20 to 30 m, 30 to 50 m.
Brittlestars on faunal and algal encrusted exposed to moderately wave- exposed circalittoral rock (De-Bastos, Hill, Lloyd, <i>et al.</i> , 2023a)	Abrasion: Medium	10 to 20 m, 20 to 30 m,
<i>Sabellaria spinulosa</i> encrusted circalittoral rock (Tillin <i>et al.</i> , 2023a)		30 to 50 m.
<i>Sabellaria spinulosa</i> with a bryozoan turf and barnacles on silty turbid circalittoral rock (Tillin <i>et al.</i> , 2023b)		0 to 5 m, 5 to 10m, 10 to 20 m, 20 to 30 m, 30 to 50 m.

Table A2 3: Subtidal mixed sediments biotopes that may be found within East of Haig Fras MPA with medium sensitivity to the abrasion/disturbance of the substrate on the surface of the seabed pressure.

Biotope	Sensitivity
<i>Cerianthus lloydii</i> and other burrowing anemones in circalittoral muddy mixed sediment (Perry and Watson, 2024)	Abrasion: Medium
<i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment (Perry and Watson, 2023)	Abrasion: Medium
<i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment (Readman and Watson, 2024)	Abrasion: Medium
<i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> brittlestar beds on sublittoral mixed sediment (De-Bastos, Hill, Garrard, <i>et</i> <i>al.</i> , 2023)	Abrasion: Medium

# Table A2 4: Subtidal sand biotopes that may be found within East of Haig Fras MPA with high or medium sensitivity to the abrasion/disturbance of the substrate on the surface of the seabed pressure.

Biotope	Sensitivity
<i>Echinocardium cordatum</i> and <i>Ensis</i> spp. in lower shore and shallow sublittoral slightly muddy fine sand (De-Bastos, Hill, Lloyd, <i>et al.</i> , 2023b)	Abrasion: Medium
Acrocnida brachiata with Astropecten irregularis and other echinoderms in circalittoral muddy sand (De-Bastos, Lloyd and Watson, 2023)	Abrasion: Medium
Maldanid polychaetes and <i>Eudorellopsis deformis</i> in deep circalittoral sand or muddy sand (Ashley, 2016)	Abrasion: Medium
<i>Owenia fusiformis</i> and <i>Amphiura filiformis</i> in deep circalittoral sand or muddy sand (De-Bastos, 2023)	Abrasion: Medium

Table A2 5: Subtidal mud biotopes that may be found within East of Haig FrasMPA with high or medium sensitivity to the relevant pressures.

Biotope	Sensitivity
<i>Amphiura filiformis</i> and <i>Ennucula tenuis</i> in circalittoral and offshore sandy mud (De-Bastos and Watson, 2023a)	Abrasion: Medium
<i>Virgularia mirabilis</i> and <i>Ophiura</i> spp. with <i>Pecten maximus</i> on circalittoral sandy or shelly mud (Hill <i>et al.</i> , 2024b)	Abrasion: Medium Removal of non-target species: Medium
<i>Virgularia mirabilis</i> and <i>Ophiura</i> spp. With <i>Pecten</i> <i>maximus</i> , hydroids and ascidians on circalittoral sandy or shelly mud with shells or stones (Hill <i>et al.</i> , 2024a)	Abrasion: Medium Removal of non-target species: Medium
Sea-pens and burrowing megafauna in circalittoral fine mud (Hill <i>et al.</i> , 2023)	Abrasion: Medium Removal of non-target species: Medium
Ampharete falcata turf with Parvicardium ovale on cohesive muddy sediment near margins of deep stratified seas (De-Bastos and Hill, 2016)	Abrasion: Medium Removal of non-target species: Medium
<i>Cylista undata</i> and <i>Ascidiella aspersa</i> on infralittoral sandy mud (Readman and Watson, 2023)	Abrasion: Medium Removal of non-target species: Medium
<i>Amphiura filiformis</i> , <i>Kurtiella bidentata</i> and <i>Abra nitida</i> in circalittoral sandy mud (De-Bastos, Hill and Watson, 2023)	Abrasion: Medium Removal of non-target species: Medium
<i>Thyasira</i> spp. and <i>Ennucula tenuis</i> in circalittoral sandy mud (De-Bastos and Watson, 2023b)	Abrasion: Medium Removal of non-target species: Medium
Burrowing megafauna and <i>Maxmuelleria lankesteri</i> in circalittoral mud (Durkin and Tyler-Walters, 2022)	Abrasion: Medium
<i>Brissopsis lyrifera</i> and <i>Amphiura chiajei</i> in circalittoral mud (De-Bastos and Budd, 2016)	Abrasion: Medium Removal of non-target species: Medium
<i>Levinsenia gracilis</i> and <i>Heteromastus filifirmis</i> in offshore circalittoral mud and sandy mud (E. S. R. De-Bastos, 2016)	Abrasion: Medium Removal of non-target species: Medium
<i>Paramphinome jeffreysii, Thyasira</i> spp. and <i>Amphiura filiformis</i> in offshore circalittoral sandy mud (E. De-Bastos, 2016b)	Abrasion: Medium Removal of non-target species: Medium
<i>Myrtea spinifera</i> and polychaetes in offshore circalittoral sandy mud (E. De-Bastos, 2016a)	Abrasion: Medium Removal of non-target species: Medium

Table A2 6: Sea-pen and burrowing megafauna communities' biotopes that may be found within East of Haig Fras MPA with high or medium sensitivity to the relevant pressures.

Biotope	Sensitivity
Seapens and burrowing megafauna in circalittoral fine mud (Hill <i>et al.</i> , 2023)	Abrasion: Medium Removal of non-target species: Medium
Seapens, including <i>Funiculina quadrangularis,</i> and burrowing megafauna in undisturbed circalittoral fine mud (Tyler-Walters and Watson, 2023)	Abrasion: High Removal of non-target species: High
Burrowing megafauna and <i>Maxmuelleria lankesteri</i> in circalittoral mud (Durkin and Tyler-Walters, 2022)	Abrasion: Medium
<i>Brissopsis lyrifera</i> and <i>Amphiura chiajei</i> in circalittoral mud (De-Bastos and Budd, 2016)	Abrasion: Medium Removal of non-target species: Medium
<i>Atrina fragilis</i> and echinoderms on circalittoral mud (Tyler-Walters, 2022)	Abrasion: High