Marine Management Organisation

MMO Stage 3 Site Assessment: Isles of Scilly: Bristows to The Stones MPA (DRAFT)

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Title: MMO Stage 3 Site Assessment: Isles of Scilly: Bristows to The Stones MPA (DRAFT)

Contents

Executive Summary

This assessment analyses the impact of bottom towed fishing on the designated features; fragile sponge and anthozoan communities on subtidal rocky habitats, high energy circalittoral rock, moderate energy circalittoral rock, pink sea-fan (*Eunicella verrucosa*), spiny lobster (*Palinurus elephas*) and subtidal coarse sediment in Isles of Scilly: Bristows to The Stones Marine Protected Area (MPA) to determine whether a significant risk of hindering the conservation objectives of the site can be excluded. The assessment sets out the evidence considered and analyses the quality of that evidence.

The assessment finds that ongoing fishing activities by bottom towed gear occurring in the site may result in a significant risk of hindering the achievement of the conservation objectives of Isles of Scilly: Bristows to The Stones MPA. As such the Marine Management Organisation (MMO) concludes that management measures are required.

1 Introduction

This assessment considers whether fishing activities are compatible with the conservation objectives of Isles of Scilly: Bristows to The Stones MPA. The assessment is confined to the portion of the MPA that is regulated by the 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 and determine if there is a significant risk of fishing activities hindering the conservation objectives of the site. If so, 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, conservation objectives and general management approaches in this assessment:

- Natural England Conservation Advice – Isles of Scilly: Bristows to The Stones MCZ[1]
- Defra Factsheet - Isles of Scilly MCZ[2]

The Isles of Scilly MCZ is a collection of inshore sites located around the Isles of Scilly, a group of islands located approximately 45 km south-west off the Cornish coast. The MCZ consists of 11 separate sites covering a total area of over 30 km^2.

Bristows to The Stones MPA is an inshore site which straddles the 6 nm boundary. It is located to the northeast of the main archipelago and has a maximum depth of 75 m (**Figure 1**). The site straddles the 6 nm limit with approximately 194 km^2 of the site falling within the 6 nm limit and the remaining 1.6 km^2 falling outside the 6 nm limit. The site falls within two administrative areas: the 0 to 6 nm portion of the site falls within the District of Isles of Scilly Inshore Fisheries and Conservation Authority (IFCA); and the 6 to 12 nm portion of the site (hereafter the 'MMO portion') extends outside of Isles of Scilly IFC District and into the administrative area where the MMO has responsibility.

Bristows to The Stones MPA was designated as an MCZ in 2013, with moderate energy circalittoral rock and subtidal coarse sediment added as designated features in 2019. The designated features and their general management approaches are set out in **Table 1**.

[1] Natural England Conservation Advice – Isles of Scilly: Bristows to The Stones MCZ designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=MCZ0008-02

[2] Defra Factsheet - Isles of Scilly: Bristows to The Stones MCZ www.gov.uk/government/publications/marine-conservation-zone-2013-designation-isles-of-scilly (last accessed 13 September 2023)

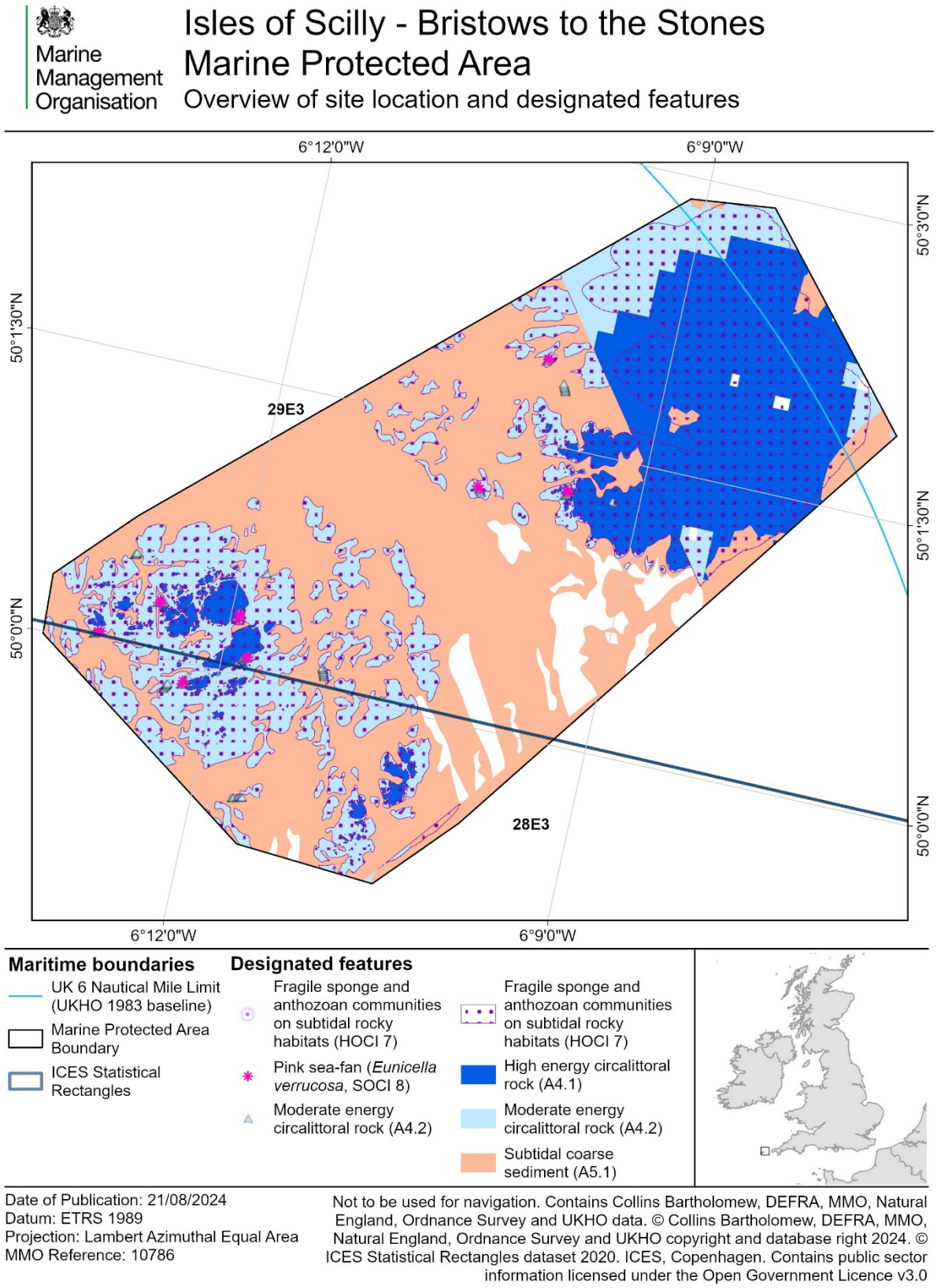

Figure 1: Site overview map.

Table 1: Designated features and general management approaches.

Designated feature	General management approach
Fragile sponge and anthozoan communities on subtidal rocky habitats	Recover to favourable condition
High energy circalittoral rock	
Moderate energy circalittoral rock	
Pink sea-fan (*Eunicella verrucosa*)	
Spiny lobster (*Palinurus elephas*)	
Subtidal coarse sediment	

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. The general management approaches for the features of Bristows to The Stones MPA have been set based on a vulnerability assessment. More information on this can be found in Natural England's supplementary advice on conservation objectives[1].

2.2 Scope of this assessment

The scope of this assessment covers bottom towed fishing activities alone, and relevant activities in combination with fishing, offshore of 6 nm. It does not cover areas of this site inshore of 6 nm, for which Isles of Scilly IFCA is the regulator. The area of Bristows to The Stones MPA outside of 6 nm is 1.6 km^2. Hereafter, all references to the site or MPA refer only the portion offshore of 6 nm unless otherwise indicated. The assessment of traps as well as anchored nets and lines within the MMO portion of the site will be conducted by Isles of Scilly IFCA.

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[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. 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.

[3] For more information: 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);
- 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 Stage 3 MPA Site Assessment Methodology document[4], 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 and landings data for Bristows to The Stones MPA, 2016 to 2021.

Gear type	Gear name	Gear code	Justification
Anchored nets and lines	Gill nets (not specified)	GN	Present in under 12 m landings data for ICES statistical rectangles that overlap the site.
	Set gillnet (anchored)	GNS	
	Trammel net	GTR	
Bottom towed gear	Bottom otter trawl	OTB	
	Otter trawls (unspecified)	OT	
	Towed dredge	DRB	
Midwater Gear	Hand-operated pole-and-line	LHP	
	Encircling gillnets	GNC	
Traps	Pots	FPO	Present in VMS records and under 12 m landings data for ICES statistical rectangles that overlap the site.

3.2 Pressures, features and activities screened out or screened in

This section identifies activities that are **occurring but do not need to be considered** for Bristows to The Stones MPA.

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

- **Static gears:** Isles of Scilly IFCA will be assessing the impact of anchored nets and lines and traps across the entire MPA, including the area that extends beyond 6 nm. Therefore, they will not be covered in this assessment.
- **Midwater gears:** although the use of midwater gears does occur within Bristows to The Stones MPA, there is no feasible pathway for gears of this

[4] Stage 3 MPA Site Assessment Methodology document: www.gov.uk/government/publications/stage-3-site-assessments (last accessed 12 September 2024).

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 Bristows to The Stones MPA is not considered to be capable of affecting the designated features other than insignificantly and is not considered further within this assessment.

- **Shore based activities:** as the MMO portion of the site lies beyond the 6 nm limit, it is not possible that shore-based activities would be capable of affecting the designated features due to distance; shore-based activities are therefore not considered further within this assessment.

This section identifies features which may not be present in the MMO portion of the site but need to be considered. These features are listed below with justification:

- **Fragile sponge and anthozoan communities on subtidal rocky habitats; pink sea-fan *(E. verrucosa)*; and spiny lobster (*P. elephas)***: there is direct evidence of these features being present within the 6 nm portion of the site but not in the portion of the site outside 6 nm. However, MMO cannot rule out suitable habitat being present outside of the 6 nm as there may be suitable habitat, therefore they have been assessed across the whole site, including the area outside of 6 nm.

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 bottom towed gear Impacts Evidence document[5].

To determine whether a pressure should be taken forward for this particular site, **Table 3** uses the information from the bottom towed gear Impacts Evidence document, alongside site level information, including sensitivity assessments, risk profiling of pressures from 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 bottom towed gear to be assessed in Part B, taking into account the pressures screened out in **sections 3.1** and **3.2**.

[5] Stage 3 Fishing Gear MPA Impacts Evidence Bottom Towed Gear: www.gov.uk/government/publications/stage-3-impacts-evidence (last accessed 13 September 2024).

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 potential bottom towed gear pressures on designated features of Bristows to The Stones MPA to be taken forward to Part B.

Potential pressures	Subtidal coarse sediment	Fragile sponge and anthozoan communities	High energy circalittoral rock	Moderate energy circalittoral rock	Spiny lobster	Pink sea-fan
Abrasion/disturbance of the substrate on the surface of the seabed						
Changes in suspended solids (water clarity)						
Deoxygenation						
Hydrocarbon and PAH 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 substratum 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 (Light)						
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 required 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 Isles of Scilly: Bristows to The Stones MPA conservation advice package and are shown in **Table 4** and **Table 5**.

Table 4: Relevant favourable condition targets for identified pressures on high and moderate energy circalittoral rock, fragile sponge and anthozoan communities on subtidal rocky habitats and subtidal coarse sediment. (*moderate energy circalittoral rock is not sensitive to this pressure, [+]high energy circalittoral rock is not sensitive to this pressure, [Δ] fragile sponge and anthozoan communities on subtidal rocky habitats is not sensitive to this pressure).

Feature name	Attribute	Target	Relevant pressures (where feature is sensitive)
High and moderate energy circalittoral rock Fragile sponge and anthozoan communities on subtidal rocky habitats Subtidal coarse sediment	Distribution: presence and spatial distribution of biological communities	Recover	Relevant to: • 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[Δ] • Removal of non-target species • Removal of target species*[+Δ] • Smothering and siltation rate changes (Light)
	Extent and distribution	Maintain	
	Structure and function: presence and abundance of key structural and influential species	[Maintain OR Recover OR Restore]	
	Structure: species composition of component communities	Recover	
High and moderate energy circalittoral rock Fragile sponge and anthozoan communities on subtidal rocky habitats	Structure: physical structure of rocky substrate	Maintain	Relevant to: • 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[Δ] • Smothering and siltation rate changes (Light)
Subtidal coarse sediment	Structure: sediment composition and distribution	Maintain	

Table 5: Relevant favourable condition targets for identified pressures on pink sea-fan (*E. verrucosa*) and spiny lobster *(P. elephas)* (#spiny lobster is not sensitive to this pressure).

Feature name	Attribute	Target	Relevant pressures (where feature is sensitive)
Spiny lobster Pink sea-fan	Population: population size	Recover	Relevant to: • Abrasion or disturbance of the substrate on the surface of the seabed# • Removal of non-target species
	Population: recruitment and reproductive capability	Recover	
	Presence and spatial distribution of the species	Recover	
	Supporting processes: sediment movement and hydrodynamic regime (species)	Maintain	Relevant to: • Abrasion or disturbance of the substrate on the surface of the seabed# • Removal of non-target species
	Supporting processes: water quality - turbidity (species)	Maintain	
	Supporting habitat: extent and distribution	Maintain	
Spiny lobster	Structure and function: biological connectivity	Maintain	

4.1 Fisheries access and existing management

As the MMO portion of Bristows to The Stones MPA lies entirely within the 6 to 12 nm zone, the only non-UK vessels that can operate within this portion of the site are those from Belgium and France licensed by the UK to do so. However, VMS and landings records from 2016 to 2021 indicate that the site has only been accessed by UK vessels.

More information on non-UK vessel access to UK waters can be found on MMO's Single Issuing Authority page[6].

4.2 Fishing activity summary

Table A1. 1 to **Table A1. 4** in Annex 1 display a detailed breakdown of fishing activity within Bristows to The Stones MPA. Of the fishing activities not screened out in Part A of this assessment or already subject to management, the most prevalent gears which may be operating within the site are demersal trawls and dredges. The activity levels of these bottom towed gears are low.

Static gears are outside the scope of this site assessment. Isles of Scilly IFCA will be assessing the impact of static gears, including traps across the entire MPA, including the area that extends beyond 6 nm.

Under 12 m vessels using bottom towed gears landed less than 0.01 tonnes (t) per year on average between 2016 and 2021, activity is limited to 2018 only. 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. Bristows to The Stones MPA covers 0.04 % of ICES rectangle 29E3. Fishing effort days are derived from logbooks and collected at ICES rectangle and then apportioned accordingly. Average fishing effort recorded by UK vessels under 12 m in length using bottom towed gear between 2016 and 2021 for the area of Bristows to The Stones MPA that intersects ICES rectangle 29E3 was less than 0.01 of a day.

The mean SAR values for bottom towed gear activity for C-squares intersecting Bristows to The Stones MPA from 2016 to 2020 range from 0 to less than 0.01 for subsurface and 0 to 0.02 for surface figures, this includes no activity for 2018 and 2019. An SAR value of 1 means that each area C-square experiences a pass of fishing gear on average once a year. The surface SAR of 0.02 indicates that each area C-square experienced less than one pass of fishing gear on average once every 50 years. Large portions of some of these C-squares also cover areas that are outside of the site, so some or all of the activity may not be occurring within the site. SAR values are also likely to be an underestimation of the total fishing pressure as

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

they are based on VMS and logbook recordings, therefore do not include under 12 m vessel activity.

4.3 Pressures by gear type

The bottom towed gear Impacts Evidence document[5] collates and analyses the best available evidence on the impacts of bottom towed fishing gears on MPA features. This section summarises the analyses and conclusion of that document, and considers this alongside site level information, including the nature and condition of the habitats and species present, the general management approaches for designated features, intensity of fishing activity taking place and exposure to natural disturbance.

As the designated features high energy circalittoral rock, moderate energy circalittoral rock, fragile sponge and anthozoan communities and pink sea-fan 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 bottom towed fishing gears, 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 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.

4.3.1 Bottom towed gear

The following features of Bristows to The Stones MPA have been considered in relation to pressures from bottom towed gear.

Subtidal coarse sediment:

The relevant pressures on subtidal coarse sediment of Bristows to The Stones MPA from bottom towed gear were identified in **Table 3** and are:

- abrasion or disturbance of the substrate on the surface of the seabed*
- changes in suspended solids (water clarity)$^{\Delta}$;
- penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion*;

- removal of target species;
- removal of non-target species; and
- smothering and siltation rate changes$^{\Delta}$.

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

Section 4.2 describes fishing activity within Bristows to The Stones MPA and notes that under 12 m vessels operate bottom towed fishing gears within the site at low levels. VMS data indicates that there are no over 12 m vessels using bottom towed gears in the site.

Communities in subtidal coarse sediment habitats are particularly sensitive to bottom towed gear activity because they generally contain large proportions of long-lived and more sessile epifauna which are easily damaged or removed by the pass of bottom towed gears leading to reduced diversity, abundance and occurrences.

As per section 8.4 of the bottom towed gear Impacts Evidence document[5], the abrasion and penetration pressures from this gear type can have both biological and physical impacts. The physical impacts include the creation of furrows and berms in the sediment from the trawl doors associated with bottom otter trawls; and the flattening of bottom features such as ripples and irregular topography by beam trawls and demersal seines. Physical impacts are unlikely, however, to significantly impact the large-scale topography of sediment features. Of more concern are the impacts to the biological structure of sediment habitats. Biological impacts 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.

Demersal trawls can cause collision, crushing and uprooting as animals encounter or pass under the gear. Initial reductions in biomass, species richness and diversity, as well as changes in community structure are considered likely to be greatest on subtidal coarse sediments compared to subtidal sand. The first pass of a trawl has the largest initial impact on biomass and production of sediments whereas in areas of high trawling intensity, further increasing trawling intensity can have smaller additional effects on biomass and production. Where sessile or attached epifauna are present, demersal seines have the potential to disturb or damage epifauna when the ropes of a seine net are closed to herd demersal fish.

Of the nine biotopes which could be found within the subtidal coarse sediment in Bristows to The Stones MPA (**Table A2. 1**), eight are characterised as having low sensitivity and the remaining one is not sensitive to abrasion. However, comparative studies on the abrasion pressures state that bottom towed gears reduced species

abundance, biomass and biodiversity over subtidal sediments, including subtidal coarse sediment (Collie, Escanero and Valentine, 1997). Abrasion from bottom towed gears may also displace larger rocks and stones that may be suitable for both colonisation from epifauna and flora, as well as refugia from species such as crustacea (Tillin and Watson, 2023d). Abrasion is therefore likely to damage epifauna and flora and may damage a proportion of the characterising species. The biotope *Moerella* spp. with venerid bivalves in infralittoral gravelly sand has medium resistance to abrasion, however, resilience is assessed as high due to the likelihood of opportunistic species within the biotope to rapidly recruit (Tillin and Watson, 2023d). Other subtidal coarse sediment biotopes such as *Glycera lapidum* in impoverished infralittoral mobile gravel and sand also display low sensitivities to abrasion, with high resilience to this pressure (Tillin and Watson, 2023b). As bottom towed gears are known to cause shifts in community structure, the presence of such biotopes in the site could be a result of the pressures from bottom towed gears potentially driving this shift towards the dominance of less sensitive, opportunistic species.

Of the nine biotopes which may be present in the subtidal coarse sediment in Bristows to The Stones MPA, the biotope *Neopentadactyla mixta* in circalittoral shell gravel or coarse sand (Tyler-Walters, Durkin and Watson, 2023) has a medium sensitivity to the pressure ‘changes in suspended solids (water clarity)’. Of the remaining eight biotopes, five are classed as not sensitive and the remaining three have a low sensitivity rating coupled with high resilience. *N. mixta* in circalittoral shell gravel or coarse sand occurs in areas which have a reasonably high level of wave exposure. *N. mixta* is a passive suspension feeder and as such suspension feeders require a good water flow and steady flow of seston (Tyler-Walters, Durkin and Watson, 2023) and the biotope’s medium sensitivity and medium resistance is suggested to highlight the potential loss of feeding and food quality in instances of higher turbidity, this is however, low confidence (Tyler-Walters, Durkin and Watson, 2023).

The impact of smothering and siltation rate changes from bottom towed gear will vary in line with the degree of resuspension; the larger the amount of entrainment of sediment, the greater the impact to vulnerable biological communities. Suspension and settlement of sediments varies between the gear types used, sediment grain size and the degree of sediment compaction. Three of the subtidal coarse sediment biotopes (*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel (Tillin and Watson, 2023a), *N. mixta* in circalittoral shell gravel or coarse sand and *Hesionura elongata* and *Microphthalmus similis* with other interstitial polychaetes in infralittoral mobile coarse sand (Marshall, Ashley and Watson, 2023)) are listed as having a medium sensitivity to the smothering and siltation rate changes. This may be in part due to the abundance of sessile, or low mobility filter feeders present in these biotopes. Changes in suspended sediment in the water column may have a range of biological effects on different species within the habitat; affecting their ability

to feed or breathe. Tillin and Tyler-Walters (2014) found that sedentary, filter or suspension feeders, such as bivalves, had low resistance to smothering. Similarly, erect, large, longer-lived epifaunal species with some flexibility had high resilience and for soft-bodied or flexible epifaunal species, increased turbidity (to a point) could even be beneficial under certain conditions (Tillin and Tyler-Walters, 2014). Therefore, impacts on the biological communities of sediment features from smothering and siltation are variable dependent on the species present.

Whilst levels of bottom towed gear in the site are low, the first pass of a trawl has the largest and most damaging initial impact on biomass and production of sediments, causing high levels of mortality. Subsequent passes have additional effects and repeated passes allow little time for species to recover. This contributes to a shift in the biological community, removing the most sensitive species while allowing resilient organisms to remain, suggesting that infrequent trawling may be sufficient to maintain a community in an altered state.

Bottom towed gears contact a much larger area of the seabed than static gears meaning that they have an impact on a spatial scale much larger than anchored nets and lines or traps. Despite the site's dominance of low sensitivity biotopes, activity levels across the site and swept area ratios for bottom towed gears indicate there is a risk of the abrasion and penetration pressures hindering the achievement of the conservation objectives for subtidal coarse sediment. The site does contain sensitive species and its dominance of low sensitivity biotopes may be a result of decades of bottom towed fishing activity that have shifted community baselines.

With regards to the discussion above, the assessed activity levels and the evidence available for the impact of bottom towed gears, **MMO concludes that impacts of abrasion or disturbance and penetration from the ongoing use of bottom towed gear at the levels described on the sedimentary features of Bristows to The Stones MPA may result in a significant risk of hindering the achievement of the conservation objectives of the MPA.**

Rocky reef features

The relevant pressures on the high and moderate energy circalittoral rock, fragile sponge and anthozoan communities on subtidal rocky habitats and pink sea-fan of Bristows to The Stones MPA from bottom towed gear were identified in **Table 3** and are:

Fragile sponge and anthozoan communities:

- abrasion/disturbance of the substrate on the surface of the seabed;
- changes in suspended solids (water clarity) $^{\Delta}$;
- removal of non-target species;
- smothering and siltation rate changes (Light) $^{\Delta}$.

High energy circalittoral rock:

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

Moderate energy circalittoral rock:

- abrasion/disturbance of the substrate on the surface of the seabed*;
- penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion*;
- removal of non-target species; and
- smothering and siltation rate changes (light).

Pink sea-fan:

- abrasion/disturbance of the substrate on the surface of the seabed; and
- removal of non-target species.

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

Section 4.2 describes fishing activity within Bristows to The Stones MPA and notes that under 12 m vessels operate bottom towed fishing gears within the site at low levels. VMS data indicates that there are no over 12 m vessels using bottom towed gears in the site.

Unrestricted access to fragile sponge and anthozoan communities on subtidal rocky habitats by bottom towed gear will lead to the conservation objectives for MPAs not being met (JNCC and Natural England, 2011). Similarly, biotopes in which pink sea-fan are present are illustrative of the fragile sponge and anthozoan communities on subtidal rocky habitats and therefore it is assumed that the impact of bottom towed fishing on pink sea-fan will likely be similar to that of the fragile sponge and anthozoan communities on subtidal rocky habitats in which they are found. Biotopes within the rocky reef features with sensitivity to the above pressures are listed in Annex 2 **Table A2. 2** to **Table A2. 4**.

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, Allain and Fossa, 2002; Grieve, Brady and Polet, 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).

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, Bolam and Hiddink, 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 rock habitats will depend on several factors, such as gear type, gear design and fishing intensity (Van Dolah, Wendt and Nicholson, 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, Wendt and Nicholson, 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 sublittoral rock 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.

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 1 to 3 years) potentially recovering from trawling in 6 months to 3 years, whereas long lived fauna (for example, with lifespans over 10 years) may take several years (less than 8 years) to recover (Hiddink et al., 2019). Field 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.

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).

The 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). Rocky reefs found within Bristows to The Stones MPA which have branching epifauna are particularly sensitive to bottom towed gear impacts (Defra, 2014).

The evidence considered in this assessment indicates that bottom towed fishing has the potential to have significant impacts on rock, reef and related features in Bristows to The Stones MPA. In particular these impacts are a result of physical impacts, such as abrasion.

With regards to the discussion above, the assessed activity levels and the evidence available for the impact of bottom towed gears, **MMO concludes that the impacts of abrasion or disturbance and penetration from the ongoing use of bottom towed gear at the levels described on fragile sponge and anthozoan communities, high energy circalittoral rock, moderate energy circalittoral rock and pink sea-fan within Bristows to The Stones MPA may result in a significant risk of hindering the achievement of the conservation objectives of Bristows to The Stones MPA.**

Spiny Lobster

This assessment has determined that there is a significant risk of the ongoing use of bottom towed gear hindering the achievement of the conservation objectives for both subtidal coarse sediments and rocky reef features. These features cover the whole of the site offshore of 6 nm. Management will therefore be introduced to prohibit bottom towed gear throughout this portion of the site (**Section 6**). Whilst this management is in place, there will therefore be no interaction between bottom towed gear and spiny lobster in this area, and **no significant risk of hindering the conservation objectives of the Bristows to the Stones MPA.**

4.4 Part B conclusion

The assessment of bottom towed gear on the designated features; fragile sponge and anthozoan communities on subtidal rocky habitats, high energy circalittoral rock, moderate energy circalittoral rock, pink sea-fan (*E. verrucosa*), and subtidal coarse sediment in Isles of Scilly: Bristows to The Stones MPA has concluded that the ongoing use of bottom towed gear at the levels described may result in 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 Isles of Scilly: Bristows to The Stones MPA. **Section 6** contains further details of these measures.

As management will be implemented for bottom towed gear on the above features, which cover the whole of the site offshore of 6 nm, there will be no interaction between bottom towed gear and spiny lobster (*P. elephas*). Therefore, this assessment concludes that there is no significant risk of hindering the conservation objective of the Bristows to the Stones MPA for this feature, whilst this management is in place.

5 Part C - In-combination assessment

This section assesses the effects of activities considered as compatible with the conservation objectives of the site in question in combination with other relevant live projects/activities taking place. This includes the following:

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

ArcGIS software has been used to check relevant activities that occur within, or adjacent to, the assessed site where there could be a pathway for impact. To determine relevant activities to be included in this part of the assessment, a distance of 5 km was selected as suitable to capture any potential way in which the activity could impact the benthic features of the site in-combination with effects of the fishing activities assessed. Bristows to the Stones MPA straddles the 6 nm limit and therefore, only activities that are within 5 km of the portion of the site seawards of the 6 nm limit were considered. This assessment considers the in-combination impacts of marine licensable activities that are ongoing or upcoming, with 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 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 submarine cables within buffer of this MPA, these cables are already in-situ, and it is unlikely that there is any direct or indirect pressure pathway for impact and therefore, it is unlikely that there will be any in-combination effects.

In accordance with the methodology detailed above, ArcGIS identified one active marine licence, for the Celtic Sea Metocean Survey (MLA/2022/00239/1, Licence expiry date: 31st of October 2024). The Celtic Sea Metocean Survey involves the

installation of up to four sets of floating buoy/ FLiDAR/seabed mooring with upward looking ADCP at a maximum of four locations for the purposes of collecting metocean data (wave and currents). The buoys will remain in-situ, anchored by a gravity based mooring solution, for a period of up to 12 months. During this time, there will be occasional maintenance visits to the buoys. A portion of area of search 5 of this project overlaps with Bristows to the Stones MPA, specific locations for deployment of the buoys will be identified prior to deployment.

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. In addition, as discussed in **section 3.2** Isles of Scilly IFCA will be assessing the impact of anchored nets and lines and traps across the entire MPA, including the area that extends beyond 6 nm. Therefore, they have not be covered in this assessment. As such there are no remaining fishing activities considered in this assessment which interact with the seabed and the above non-fishing activities, therefore there are no in-combination fishing interactions to assess.

5.1 Part C conclusion

MMO concludes that there are no in-combination fishing interactions for Isles of Scilly: Bristows to the Stones MPA.

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

6 Conclusion and proposed management

Part A of this assessment concluded that bottom towed gear is capable of affecting (other than insignificantly) the designated features of Isles of Scilly: Bristows to the Stones MPA.

Part B of this assessment concluded that ongoing use of bottom towed gear on the designated features; fragile sponge and anthozoan communities on subtidal rocky habitats, high energy circalittoral rock, moderate energy circalittoral rock, pink sea-fan (*E. verrucosa*), and subtidal coarse sediment in Isles of Scilly: Bristows to The Stones MPA may result in a significant risk of hindering the achievement of the conservation objectives of the MPA. Part B also concluded that as management will be implemented for bottom towed gear on the above features, which cover the whole of the site offshore of 6 nm, there will be no interaction between bottom towed gear and spiny lobster (*P. elephas*). Therefore, this assessment concludes that there is no significant risk of hindering the conservation objectives of the Bristows to the Stones MPA for this feature, whilst this management is in place.

Part C of this assessment conclude that are no in-combination fishing interactions for Isles of Scilly: Bristows to the Stones MPA.

To ensure that fishing activities do not result in a significant risk of hindering the conservation objectives, MMO propose to implement a byelaw to prohibit the use of bottom towed gear on the subtidal rocky habitats, high energy circalittoral rock, moderate energy circalittoral rock, pink sea-fan (*E. verrucosa*), and subtidal coarse sediment features of Isles of Scilly: Bristows to the Stones MPA.

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

The boundaries of the proposed management area include an appropriate buffer zone to prevent direct damaging physical interactions between fishing activities and the designated features to be protected. The rationale for determining buffer size can be found in in Annex 2 of the Stage 3 MPA Site Assessment Methodology document[4].

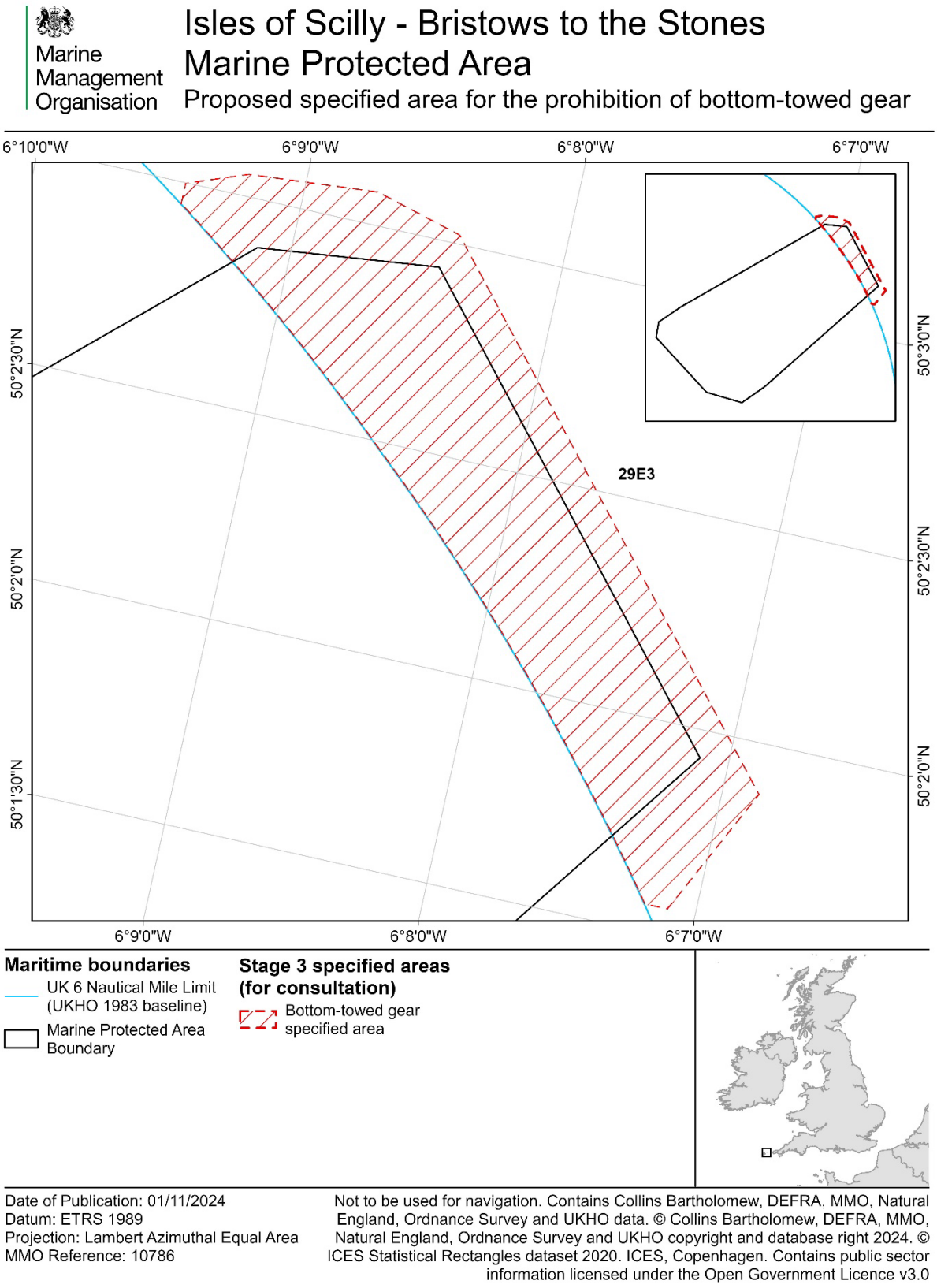

Figure 2: Map of proposed management.

7 Review of this assessment

An annual MPA report will be completed by MMO Marine Conservation Team. As part of the annual report, MPA VMS/landings/logbook data, sightings and inspection data and any intelligence will be reviewed to identify any changes in fishing activity and/or infringements. This may trigger further bespoke monitoring and control measures and/or review of the MPA fisheries assessment.

The MPA fisheries assessment will be reviewed every five years or sooner if significant new evidence triggers an early review, this may include:

- updated conservation advice;
- updated advice on the condition of the site's feature(s);
- significant increase in activity levels;
- changes made to IFCA management areas (cross-boundary MPAs); or
- a variation (significant increase or change – spatial/temporal/gear used/modifications) in fishing activity from that assumed in the previous MPA fisheries assessment and/or MPA annual report.

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

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Annexes

Annex 1: Fishing activity data

Table A1. 1: Percentage of ICES rectangle 29E3 intersected by the MMO section of Bristows to The Stones MPA. Rounded to the nearest 2 decimal places.

ICES rectangle	Percentage overlap (%)
29E3	0.04

Table A1. 2: UK live weight landings tonnage (t) estimates by gear from vessels under 12 m in length for the MMO section of Bristows to The Stones MPA (2016 to 2021). All numbers are rounded to the nearest 2 decimal places.

		Years						Total (2016 to 2021)	Average annual (2016 to 2021)
Gear Group	Gear code	2016	2017	2018	2019	2020	2021		
Demersal Trawl	**OTB**	0	0	<0.01	0	0	0	<0.01	<0.01
Demersal Trawl Total		**0**	**0**	**<0.01**	**0**	**0**	**0**	**<0.01**	**<0.01**
Dredge	**DRB**	0	0	<0.01	0	0	0	<0.01	<0.01
Dredge Total		**0**	**0**	**<0.01**	**0**	**0**	**0**	**<0.01**	**<0.01**
Midwater Gill Encircling	**GNC**	0	0	0	0	<0.01	<0.01	<0.01	<0.01
Midwater Gill Encircling Total		**0**	**0**	**0**	**0**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
Midwater Hooks and Lines	**LHP**	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Midwater Hooks and Lines Total		**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**

Gear Group	Gear code	Years						Total (2016 to 2021)	Average annual (2016 to 2021)
		2016	2017	2018	2019	2020	2021		
MPA Total		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table A1. 3: Mean annual surface and subsurface SAR values for C-squares intersecting the MMO section of Bristows to The Stones MPA (2016 to 2020). All numbers are rounded to the nearest 2 decimal places.

Gear group	SAR category	2016	2017	2018	2019	2020
Demersal Seines	Surface	0	0	0	0	0
	Subsurface	0	0	0	0	0
Dredges	Surface	0	0	0	0	<0.01
	Subsurface	0	0	0	0	<0.01
Demersal Trawls	Surface	0.02	0.01	0	0	0
	Subsurface	<0.01	<0.01	0	0	0
All Bottom Towed Gear	Surface	0.02	0.01	0	0	<0.01
	Subsurface	<0.01	0.01	0	0	<0.01

Table A1. 4: Fishing effort (days) recorded by UK vessels under 12 m in length, separated by gear type for the area of Bristows to The Stones MPA that intersects ICES rectangles 29E3 (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. 1).

Gear group	Fishing effort (days at sea)							
	2016	2017	2018	2019	2020	2021	Total (2016 to 2021)	Annual average (2016 to 2021)
Demersal Trawl	0	0	<0.01	0	0	0	<0.01	<0.01
Dredge	0	0	<0.01	0	0	0	<0.01	<0.01
Bottom Towed Gear Total	**0**	**0**	**<0.01**	**0**	**0**	**0**	**<0.01**	**<0.01**
Midwater Gill Encircling	0	0	0	0	<0.01	<0.01	<0.01	<0.01
Midwater Hooks and Lines	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Midwater gear Total	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**
MPA Total	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.01**	**<0.01**

Annex 2: Biotope tables

Table A2. 1: The subtidal coarse sediment biotopes which may be present in Bristows to The Stones MPA which have a sensitivity to abrasion, penetration, smothering and siltation rate changes (light) and changes to suspended solids (water clarity) pressures.

Biotope	Sensitivity	Resistance	Resilience
Moerella spp. with venerid bivalves in infralittoral gravelly sand (Tillin and Watson, 2023d).	**Abrasion:** Low **Water clarity:** Low **Penetration:** Low **Smothering:** Low	**Abrasion:** Medium **Water clarity:** Medium **Penetration:** Medium **Smothering:** Medium	**Abrasion:** High **Water clarity:** High **Penetration:** High **Smothering:** High
Hesionura elongata and *Microphthalmus similis* with other interstitial polychaetes in infralittoral mobile coarse sand (Marshall, Ashley and Watson, 2023).	**Abrasion:** Low **Penetration:** Medium **Smothering:** Low	**Abrasion:** Medium **Penetration:** Low **Smothering:** Medium	**Abrasion:** High **Penetration:** Medium **Smothering:** High
Glycera lapidum in impoverished infralittoral mobile gravel and sand (Tillin and Watson, 2023b)	**Abrasion:** Low **Penetration:** Low **Smothering:** Low	**Abrasion:** Medium **Penetration:** Medium **Smothering:** Medium	**Abrasion:** High **Penetration:** High **Smothering:** High
Cumaceans and *Chaetozone setosa* in infralittoral gravelly sand (Tillin and Watson 2023c)	**Abrasion:** Low **Water clarity:** Low **Penetration:** Low	**Abrasion:** Medium **Water clarity:** Medium **Penetration:** Low	**Abrasion:** High **Water clarity:** High **Penetration:** High
Pomatoceros triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles (Tyler-Walters and Tillin, 2023)	**Abrasion:** Low **Penetration:** Low	**Abrasion:** Low **Penetration:** Low	**Abrasion:** High **Penetration:** High

Biotope	Sensitivity	Resistance	Resilience
Mediomastus fragilis, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel (Tillin and Watson, 2023c).	**Abrasion:** Low **Water clarity:** Low **Penetration:** Low **Smothering:** Low	**Abrasion:** Medium **Water clarity:** Medium **Penetration:** Medium **Smothering:** Medium	**Abrasion:** High **Water clarity:** High **Penetration:** High **Smothering:** High
Protodorvillea kefersteini and other polychaetes in impoverished circalittoral mixed gravelly sand (Tillin and Watson, 2023e).	**Abrasion:** Low **Penetration:** Low	**Abrasion:** Medium **Penetration:** Medium	**Abrasion:** High **Penetration:** High
Branchiostoma lanceolatum in circalittoral coarse sand with shell gravel(Tillin and Watson, 2023a)	**Abrasion:** Low **Penetration:** Medium **Smothering:** Low	**Abrasion:** Medium **Penetration:** Low **Smothering:** Low	**Abrasion:** High **Penetration:** Medium **Smothering:** High
Neopentadactyla mixta in circalittoral shell gravel or coarse sand (Tyler-Walters, Durkin and Watson, 2023)	**Water clarity:** Medium **Penetration:** Medium	**Water clarity:** Medium **Penetration:** Medium	**Water clarity:** Medium **Penetration:** Medium

Table A2. 2: The fragile sponge and anthozoan community biotopes which may be present in Bristows to The Stones MPA which have a sensitivity to abrasion, penetration, smothering and siltation rate changes (light) and changes to suspended solids (water clarity) pressures.

Biotope	Sensitivity	Resistance	Resilience
Phakellia ventilabrum and axinellid sponges on deep, wave-exposed circalittoral rock (Readman, Lloyd and Watson, 2023h)	**Abrasion:** High **Smothering:** Medium	**Abrasion:** Low **Smothering:** Medium	**Abrasion:** Very Low **Smothering:** Very Low
Eunicella verrucosa and *Pentapora foliacea* on wave-exposed circalittoral rock (Readman, Jackson, *et al.*, 2023)	**Abrasion:** High	**Abrasion:** Low	**Abrasion:** Very Low
Mixed turf of bryozoans and erect sponges *Sagartia elegans* on tide-swept circalittoral rock (Readman, Lloyd and Watson, 2023g)	**Abrasion:** Medium **Water clarity:** Medium	**Abrasion:** Low **Water clarity:** Low	**Abrasion:** Medium **Water clarity:** Medium
Bryozoan turf and erect sponges on tide-swept circalittoral rock (Readman, Lloyd and Watson, 2023a)	**Abrasion:** Medium **Water clarity:** Medium	**Abrasion:** Low **Water clarity:** Low	**Abrasion:** Medium **Water clarity:** Medium

Table A2. 3:The high energy circalittoral rock biotopes which may be present in Bristows to The Stones MPA which have a sensitivity to abrasion, penetration, smothering and siltation rate changes (light) and changes to suspended solids (water clarity) pressures.

Biotopes	Sensitivity	Resistance	Resilience
Alcyonium digitatum with dense *Tubularia indivisa* and anemones on strongly tide-swept circalittoral rock (Stamp and E. Williams, 2021)	**Abrasion:** Low **Smothering:** Not sensitive **Water clarity:** Not sensitive	**Abrasion:** Medium **Smothering:** High **Water clarity:** High	**Abrasion:** High **Smothering:** High **Water clarity:** High
Bryozoan turf and erect sponges on tide-swept circalittoral rock (Readman, Lloyd and Watson, 2023a)	**Abrasion:** Medium **Smothering:** Not sensitive **Water clarity:** Medium	**Abrasion:** Low **Smothering:** High **Water clarity:** Low	**Abrasion:** Medium **Smothering:** High **Water clarity:** Medium
Corynactis viridis and a mixed turf of crisiids, *Bugula*, *Scrupocellaria*, and *Cellaria* on moderately tide-swept exposed circalittoral rock (Stamp, Lloyd and Watson, 2016)	**Abrasion:** Low **Smothering:** Not sensitive **Water clarity:** Not sensitive	**Abrasion:** Medium **Smothering:** High **Water clarity:** High	**Abrasion:** High **Smothering:** High **Water clarity:** High
Eunicella verrucosa and *Pentapora foliacea* on wave-exposed circalittoral rock (Readman, Jackson, *et al.*, 2023)	**Abrasion:** High **Smothering:** Not sensitive **Water clarity:** Not sensitive	**Abrasion:** Low **Smothering:** High **Water clarity:** High	**Abrasion:** Very low **Smothering:** High **Water clarity:** High

Biotopes	Sensitivity	Resistance	Resilience
Flustra foliacea and colonial ascidians on tide-swept exposed circalittoral mixed substrata (Readman, 2016a)	**Abrasion:** Low **Smothering:** Low **Water clarity:** Not sensitive	**Abrasion:** Medium **Smothering:** Medium **Water clarity:** High	**Abrasion:** High **Smothering:** High **Water clarity:** High
Flustra foliacea and colonial ascidians on tide-swept moderately wave-exposed circalittoral rock (Readman, 2016b)	**Abrasion:** Low **Smothering:** Low **Water clarity:** Not sensitive	**Abrasion:** Medium **Smothering:** Medium **Water clarity:** High	**Abrasion:** High **Smothering:** High **Water clarity:** High
Flustra foliacea and *Haliclona oculata* with a rich faunal turf on tide-swept circalittoral mixed substrata (Readman, 2016c)	**Abrasion:** Low **Smothering:** Low **Water clarity:** Not sensitive	**Abrasion:** Medium **Smothering:** Medium **Water clarity:** High	**Abrasion:** High **Smothering:** High **Water clarity:** High
Mixed turf of bryozoans and erect sponges with *Sagartia elegans* on tide-swept circalittoral rock (Readman, Lloyd and Watson, 2023g)	**Abrasion:** Medium **Smothering:** Not sensitive **Water clarity:** Medium	**Abrasion:** Low **Smothering:** High **Water clarity:** Low	**Abrasion:** Medium **Smothering:** High **Water clarity:** Medium
Phakellia ventilabrum and axinellid sponges on deep, wave-exposed circalittoral rock (Readman, Lloyd and Watson, 2023h)	**Abrasion:** High **Smothering:** Medium	**Abrasion:** Low **Smothering:** Medium **Water clarity:** High	**Abrasion:** Very low **Smothering:** Very low **Water clarity:** High

Biotopes	Sensitivity	Resistance	Resilience
	Water clarity: Not sensitive		
Sparse sponges, *Nemertesia spp*., and *Alcyonidium diaphanum* on circalittoral mixed substrata (Readman, Lloyd and Watson, 2023i)	**Abrasion:** Medium **Penetration:** Medium **Smothering:** Not sensitive **Water clarity:** Not sensitive	**Abrasion:** Low **Penetration:** Low **Smothering:** High **Water clarity:** High	**Abrasion:** Medium **Penetration:** Medium **Smothering:** High **Water clarity:** High
Sponge communities on deep circalittoral rock (Readman, 2018)	**Abrasion:** High **Smothering:** Medium **Water clarity:** Not sensitive	**Abrasion:** Low **Smothering:** Medium **Water clarity:** High	**Abrasion:** Very low **Smothering:** Very low **Water clarity:** High
Sponges and anemones on vertical circalittoral bedrock (Readman, Lloyd and Watson, 2023j)	**Abrasion:** Medium **Smothering:** Not sensitive **Water clarity:** Medium	**Abrasion:** Low **Smothering:** High **Water clarity:** Low	**Abrasion:** Medium **Smothering:** High **Water clarity:** Medium
Tubularia indivisa and cushion sponges on tide-swept turbid circalittoral bedrock (Stamp and Tyler-Walters, 2018a)	**Abrasion:** Low **Smothering:** Not sensitive **Water clarity:** Not sensitive	**Abrasion:** Medium **Smothering:** High **Water clarity:** High	**Abrasion:** High **Smothering:** High **Water clarity:** High

Biotopes	Sensitivity	Resistance	Resilience
Tubularia indivisa on tide-swept circalittoral rock (Stamp and Tyler-Walters, 2018b)	**Abrasion:** Low **Smothering:** Not sensitive **Water clarity:** Not sensitive	**Abrasion:** Medium **Smothering:** High **Water clarity:** High	**Abrasion:** High **Smothering:** High **Water clarity:** High

Table A2. 4: The moderate energy circalittoral rock biotopes which may be present in Bristows to The Stones MPA which have a sensitivity to abrasion, penetration, smothering and siltation rate changes (light) and changes to suspended solids (water clarity) pressure.

Biotopes	Sensitivity	Resistance	Resilience
Alcyonium digitatum and faunal crust communities on vertical circalittoral bedrock (Readman and Williams, 2021)	**Abrasion:** Low **Smothering:** Not sensitive	**Abrasion:** Medium **Smothering:** High	**Abrasion:** High **Smothering:** High
Alcyonium digitatum, *Pomatoceros triqueter*, algal and bryozoan crusts on wave-exposed circalittoral rock (Stamp and E Williams, 2021)	**Abrasion:** Low **Smothering:** Not sensitive	**Abrasion:** Medium **Smothering:** High	**Abrasion:** High **Smothering:** High
Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock (De-Bastos *et al.*, 2023)	**Abrasion:** Medium **Smothering:** Medium	**Abrasion:** Low **Smothering:** Low	**Abrasion:** Medium **Smothering:** Medium

Biotopes	Sensitivity	Resistance	Resilience
Brittlestars overlying coralline crusts, *Parasmittina trispinosa* and *Caryophyllia smithii* on wave-exposed circalittoral rock (De-Bastos, Williams and Hill, 2023)	**Abrasion:** Medium **Smothering:** Medium	**Abrasion:** Low **Smothering:** Low	**Abrasion:** Medium **Smothering:** Medium
Caryophyllia smithii and sponges *with Pentapora foliacea*, *Porella compressa* and crustose communities on wave-exposed circalittoral rock (Readman, Williams, *et al.*, 2023)	**Abrasion:** Low **Smothering:** Not sensitive	**Abrasion:** Medium **Smothering:** High	**Abrasion:** High **Smothering:** High
Caryophyllia smithii with faunal and algal crusts on moderately wave-exposed circalittoral rock (Stamp *et al.*, 2023)	**Abrasion:** Low **Smothering:** Low	**Abrasion:** Medium **Smothering:** Low	**Abrasion:** High **Smothering:** High
Caryophyllia smithii, sponges and crustose communities on wave-exposed circalittoral rock (Stamp, Lloyd and Watson, 2023)	**Abrasion:** Low **Smothering:** Not sensitive	**Abrasion:** Medium **Smothering:** High	**Abrasion:** High **Smothering:** High
Circalittoral faunal communities in variable salinity (Readman, Lloyd and Watson, 2023b)	**Abrasion:** Medium **Smothering:** Low	**Abrasion:** Low **Smothering:** Medium	**Abrasion:** Medium **Smothering:** High
Cushion sponges and hydroids on turbid tide-swept sheltered circalittoral rock (Readman, Lloyd and Watson, 2023d)	**Abrasion:** Medium **Smothering:** Low	**Abrasion:** Low **Smothering:** Medium	**Abrasion:** Medium **Smothering:** High
Cushion sponges and hydroids on turbid tide-swept variable salinity sheltered circalittoral rock (Readman, Lloyd and Watson, 2023e)	**Abrasion:** Medium **Smothering:** Low	**Abrasion:** Low **Smothering:** Medium	**Abrasion:** Medium **Smothering:** High

Biotopes	Sensitivity	Resistance	Resilience
Cushion sponges, hydroids and ascidians on turbid tide-swept sheltered circalittoral rock (Readman, Lloyd and Watson, 2023c)	**Abrasion:** Medium **Smothering:** Low	**Abrasion:** Low **Smothering:** Medium	**Abrasion:** Medium **Smothering:** High
Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock (Stamp and Tyler-Walters, 2016)	**Abrasion:** Low **Smothering:** Not sensitive	**Abrasion:** Medium **Smothering:** High	**Abrasion:** High **Smothering:** High
Faunal and algal crusts with *Pomatoceros triqueter* and sparse *Alcyonium digitatum* on exposed to moderately wave-exposed circalittoral rock (Stamp, 2016)	**Abrasion:** Low **Smothering:** Not sensitive	**Abrasion:** Medium **Smothering:** High	**Abrasion:** High **Smothering:** High
Flustra foliacea on slightly scoured silty circalittoral rock (Readman, Lloyd and Watson, 2023f)	**Abrasion:** Low **Smothering:** Low	**Abrasion:** Medium **Smothering:** Medium	**Abrasion:** High **Smothering:** High
Mytilus edulis beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock (Tyler-Walters, Mainwaring and Williams, 2022)	**Abrasion:** Medium **Smothering:** Medium	**Abrasion:** Low **Smothering:** Medium	**Abrasion:** Medium **Smothering:** Medium
Piddocks with a sparse associated fauna in sublittoral very soft chalk or clay (Tillin and Hill, 2016)	**Abrasion:** Medium **Penetration:** High **Smothering:** Medium	**Abrasion:** Medium **Penetration:** Low **Smothering:** Medium	**Abrasion:** Very low **Penetration:** Very low **Smothering:** Medium

Biotopes	Sensitivity	Resistance	Resilience
Sabellaria reefs on circalittoral rock (Tillin *et al.*, 2023)	**Abrasion:** Medium **Penetration:** Medium **Smothering:** Not sensitive	**Abrasion:** Low **Penetration:** None **Smothering:** High	**Abrasion:** Medium **Penetration:** Medium **Smothering:** High
Urticina felina and sand-tolerant fauna on sand-scoured or covered circalittoral rock (Tillin and Hiscock, 2016)	**Abrasion:** Medium **Smothering:** Not sensitive	**Abrasion:** Low **Smothering:** High	**Abrasion:** Medium **Smothering:** High