Document Control

Title	**Yarmouth to Cowes MCZ – Part B Fisheries Assessment – Bottom Towed Fishing Gear –**
SIFCA Reference	MCZ/05/002
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Owner	Southern IFCA
Template Used	MCZ Assessment Template v1.0

Revision History

Date	Author	Version	Status	Reason	Approver(s)
19/11/2019	C Smith	1.1	Draft	Additions to major sections	
14/01/2020	C Smith	1.2	Draft	Additions to major sections	
21/01/2020	C Smith	1.3	Draft	Minor edits	
27/01/2020	C Smith	1.4	Draft	Minor edits to management options	
22/05/2020	C Smith	1.5	Draft	Natural England Comments Addressed	
11/08/2020	C Smith	1.6	Final		

This document has been distributed for information and comment to:

Title	Name	Date sent	Comments received
Southern IFCA Technical Advisory Committee	Members	06 February 2020	Approval to seek NE advice
Natural England	Richard Morgan	07 February 2020	06 May 2020

Southern Inshore Fisheries and Conservation Authority (IFCA)
Marine Conservation Zone Fisheries Assessment (Part B)

Marine Conservation Zone: Yarmouth to Cowes MCZ

Feature: Moderate energy circalittoral rock, high energy circalittoral rock, moderate energy infralittoral rock, high energy infralittoral rock, subtidal chalk, peat and clay exposures and Bouldnor cliff geological feature.

Broad Gear Type: Bottom Towed Fishing Gear

Gear type(s) Assessed: Light otter trawl; Beam trawl

Technical Summary

As part of the MCZ assessment process for the tranche 3 Yarmouth to Cowes MCZ, it was identified that trawling (specifically light otter trawl & beam trawl) and its potential impacts required an in-depth assessment. The level of trawling within the site is very low, with light otter trawling occurring up to four times a year by one to two vessels, over subtidal sediment designated features; subtidal coarse sediment, subtidal mixed sediments and sheltered muddy gravels.

The potential pressures likely to be exerted by the activity upon designated features were identified as abrasion, disturbance and penetration of the seabed below and on the surface of the seabed, the removal of non-target species, changes in suspended solids & siltation rates. Scientific literature on the effects of trawling on site specific features is sparse. Literature on other rock type features shows that when gear does make contact with the features erect and branching fauna and flora can be damaged and destroyed. Recoverability of these habitats and habitats similar to those found in this site have been estimated to be between 5-10 years.

When considering the location of trawling within Yarmouth to Cowes MCZ, in combination with other evidence (scientific literature, sightings data, feature mapping) and site-specific factors, namely the sensitivity, and irreplaceability of the features assessed, it was concluded the activity is likely to pose a significant risk to moderate energy circalittoral rock, high energy circalittoral rock, moderate energy infralittoral rock, high energy infralittoral rock, subtidal chalk, peat and clay exposures and Bouldnor geological feature.

As such, it is believed the activity could hinder the achievement of the designated feature's 'Recover' and 'Maintain' general management approach. Existing management measures are therefore considered not to be sufficient. Therefore, four to six additional closed areas, protecting these features in the site, will be developed. The areas will completely prohibit the use of bottom towed fishing gear (including trawling) over the features. As such, it is believed the activity will not hinder the achievement of the designated features to achieve their 'Recover' and 'Maintain' general management approaches and that the activity will remain consistent with the site's conservation objectives, fishing effort will continue to be monitored.

Contents

1. Introduction

1.1 Need for an MCZ assessment

This assessment has been undertaken by Southern IFCA in order to document and determine whether management measures are required to achieve the conservation objectives of Yarmouth to Cowes Marine Conservation Zone (MCZ). Southern IFCA has duties under section 154 of the Marine and Coastal Access Act 2009 which states;

154 Protection of marine conservation zones

(1) The authority for an IFC district must seek to ensure that the conservation objectives of any MCZ in the district are furthered.

(2) Nothing in section 153(2) is to affect the performance of the duty imposed by this section.

(3) In this section —

(a) "MCZ" means a marine conservation zone designated by an order under section 116;

(b) the reference to the conservation objectives of an MCZ is a reference to the conservation objectives stated for the MCZ under section 117(2)(b).

Section 125 of the 2009 Act also requires that public bodies (which includes the IFCA) exercise its functions in a manner to best further (or, if not possible, least hinder) the conservation objectives for MCZs.

This MCZ assessment will complement Southern IFCA's assessment of commercial fishing activities in European Marine Sites (EMS) – designated to protect habitats and species in line with the EU Habitats Directive and Birds Directive. To bring fisheries in line with other activities, the Department for Environment, Food and Rural Affairs (DEFRA) announced on the 14th August 2012 a new approach to manage fishing activities within EMSs. This change in approach will promote sustainable fisheries while conserving the marine environment and resources, securing a sustainable future for both.

1.2 Documents reviewed to inform this assessment

- Reference list (Section 8)
- Defra's matrix of fisheries gear types and European Marine Site protected features[1]
- Site map(s) – feature location and extent (Annex 1)
- Natural England's Advice on Operations for Coquet to St Marys MCZ[2] (Annex 5)

[1] https://www.gov.uk/government/publications/fisheries-in-european-marine-sites-matrix

[2] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UKMCZ0030&SiteName=Coquet&SiteNameDisplay=Coquet+to+St+Mary%27s+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=

- Natural England's Supplementary Advice on Conservation Objectives Coquet to St Marys[3] MCZ
- Natural England's Advice on Operations for The Needles MCZ[4] (Annex 4)
- Natural England's Supplementary Advice on Conservation Objectives The Needles MCZ[5]
- Natural England's Advice on Operations for Beachy Head West[6] (Annex 6)
- Natural England's Supplementary Advice on Conservation Objectives Beachy Head West[7] MCZ
- Fishing activity data (map(s), etc) (Annex 7)
- Fisheries Impact Evidence Database (FIED)

2 Information about the MCZ

2.1 Overview and designated features

Yarmouth to Cowes MCZ was designated in May 2019 and covers the stretch of the Isle of Wight coast from Yarmouth to Cowes. The site covers an area of approximately 16 km² and protects a number of rare and fragile habitats including peat and clay exposures, intertidal rocky reef, and soft sediment habitats. In turn these habitats support an array of sea life including piddocks, the native oyster, starfish, urchins and anemones.

A summary of the site's designated features is provided in Table 1, together with the recommended General Management Approach (GMA) for each feature. The GMA required for a feature in a MCZ will either be for it to be maintained in favourable condition (if it is currently in this state), or for it to be recovered to favourable condition (if it is currently in a damaged state) and then to be maintained in favourable condition.

Table 1 Designated features and general management approach

Designated feature	General Management Approach
Intertidal under boulder communities	Maintain in a favourable condition
Intertidal coarse sediment	

3 https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UKMCZ0030&SiteName=Coquet&SiteNameDisplay=Coquet+to+St+Mary%27s+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=,0

4 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UKMCZ0040&SiteName=needles&SiteNameDisplay=The+Needles+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=

5 https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0040&SiteName=needles&countyCode=&responsiblePerson=&unitId=&SeaArea=&IFCAArea=&NumMarineSeasonality=&SiteNameDisplay=The%20Needles%20MCZ&HasCA=1&NumMarineSeasonality=0&SiteNameDisplay=The%20Needles%20MCZ#suppadvice

6 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UKMCZ0002&SiteName=Beachy+Head+West&SiteNameDisplay=Beachy+Head+West+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=

7 https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UKMCZ0002&SiteName=Beachy%20Head%20West&SiteNameDisplay=Beachy+Head+West+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=,0

Low energy intertidal rock	
Moderate energy intertidal rock	
Estuarine rocky habitats	
Littoral chalk communities	
Subtidal coarse sediment	
Bouldnor Cliff Geological Feature	
High energy circalittoral rock	Recover to favourable condition
Moderate energy circalittoral rock	
High energy infralittoral rock	
Moderate energy infralittoral rock	
Native oyster (Ostrea edulis)	
Peat and clay exposures	
Sheltered Muddy Gravels	
Subtidal Chalk	
Subtidal mixed sediments	
Subtidal mud	

Please refer to Annex 1 for site feature maps of broad-scale habitats and features of conservation importance. This feature data comes from the Natural England, 2019 data set given to Southern IFCA, containing a collation of marine habitat and species records that contribute to the designation of marine habitats and features. This corresponds with the feature data on Magic Map which represents Natural England's best available evidence (https://magic.defra.gov.uk/MagicMap.aspx).

Conservation objectives

The site's conservation objectives apply to the Marine Conservation Zone and the individual species and/or habitat for which the site has been designated (the "Designated features" listed below).

The conservation objective of each of the zones is that the protected habitats:

1. are maintained in favourable condition if they are already in favourable condition
2. be brought into favourable condition if they are not already in favourable condition

For each protected feature, favourable condition means that, within a zone:

1. its extent is stable or increasing
2. its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

For each species of marine fauna, favourable condition means that the population within a zone is supported in numbers which enable it to thrive, by maintaining:

1. the quality and quantity of its habitat
2. the number, age and sex ratio of its population. Any temporary reduction of numbers of a species is to be disregarded if the population is sufficiently thriving and resilient to enable its recovery.

Any alteration to a feature brought about entirely by natural processes is to be disregarded when determining whether a protected feature is in favourable condition.

3 MCZ assessment process

3.1 Overview of the assessment process

The assessment of commercial fishing activities within the Yarmouth to Cowes MCZ will be undertaken using a staged process, akin to that proposed by the Marine Management Organisation (MMO)[8], for marine license applications (Annex 2). The assessment process comprises of an initial screening stage to establish whether an activity occurs or is anticipated to occur/has the potential to occur within the site. Activities which are not screened out are subject to a simple 'part A' assessment, akin to the Test of Likely Significant Effect required by article 6(3) of the Habitats Directive. The aim of this assessment is to identify pressures capable of significantly affecting designated features or their related processes. Fishing activities and their associated pressures which are not screened out in the part A assessment and then subject to a more detailed 'part B' assessment, where assessment is undertaken on a gear type basis. A part B assessment is akin to the Appropriate Assessment required by article 6(3) of the Habitats Directive. The aim of this assessment is to determine whether there is a significant risk of the activity hindering the conservation objectives of the MCZ. Within this stage of assessment, 'hinder' is defined as any act that could, either alone or in combination:

- in the case of a conservation objective of 'maintain', increase the likelihood that the current status of a feature would go downwards (e.g. from favourable to degraded) either immediately or in the future (i.e. they would be placed on a downward trend); or

- in the case of a conservation objective of 'recover', decrease the likelihood that the current status of a feature could move upwards (e.g. from degraded to favourable) either immediately or in the future (i.e. they would be placed on a flat or downward trend) (MMO, 2013).

[8] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/410273/Marine_conservation_zones_and_marine_licensing.pdf

If the part B assessment is unable to conclude that there is no significant risk of an activity hindering the conservation objectives of the MCZ, then the activity may be subject to management and consideration will be given to whether or not the public benefit of the activity outweighs the risk of damage to the environment; and if so, whether the activity is able to deliver measures of equivalent environmental benefit to the damage that is likely to occur to the MCZ.

3.2 Screening and part A assessment

The aim of the screening stage and part A assessment is to determine whether, under section 125 and 154 of MCAA, fishing activities occurring or those which have the potential to occur within the site are compatible with the conservation objectives of the MCZ.

The screening of commercial fishing activities in Yarmouth to Cowes MCZ was undertaken using broad gear type categories. Sightings data collected by the Southern IFCA, together with officers' knowledge, was used to ascertain whether each activity occurs within the site, or has the potential to occur/is anticipated to occur in the foreseeable future. For these occurring/potentially occurring activities, an assessment of pressures upon MCZ designated features was undertaken using Natural England's Advice on Operations.

Activities were screened out for further part B assessment if they satisfied one or more of the following criteria:

1. The activity does not occur within the site, does not have the potential to occur and/or is not anticipated to occur in the foreseeable future.

2. The activity does occur but the pressure(s) does not significantly affect/ interact with the designated feature(s).

3. The activity does occur but the designated feature(s) is not sensitive to the pressure(s) exerted by the activity.

3.2.3 Screening of commercial fishing activities based on occurrence

Initial screening was undertaken to identify the commercial fishing activities which currently occur within the site, together with those which have the potential to occur or/and are reasonably foreseen to occur in the future (Annex 3). To maintain consistency with Southern IFCA's assessment of commercial fishing activities in European Marine Sites, the individual gear types identified in Defra's matrix were assessed and these were grouped into broad gear types.

3.2.4 Screening of commercial fishing activities based on pressure-feature interaction

Fishing activities which were identified as occurring, have the potential to occur and/or are anticipated to occur in the foreseeable future within the site were screened with respect to the potential pressures which they may be exert upon designated features (Part A assessment). This screening exercise was undertaken using Natural England's Advice on Operations for The Needles, Coquet to St Marys and Beachy Head MCZs (Annex 4, 5 & 6). The Advice on Operations provides a broad scale assessment of the sensitivity of designated features to different activity-derived pressures, using nationally available evidence on their resilience (an ability to recover) and resistance (the level of tolerance) to physical, chemical and biological pressures (Annex 4, 5 & 6). The assessments of sensitivity to these pressures are measured against a benchmark. It should be noted that these benchmarks are representative of the likely intensity of a pressure caused by typical activities, and do not represent a threshold of an 'acceptable' intensity of a pressure. It is therefore necessary to consider how the level of fishing intensity observed within Yarmouth to Cowes MCZ compares with these benchmarks when screening individual activities.

Due to the broad-scale nature of the sensitivity assessments provided in Natural England's Advice on operations, each pressure is assigned a risk profile based upon the likelihood of the pressure occurring and the magnitude of the impact should that pressure occur. These risk profiles have been used, together with site-specific knowledge, to identify those pressures which could significantly affect designated features.

The resultant activity pressure-feature interactions which have been screened in for bottom towed fishing gear for the part B assessment are summarised in Tables 2 for sensitive designated features. The activity pressure-feature interactions which were screened out in the Part A Assessment are detailed in a standalone document ('Screening and Part A Assessment') for Yarmouth to Cowes MCZ.

Table 2. Summary of fishing pressure-feature screening for moderate energy circalittoral rock for demersal trawls. Please note only pressures screened in for the part B assessment are presented here.

Pressure	Sensitivity	Considered in Part B Assessment?	Justification	Relevant Attributes (effected by identified pressures)
Abrasion/disturbance of the substrate on the surface of the seabed	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: physical structure of rocky substrate; Structure: species composition of component communities
Changes in suspended solids (water clarity)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity
Penetration and/or disturbance of the substrate below the	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and

surface of the seabed, including abrasion			the magnitude of the pressure, including the spatial scale/intensity of the activity.	function: presence and abundance of key structural and influential species; intertidal rock Structure: physical structure of rocky substrate; Structure: species composition of component communities
Removal of non-target species	S	Y	Impacts on the associated community may occur through the removal of larger epifaunal and potentially Infaunal species, whilst smaller organisms are likely to pass through the gear. Abrasion, resulting from contact with the gear, however is likely to disturb smaller species. There is no site specific information on the communities associated with this feature as it is newly designated. General information on the designated features from the MCZ features catalogue provides a general description. The feature tends to be dominated by dense mats of green and red seaweeds, as well as periwinkles. The post-survey site report provides a species list from grab and video samples. Further investigation is needed as to the magnitude of disturbance to associated communities/species.	Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: species composition of component communities
Smothering and siltation rate changes (Light)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity

Table 3. Summary of fishing pressure-feature screening for high energy circalittoral rock for demersal trawls. Please note only pressures screened in for the part B assessment are presented here.

Pressure	Sensitivity	Considered in Part B Assessment?	Justification	Relevant Attributes (effected by identified pressures)
Abrasion/disturbance of the substrate on the surface of the seabed	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: physical structure of rocky

				substrate; Structure: species composition of component communities
Changes in suspended solids (water clarity)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: physical structure of rocky substrate; Structure: species composition of component communities
Removal of non-target species	S	Y	Impacts on the associated community may occur through the removal of larger epifaunal and potentially Infaunal species, whilst smaller organisms are likely to pass through the gear. Abrasion, resulting from contact with the gear, however is likely to disturb smaller species. There is no site specific information on the communities associated with this feature as it is newly designated. General information on the designated features from the MCZ features catalogue provides a general description. The feature tends to be dominated by dense mats of green and red seaweeds, as well as periwinkles. The post-survey site report provides a species list from grab and video samples. Further investigation is needed as to the magnitude of disturbance to associated communities/species.	Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: species composition of component communities
Smothering and siltation rate changes (Light)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity

Table 4. Summary of fishing pressure-feature screening for moderate energy infralittoral rock for demersal trawls. Please note only pressures screened in for the part B assessment are presented here.

Pressure	Sensitivity	Considered in Part B Assessment?	Justification	Relevant Attributes (effected by identified pressures)
Abrasion/disturbance of the substrate on the surface of the seabed	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: physical structure of rocky substrate; Structure: species composition of component communities
Changes in suspended solids (water clarity)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: physical structure of rocky substrate; Structure: species composition of component communities
Removal of non-target species	S	Y	Impacts on the associated community may occur through the removal of larger epifaunal and potentially Infaunal species, whilst smaller organisms are likely to pass through the gear. Abrasion, resulting from contact with the gear, however is likely to disturb smaller species. There is no site specific information on the communities associated with this feature as it is newly designated. General information on the designated features from the MCZ features catalogue provides a general description. The feature tends to be dominated by dense mats of green and red seaweeds, as well as periwinkles. The post-survey site report provides a species list from grab and video samples. Further	Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: species composition of component communities

			investigation is needed as to the magnitude of disturbance to associated communities/species.	
Smothering and siltation rate changes (Light)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity

Table 5. Summary of fishing pressure-feature screening for high energy infralittoral rock for demersal trawls. Please note only pressures screened in for the part B assessment are presented here.

Pressure	Sensitivity	Considered in Part B Assessment?	Justification	Relevant Attributes (effected by identified pressures)
Abrasion/disturbance of the substrate on the surface of the seabed	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: physical structure of rocky substrate; Structure: species composition of component communities
Changes in suspended solids (water clarity)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion		Y	This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; intertidal rock Structure: physical structure of rocky substrate; Structure: species composition of component communities
Removal of non-target species	S	Y	Impacts on the associated community may occur through the removal of larger epifaunal and potentially Infaunal species, whilst smaller organisms are likely to pass through the gear. Abrasion, resulting from contact with the gear,	Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and

			however is likely to disturb smaller species. There is no site specific information on the communities associated with this feature as it is newly designated. General information on the designated features from the MCZ features catalogue provides a general description. The feature tends to be dominated by dense mats of green and red seaweeds, as well as periwinkles. The post-survey site report provides a species list from grab and video samples. Further investigation is needed as to the magnitude of disturbance to associated communities/species.	influential species; intertidal rock Structure: species composition of component communities
Smothering and siltation rate changes (Light)	NS	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity

Table 6. Summary of fishing pressure-feature screening for subtidal chalk for demersal trawls. Please note only pressures screened in for the part B assessment are presented here.

Pressure	Sensitivity	Considered in Part B Assessment?	Justification	Relevant Attributes (effected by identified pressures)
Abrasion/disturbance of the substrate on the surface of the seabed	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. The softer nature of the substrate (in comparison to bedrock) means the substrate may be considered more vulnerable to erosion by abrasion. Due to the nature of the gear however, this activity does typically not occur over areas of harder ground like subtidal chalk (in comparison to subtidal sediments), due to issues surrounding snagging or loss of fishing gear. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; Structure: physical structure of rocky substrate; Structure: species composition of component communities
Changes in suspended solids (water clarity)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity
Penetration and/or disturbance of the substrate below the surface of the	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. The softer nature of the substrate (in comparison to bedrock) means the substrate may be considered more vulnerable to erosion by abrasion. Due to	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key

seabed, including abrasion			the nature of the gear however, this activity does typically not occur over areas of harder ground like subtidal chalk (in comparison to subtidal sediments), due to issues surrounding snagging or loss of fishing gear. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	structural and influential species; Structure: physical structure of rocky substrate; Structure: species composition of component communities
Removal of non-target species	S	Y	Impacts on the associated community may occur through the removal of larger epifaunal and potentially Infaunal species, whilst smaller organisms are likely to pass through the gear. Abrasion, resulting from contact with the gear, however is likely to disturb smaller species. There is no site specific information on the communities associated with this feature as it is newly designated. General information on the designated features from the MCZ features catalogue provides a general description. The feature tends to be dominated by burrowing piddocks, sponges and worms as well as several crab species. The post-survey site report provides a species list from grab and video samples. Further investigation is needed as to the magnitude of disturbance to associated communities/species.	Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and influential species; Structure: species composition of component communities
Smothering and siltation rate changes (Light)	S	Y	This gear is known to cause the resuspension of finer sediments, therefore further assessment is required.	Supporting processes: water quality - turbidity
Physical change (to another seabed type)	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. The feature could be smothered by sediments and boulders towed by the gear. Due to the nature of the gear however, this activity does typically not occur over areas of harder ground like subtidal chalk (in comparison to subtidal sediments), due to issues surrounding snagging or loss of fishing gear. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Extent and distribution, Physical structure of rocky substrate

Table 7. Summary of fishing pressure-feature screening for peat and clay exposures for demersal trawls. Please note only pressures screened in for the part B assessment are presented here.

Pressure	Sensitivity	Considered in Part B Assessment?	Justification	Relevant Attributes (effected by identified pressures)
Abrasion/disturbance of the substrate on the surface of the seabed	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. The softer nature of the substrate (in comparison to bedrock) means the substrate may be considered more vulnerable to erosion by abrasion. Due to the nature of the gear however, this activity does typically not occur over areas of harder ground like peat and clay (in comparison to subtidal sediments), due to issues surrounding snagging or loss of fishing gear. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; Structure: physical structure of rocky substrate; Structure: species composition of component communities
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. The softer nature of the substrate (in comparison to bedrock) means the substrate may be considered more vulnerable to erosion by abrasion. Due to the nature of the gear however, this activity does typically not occur over areas of harder ground like peat and clay (in comparison to subtidal sediments), due to issues surrounding snagging or loss of fishing gear. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; Structure: physical structure of rocky substrate; Structure: species composition of component communities
Removal of non-target species	S	Y	Impacts on the associated community may occur through the removal of larger epifaunal and potentially Infaunal species, whilst smaller organisms are likely to pass through the gear. Abrasion, resulting from contact with the gear, however is likely to disturb smaller species. There is no site specific information on the communities associated with this feature as it is newly designated. General information on the designated features from the MCZ features catalogue provides a general description. The feature tends to be dominated by burrowing piddocks, seaweeds small crabs and anemones. The post-survey site report provides a species list from grab and video samples. Further investigation is needed as to the	Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and influential species; Structure: species composition of component communities

			magnitude of disturbance to associated communities/species.	
Smothering and siltation rate changes (Light)	S	Y	The gear type is known to cause disturbance of sediments which can lead to subsequent changes in siltation rate. Therefore, further assessment is required.	Supporting processes: sedimentation rate; Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and influential species; Structure: species composition of component communities
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. The softer nature of the substrate (in comparison to bedrock) means the substrate may be considered more vulnerable to erosion by abrasion. Due to the nature of the gear however, this activity does typically not occur over areas of harder ground like peat and clay (in comparison to subtidal sediments), due to issues surrounding snagging or loss of fishing gear. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Distribution: presence and spatial distribution of biological communities; Extent and distribution; Structure and function: presence and abundance of key structural and influential species; Structure: physical structure of rocky substrate; Structure: species composition of component communities
Physical change (to another seabed type)	S	Y	This gear type is known to cause abrasion and disturbance to the seabed surface. The feature could be smothered by sediments and boulders towed by the gear. Due to the nature of the gear however, this activity does typically not occur over areas of harder ground like subtidal chalk (in comparison to subtidal sediments), due to issues surrounding snagging or loss of fishing gear. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Extent and distribution, Physical structure of rocky substrate

Table 8. Summary of fishing pressure-feature screening for Bouldnor cliff geological feature for demersal trawls. Please note only pressures screened in for the part B assessment are presented here.

Pressure	Sensitivity	Considered in Part B Assessment?	Justification	Relevant Attributes (effected by identified pressures)
Abrasion/disturbance of the substrate on	Not available	Y	Bouldnor Geological feature is a site of an ancient 8000-year-old settlement, including features such as tree stumps, arkeological tools, partially build boats, and remains of fire pits. This gear type	Not available for this site

the surface of the seabed			is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Not available	Y	Bouldnor Geological feature is a site of an ancient 8000-year-old settlement, including features such as tree stumps, arkeological tools, partially build boats, and remains of fire pits. This gear type is known to cause abrasion and disturbance to the seabed surface. Further investigation is needed on the magnitude of the pressure, including the spatial scale/intensity of the activity.	Not available for this site

4 Part B Assessment

The aim of the part B assessment is for the IFCA to ensure that that there is no significant risk of a fishing activity hindering the conservation objectives of the MCZ; and to confirm that the authority is able to exercise its functions to further the site's conservation objectives.

In order to adequately assess the potential impacts of an activity upon a designated feature, it is necessary to consider the relevant attributes of that feature that may be affected. Attributes are provided in Natural England's Supplementary Advice on Conservation Objectives (SACOs) and represent the ecological characteristics or requirements of the designated species and habitats within a site. These attributes are considered to be those which best describe the site's ecological integrity and which if safeguarded will enable achievement of the Conservation Objectives. Each attribute has an associated target which identifies the desired state to be achieved; and is either quantified or qualified depending on the available evidence. No Attributes are currently available for Yarmouth to Cowes MCZ, therefore after relevant pressures were identified from the pressure-feature interaction screening (part A assessment), suitable attributes were identified from existing Natural England's Supplementary Advice packages for the Needles MCZ. These are outlined in Table 2.

4.1 Assessment of trawling in the Yarmouth to Cowes MCZ

4.1.1 Summary of the Fishery

Trawling takes place during the winter months in and around the Yarmouth to Cowes MCZ. The level of activity is however low with up to two vessels fishing up to four times a year using light otter trawls. The species caught is dependent on the time of year and catches can include common sole (*Solea solea*) and European plaice (*Pleuronectes platessa*), skates and rays.

4.1.2 Technical gear specifications

Light otter trawls are used to fish for a number of fish species in the Yarmouth to Cowes MCZ. There is also the potential for a beam trawl to be used within the site, although it is not currently known to occur.

4.1.3 Light otter trawl

An otter trawl comprises of following design (see Figure 1). Two shaped panels of netting are laced together at each side to form an elongated funnel shaped bag (Seafish, 2015). The funnel tapers down to a cod-end where fish are collected (Seafish, 2015). The remaining cut edges of the net and net mouth are strengthened by lacing them to ropes to form 'wings' that are used to drive fish into the net (Seafish, 2015). The upper edge of the rope is referred to as the head line, the lower edge is referred to as the foot rope of fishing line and side ropes are known as wing lines (Seafish, 2015). Floats are attached to the headline to hold the net open and the foot rope is weighted to maintain contact with the seabed and prevent damage to the net (Seafish, 2015). The wings of the net are held open by a pair of trawl doors, also known as otter boards, and are attached to the wings by wires, ropes or chains known as bridles and sweeps (Seafish, 2015). The sweep connects the trawl door to top and bottom bridles which are attached to the headline and footrope of the net, respectively (Seafish, 2015). The choice of material used for the sweeps and bridles depends on the size of gear and nature of the seabed, with smaller inshore boats using thin wire and combination rope (Seafish, 2015). The trawl doors, which are made of wood or steel are towed through the water at an angle which causes them to spread apart and open the net in a horizontal direction (Seafish, 2015). The trawl doors are attached to the fishing vessel using wires referred to as trawl warps (Seafish, 2015). The trawl doors must be heavy enough to keep the net on the seabed as it is towed (Seafish, 2015). As the trawl doors are towed along the seabed they

generate a sediment cloud which helps to herd fish towards the mouth of the trawl (Seafish, 2015). The bridles and sweeps continue the herding action of the trawl doors as the trail on the seabed and disturb the sediment, creating a sediment cloud (Seafish, 2015). The length of the sweeps and bridles and distance between the two trawl doors is tuned to the target species (Seafish, 2015). Species such as lemon sole and plaice can be herded into the trawl over long distances and so the length of the sweeps is longer (Seafish, 2015).

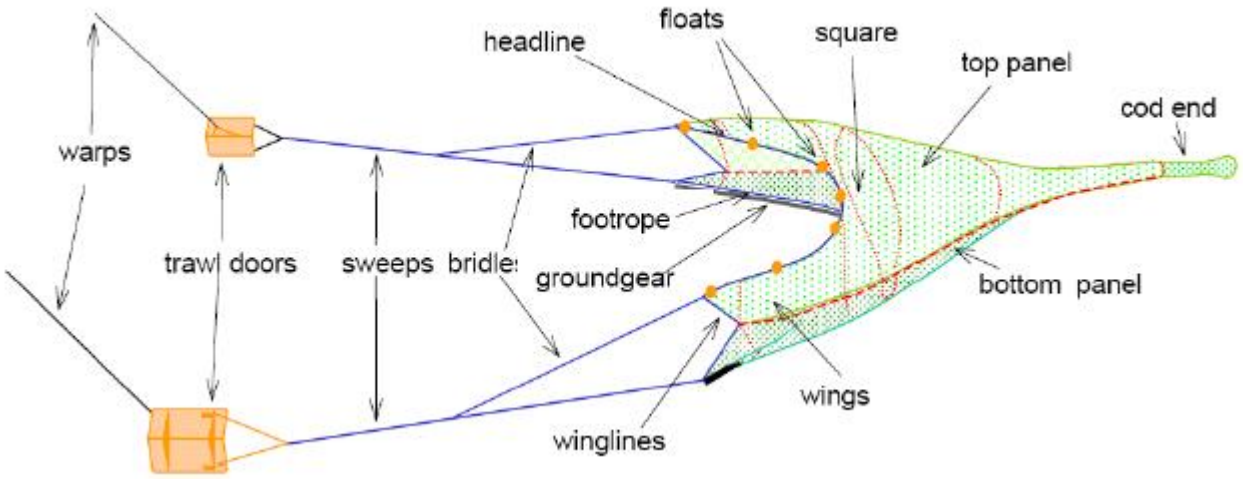


Figure 1. Key components of an otter trawl. Source: www.seafish.org/upload/b2b/file/r_d/BOTTOM%20TRAWL_5a.pdf

The mesh size of the net used varies depending on the type of trawl (Seafish, 2015). In the UK, there has been a move towards an increase in mesh size, particularly in the top panel and wings, in order to improve gear selectivity (Seafish, 2015).

The ground rope will have some form of ground gear attached to protect the netting from damage on the seabed (Seafish, 2015). The ground gear can largely vary. The most basic is where bare fishing line and the netting is laced directly to the rope of combination rope (Seafish, 2015). Chains may also be used and the style of attachment can vary (Seafish, 2015). Ground gear may also include bobbins and rock hoppers which commonly use small and large rubber discs (up to 600 mm) (Seafish, 2015).

The drag of the gear, combined with the floats on the headline, mean the weight of the trawl on the seabed is in the region of 10 to 20% of what it would be in air (Seafish, 2015).

A light otter trawl is one that uses anything less than the definition given for a heavy otter trawl, which include any of the following (MMO, 2014):

- Sheet netting of greater than 4 mm twine thickness
- Rockhoppers or discs of 200 mm or above in diameter

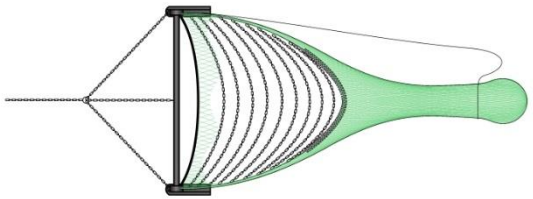
- A chain for the foot/ground line (instead of wire)

Generally, vessels will shoot and haul their gear over the stern of the boat (Seafish, 2015). Restrictions on vessels over 12 metres in length in the Southern IFCA district limits the size of gear that can be used within the district.

4.1.4 Beam trawl

A net is held open by a rigid framework to maintain trawl opening, regardless of towing speed, in addition to supporting the net (Seafish, 2015). The framework consists of a heavy tubular steel beam which is supported by steel beam heads at each end. Each beam head has wide shoes at the base which slide over the seabed (Seafish, 2015). A cone shaped net is towed from the framework, with the head rope attached to the beam and foot rope connected to the base of the shoes (Seafish, 2015). The footrope forms a 'U' shape curve behind the beam as it is towed over the seabed (Seafish, 2015). The beam is towed using a chain bridle which is attached to both shoes and at the centre of the beam; all coming together to form a single trawl warp which leads to the vessel (Seafish, 2015).

There are two types of beam trawl and these are referred to as 'open gear' and 'chain mat gear' (Seafish, 2015). Open gear uses a lighter rig, with a number of chains, known as 'ticklers', which are towed along the seabed across the mouth of the net (Figure 2) (Seafish, 2015). Tickler chains help to disturb fish from a muddy seabed. Open gear is used on clean and soft ground. Chain mat gear on the other hand is used for towing over harder and stonier seabed and if often used by larger vessels (Seafish, 2015). The chain mat gear uses a lattice work of chains which are towed from the back of the beam and attach to the footrope of the net (Figure 3) (Seafish, 2015). Lighter styles of beam, using fewer tickler chains and without a chain mat, are used to target shrimp (Seafish, 2015).



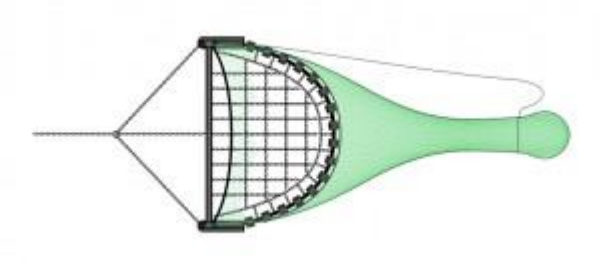


Figure 2. 'Open gear' beam trawl. **Figure 3. 'Chain mat gear' beam trawl.**

Generally, vessels below 12 metres, like those used in the Southern IFCA district, tow one trawl from the stern of the vessel (Seafish, 2015). The size of the beam towed, and the horsepower of many vessels, can be restricted by the local fishery regulations (Seafish, 2015).

4.1.5 Location, effort and scale of fishing activities

Light otter trawling takes place subtidally and occurs infrequently (4 times a year) in the site. Two vessels are known to operate in the site, out of Cowes & Portsmouth. One vessel fishes a maximum of four times per year in the site, the other vessel less frequently than this. The target species is sole, plaice and skates and rays.

Based on the information described above; trawling occurs approximately four times per year in the Yarmouth to Cowes MCZ. Hall *et al.* (2008) assessed the sensitivity of marine habitats and species to fishing activities. According to their fishing intensity categories[9] the fishing level in Yarmouth to Cowes MCZ is classed as Light (1 to 2 times a month during a season in 2.5nm x 2.5nm).

Sightings data displayed in Annex 7 illustrates trawl sightings since 2008. No trawl sightings have been made in the site over the past three years. However, pre 2016 two trawl sightings were made in the southern half of the site. Outside of the sighting multiple trawl sightings have been made over the past 11 years, with one offshore of Yarmouth harbour being made in the most recent 3-year period.

4.2 Co-location of fishing activity and features under assessment

Maps of the feature data for the sight overlaid with fishing sightings data are available in Annex 7. This shows that trawl activity occurs over subtidal coarse sediment, subtidal mixed sediment/sheltered muddy gravels in the southern half of the site. Additional information gathered of historic trawl tracks in the site shows that trawl activity takes place throughout the entire site, in the subtidal areas of these three features. Trawling typically avoids contact with rock habitats as these can cause the gear to snag and become damaged.

4.3 Pressures

4.3.1 Abrasion/disturbance of the substrate on the surface of the seabed/ Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion/ Removal of non-target species

The environmental impacts of bottom towed fishing gear are complex (Boulcott *et al*., 2014). The extent of disturbance depends on a number of factors including substrate type (Kaiser *et al*., 2002), design and weight of the gear (Boulcott & Howell, 2011) performance of the gear over a particular substrate (Caddy, 1973; Currie and Parry, 1999) and the sensitivity of the benthic community (Currie and Parry, 1996; Bergman *et al*., 1998; Collie *et al*., 2000a; Boulcott *et al*., 2014).

The potential effects of demersal trawls over areas of rocky reefs are similar to those caused by scallop dredging (Sewell and Hiscock, 2005). Although a meta-analysis of 39 fishing impact studies revealed dredging had a more negative impact than trawling (Collie *et al*., 2000b). Potential effects include reductions in habitat structural complexity and subsequent habitat homogenisation, reduction in biodiversity, removal of erect epifaunal species and large sessile species some of which are likely to large, fragile and long-lived and physical damage to fragile structures (Sewell and Hiscock, 2005). Such impacts are caused through direct contact with the seabed.

Otter trawl fishing gear has contact with the seabed through ground rope, chains and bobbins, sweeps, doors and any chaffing mats or parts of the net bag (Jones, 1992). Otter door marks are often the most recognisable and commonly observed effects of otter trawls on the seabed (Caddy, 1973; Friedlander *et al*., 1999; Grieve *et al*., 2014). Bridles or sweeps, the cables that connect the trawl doors to the trawl net, can snag on boulders or other obstructions over rough ground (Grieve *et al*., 2014). This contact with the seabed disturbs the benthos and relocates stones and boulders (Gislason 1994).

A number of studies have reported impacts of otter trawling in areas of reef and where corals are present. In an area of mixed substrata at 50 to 100 m depth in north-western Australia, Moran and Stephenson (2000) reported, on each tow of an otter trawl (dimensions unknown), a 15.5% reduction in benthic organisms that stood higher than 20 cm off the seabed, comprised mainly of gorgonians, sponges and soft corals. Van Dolah *et al*. (1987) reported significant decreases

[9] Heavy – Daily in 2.5 nm x 2.5 nm, Moderate – 1 to 2 times a week in 2.5 nm x 2.5 nm, Light – 1 to 2 times a month during a season in 2.5 nm x 2.5 nm, Single pass – Single pass of fishing activity in a year overall

in the density of barrel sponges and damage to finger sponges, vase sponges, whip corals, fan corals, stock corals and stony tree corals after a single pass with an otter trawl in a hard-bottom sponge and coral community at 20 m in Grays Reef, Georgia. The otter trawl used had a 40/54 fly net,12.2-m headrope,16.5-m footrope with 30 cm rubber rollers and 15-cm rubber discs and 1.8 x 1.2 m China V-doors. Recovery was reported to occur within one year (Van Dolah *et al*.,1987).

Deep-water trawling has had a clear and significant impact on deep-water coral reefs (200-1300m) and other organisms, including *Lophelia*, in the North Atlantic since the 1980s (Sewell and Hiscock, 2005; Malecha & Heifetz, 2017). Halls-Spencer *et al*. (2002) analysed commercial otter trawl catches taken from the West Ireland continental shelf break and West Norway and reported large amounts of coral bycatch in 5 out of 229 trawls, including pieces up to 1 m^2. ROV video observation revealed sparse living coral, coral rubble and track marks in trawled area. The otter trawls used in the fishery are fitted with rockhopper gear and 900 kilogram trawl doors. A similar study, looking at the same corals in the same area, documented that trawling had caused complete destruction of reef structures, removal and displacement of reefs by the otter boards and trawl nets (Fossa et al., 2002).

Malecha & Heifetz (2017) revisited an experimentally trawled site, ~200m depth, in the Gulf of Alaska, 13 years after the experimental original study. Thirteen years after the trawling average density of large sponges was more than 30% lower and incidence of sponge damage was 59% higher in trawled transects compared to reference areas, indicating the long-term effects of trawl damage to fragile species.

Unfortunately, due to the lack of similarity between areas and habitats in which trawling has been shown to cause adverse effects and those found in Yarmouth to Cowes MCZ, the studies examined are of limited relevance.

4.3.2 Smothering and siltation rate changes; Changes in suspended solids

The resuspension of sediment can impact upon benthic communities through smothering, burial and increased turbidity. These effects may extend to organisms living a distance away from the fished area (Kyte & Chew, 1975). If high levels of sediment are resuspended and exposure to such events is regular, impacts may be severe (Mercaldo-Allen & Goldberg, 2011). Increased turbidity can inhibit respiratory and feeding functions of benthic organisms, in addition to causing hypoxia or anoxia (Morgan & Chuenpagdee, 2003). Sediment resuspension can jeopardise the survival of bivalves and fish as a result of clogged gills and inhibition of burrowing activity (Dorsey & Pederson, 1998). Small organisms and immobile species are particularly vulnerable to smothering (Manning, 1957). A redistribution of finer sediment can also hinder the settlement of organisms if hard surfaces are smothered (Tarnowski, 2006). The severity of such impacts are largely determined by sediment type, the level of sediment burden and the tolerance of organisms which is largely related to their biology (i.e. size, relationship to substrate, life history, mobility) (Coen, 1995).

4.3.3 Sensitivity

MacDonald *et al*. (1996) assessed the fragility and recovery potential of different benthic species to determine their sensitivity to fishing disturbance. Recovery represents the time taken for a species to recover in a disturbed area and fragility represents the inability of an individual or colony of the species to withstand physical impacts from fishing gear. Recovery was scored on a scale of 1 to 4 (1 – short, 2 – moderate, 3 – long and 4 – very long) and fragility was scored on a scale of 1 to 3 (1 – not very fragile, 2 – moderately fragile and 3 – very fragile). The scores assigned to the Pink sea-fan are provided in table 4. The table also includes sensitivity information assigned by MarLIN in relation to physical disturbance and abrasion. Please note that the sensitivity ratings assigned by MarLIN are based on a single dredging event.

Table 9. Likely sensitivity of species known to be in the Yarmouth to Cowes MCZ to disturbance caused by an encounter with fishing gear scored by MacDonald *et al*. (1996) and MarLIN (in relation to physical disturbance and abrasion). Medium intensity gears include otter trawls. Fragility is derived from personal knowledge of species structure and recovery values were derived from a review of literature on life-histories of the species. Source: MacDonald *et al*. (1996) and www.marlin.ac.uk/).

		MacDonald *et al.* (1996)			MarLIN		
Species	**Common name**	**Fragility**	**Recovery**	**Sensitivity (for medium intensity gears)**	**Intolerance**	**Recoverability**	**Sensitivity**
Flustra foliacea	Hornwrack	2	2	30	Intermediate	High	Low
Cliona celata	Sponge	2	2	30	Not available	Not available	Not available
Gibbula cineraria	Grey top shell	1	2	15	Not available	Not available	Not available
Conopeum reticulum	Encrusting bryozoan	Not considered	Not considered	Not considered	Intermediate	Very High	Low
Pisidia longicornis	Long clawed porcelain crab	Not considered	Not considered	Not considered	High	High	Moderate

Subtidal chalk, peat and clay exposures

Chalk, clay and peat support a sparse fauna, as the substrate is too hard for sedimentary species and too soft for most epifauna to attach. Therefore, species tend to be mobile or rapid colonisers. Burrowing piddock's are most commonly found. Once a juvenile has settled and developed it cannot leave its burrow, therefore recolonization and recovery of this community would have to be through resettlement of juveniles. Piddocks planktonic larvae spend 45 days in the water column (Knight 1984). Sexually mature individuals can occur at a size of 2.7 cm (Pinn et al. 2005). *Pholas dactylus* lives to an estimate age of 14 years (Pinn et al., 2005) whilst *Petricolaria pholadiformis* may attain 10 years of age (Duval 1963). *Barnea candida* which reaches a much smaller size has a lifespan of around 6 years (Pinn et al., 2005).

Studies into the recovery of piddocks found that substratum type was most important, with the community recovering within two years on clay, and being able to select the substrate type (Richter & Sarnthein 1976). First observation of the species in new areas suggests its ability for long range dispersal (Micu 2007). The species and habitat may be exposed to storm damage, and on-going erosion of the soft substrate (Micu, 2007; Pinn et al., 2005) indicating that the communities which rely upon them must have an effective recovery mechanism such as larval dispersal from source populations (Tillin & Hill, 2016).

On peat habitat the common species *Ceramium virgatum* is known to recruit rapidly (within a month) to cleared surface (Brown et al. 2001).

Subtidal chalk and clay deposits are formed in prehistoric periods and can therefore not be renewed by transport of sediments in the water column. Therefore, impacts which cause the direct removal of the substrate will lead to the disappearance of the feature, as there is no mechanism by which the substratum can be replaced (Tillin & Hill, 2016).

4.3.4 Sensitivity analyses

A number of recent studies have endeavoured to map the sensitivity of habitats to different pressures (Tillin *et al*., 2010) and fishing activities (Hall *et al*., 2008).

Tillin *et al*. (2010) developed a pressure-feature sensitivity matrix, which in effect is a risk assessment of the compatibility of specific pressure levels and different features of marine protected areas. The approach used considered the resistance (tolerance) and resilience (recovery) of a feature in order to assess its sensitivity to relevant pressures (Tillin *et al*., 2010). Where features have been identified as moderately or highly sensitive to benchmark pressure levels, management measures may be needed to support achievement of conservation objectives in situations where activities are likely to exert comparable levels of pressure (Tillin *et al*., 2010). In the context of this assessment, the relevant pressures likely to be exerted are surface abrasion, shallow abrasion/penetration and penetration and/or disturbance of the substrate below the surface of the seabed. Sensitivity to all pressures is considered high for Pink sea-fans, with medium confidence in these assessments (Table 5).

Hall *et al*. 2008 aimed to assess the sensitivity of benthic habitats to fishing activities. A matrix approach was used, composed of fishing activities and marine habitat types and for each fishing activity sensitivity was scored for four levels of activity (Hall *et al*., 2008). The matrix was completed using a mixture of scientific literature and expert judgement (Hall *et al*., 2008). The type of fishing activity chosen was 'beam trawls and scallop dredges' and 'light demersal trawls and seines' as they best encompassed the fishing activities under consideration. The majority towed bottom gears where considered unlikely to be deployed in these habitat types and as such were not assessed for heavy to light gear intensities. Rock with erect and branching species appears to be slightly less sensitive to a single pass of the heavier gear types than very slow growing erect and branching species (Table 6). On the other hand, the assessment for the lighter gear type revealed a high sensitivity for both habitat types to a single pass, which may be inaccurate when considering against the sensitivity assigned for heavier gear types.

Table 10. Sensitivity of features to pressures identified by Tillin et al. (2010). Confidence of sensitivity assessment is included in brackets.

	Pressure			
Feature	**Surface abrasion: damage to seabed surface features**	**Shallow abrasion/penetration: damage to seabed surface and penetration**	**Penetration and/or disturbance of the substrate below the surface of the seabed**	**Siltation rate changes (low)**
High energy infralittoral rock	Medium (Low)	Medium (Low)	Medium (Low)	Not sensitive (low)
Moderate energy infralittoral rock	Medium (Low)	Medium (Low)	Medium (Low)	Not sensitive (low)
High energy circalittoral rock	Medium to High (Low)	Medium to High (Low)	Medium to High (Low)	Medium to High (Low)
Moderate energy circalittoral rock	Low to high (Low)	Medium to High (Low)	Medium to High (Low)	Not sensitive to high (low)
Carbonate reefs	No evidence	No evidence	No evidence	Not sensitive (low)
Subtidal Chalk	Low (Low)	Low (Low)	Medium (Medium)	Medium (low)
Peat and clay exposures	NS (High)	NS (High)	Low (Medium)	Not sensitive (high)

Table 11. Sensitivity of relevant features to different intensities (high, medium, low, single pass) of static gear (fishing activities which anchor to the seabed) as identified by Hall *et al*. (2008).

Gear Type	Habitat Type	Gear Intensity*			
		Heavy	Moderate	Light	Single pass
Beam trawls and scallop dredges	**Rock with erect and branching species**				Medium
	Erect and branching spp. very slow growing				High
	Mussels & Piddocks on intertidal clay and peat	High	Medium	Medium	Medium
	Sheltered bedrock boulders & cobles				High
	Rock with low-lying fast-growing faunal turf				Low
	Rock with erect and branching species				Medium
	Shallow subtidal rock with kelp				Medium
Light demersal trawls and seines	**Rock with erect and branching species**				High
	Erect and branching spp. very slow growing				High
	Mussels & Piddocks on intertidal clay and peat				Medium
	Sheltered bedrock boulders & cobles				Medium
	Rock with low-lying fast-growing faunal turf				Medium
	Rock with erect and branching species				High
	Shallow subtidal rock with kelp				Medium

There is no information on sensitivity for many of the heavy, moderate or light gear intensity as the gear types are considered unlikely to occur in these habitat types.
* **Heavy** – Daily in 2.5nm x 2.5 nm, **Moderate** – 1-2 times a week in 2.5 nm x 2.5 nm, **Light** – 1-2 times a month during a season in 2.5 nm x 2.5 nm, **Single** – Single pass of fishing activity in a year overall

4.3.5 Recovery

One study has looked at the recovery of Dorset's Lyme Bay reefs and assemblages to the prohibition of bottom towed fishing gear (trawling and scallop dredging) (Attrill et al., 2012). The research spans the four-year period from 2008 to 2011, with 2008 acting as the 'before' study as the newly closed sites had only be closed for 6 weeks. Sites which were open to fishing during the study, sites newly closed to bottom towed gear fishing, and sites which had been voluntarily closed to bottom towed fishing since before 2008 were compared. The abundance of individuals, and species richness was significantly greater in previously closed sites, as well as being significantly greater in the fourth year of study when compared to any other year. This may suggest that the habitats and species associated with reef features may take at least 3 year to recover from trawling and dredging fishing activities. Assemblage composition was significantly different between open and previously closed sites in all years, and open and newly closed areas in all years. The assemblages within newly closed areas became more similar to those found in previously closed areas. These similarities were associated with hydroids, turf species and bryozoans. However, strong spatial variation was found with near and far open site showing differences.

Chalk, clay and peat support a sparse fauna, as the substrate is too hard for sedimentary species and too soft for most epifauna to attach. Therefore, species tend to be mobile or rapid colonisers. Burrowing piddock's are most commonly found. Once a juvenile has settled and developed it cannot leave its burrow, therefore recolonization and recovery of this community would have to be through settlement of juveniles. Their planktonic larvae spend 45 days in the water

column (Knight (1984). Sexually mature individuals can occur at a size of 2.7 cm (Pinn et al. 2005). *Pholas dactylus* lives to an estimate age of 14 years (Pinn et al. 2005) whilst *Petricolaria pholadiformis* may atain 10 year of age (Duval 1963). Barnea candida which reaches a much smaller size has a lifespan of around 6 years (Pinn et al. 2005).

Studies into the recovery of piddocks found that substratum type was most important, with the community recovering within two years on clay, and being able to select the substrate type (Richter & Sarnthein (1976). First observation of the species in new areas suggests its ability for long range dispersal (Micu (2007). The species and habitat may be exposed to storm damage, and on-going erosion of the soft substrate (Micu, 2007; Pinn et al., 2005) indicating that the communities which rely upon them must have an effective recovery mechanism such as larval dispersal from source populations (Tillin & Hill, 2016).

On peat habitat the common species *Ceramium virgatum* is known to recruit rapidly (within a month) to cleared surface *(Brown et al. 2001).*

Subtidal chalk and clay deposits are formed in prehistoric periods and can therefore not be renewed by transport of sediments in the water column. Therefore, impacts which cause the direct removal of the substrate will lead to the disappearance of the feature, as there is no mechanism by which the substratum can be replaced (Tillin & Hill, 2016).

Foden *et al*. (2010) investigated recovery of different sediment types based on the spatial and temporal distribution of benthic fishing. Vessel monitoring system data (2006 to 2007) was used to estimate the distribution and intensity of scallop dredging, beam trawling and otter trawling in UK marine waters. This data was then linked to habitat in a geographic information system. Recovery periods for different habitats were estimated based on existing scientific literature for gear types and fishing intensity (Table 10), with recovery rates generally increasing with sediment hardness. It was estimated that based on mean annual trawl frequencies that 80% of bottom-fished areas were able to recover completely before repeat trawling. In 19% percentage bottom-fished areas however, the frequency of scallop dredging in sand and gravel and otter trawling in muddy sand and reef habitats occurred at frequencies that prevented full habitat recovery. At average fishing intensities (for each gear type), sand and mud habitats were able to recover fully, whilst gravel, muddy sand and reef habitats were fished at frequencies in excess of the estimated recovery period (shown in Figure 6 where the mean index of recovery exceeds 1).

Table 12. Recovery rates (days) of different habitats for different fishing gear types. ND: No Data. Source: Foden *et al*., 2010.

	Habitat Type
Gear Type	Reef
Beam trawl	ND
Otter trawl	2922[a]
Scallop dredge	1175[a]

[a] Kaiser et al. (2006)

4.4 Existing management measures

- **Bottom Towed Fishing Gear** byelaw – prohibits bottom towed fishing gear over sensitive features including seagrass beds.
- **Vessel Used in Fishing** byelaw – prohibits commercial fishing vessels over 12 metres from the Southern IFCA district. The reduction in vessel size also restricts the type of gear that can be used, with vessels often using lighter towed gear and restricted to carry less static gear.
- Southern IFCA has a **Minimum Fish Sizes** byelaw, which states that no person shall take from the fishery any fish of the following species (black seabream, brill, dab, conger eel, flounder, lemon sole, red mullet, shad, turbot, witch flounder) that measures less than the size listed when measured from the tip of the snout to the end of the tail. The minimum sizes contained within this byelaw differ from that in EU legislation.
- A separate Minimum Size Southern IFCA byelaw exists for Skates and Rays and this states that no person shall take any ray that measures less than 40 cm between the extreme tips of the wings or any wing which measures less than 20 cm in its maximum dimension and which is detached from the body of a skate or ray.
- Other regulations include minimum sizes, mesh sizes and catch composition as dictated by European legislation. European minimum sizes, listed under Council Regulation (EEC) 2019/1241 specify the minimum size for plaice is 27 cm and for bass is 42 cm. However, when certain gear types are used **The Landing Obligation** requires that specified bycatch species are retained at all sizes.

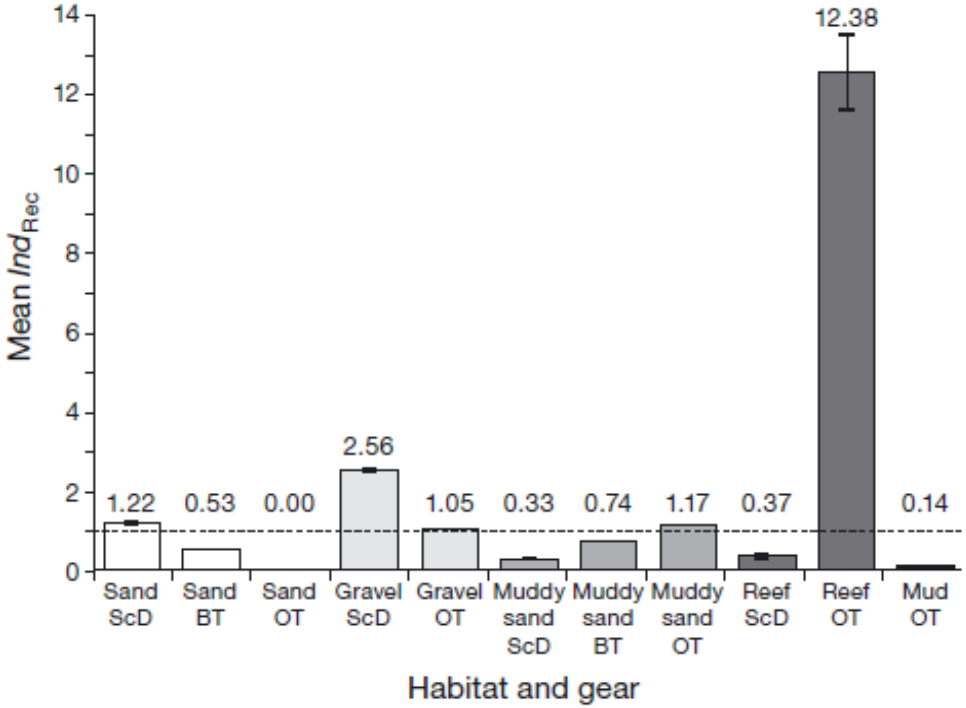


Figure 6. Mean index of recovery (Ind_{Rec}) for gear-habitat combinations using fishing intensity data derived from Vessel Monitoring Systems in 2007. At Ind_{Rec} Rec = 1, the recovery period is equal to fishing frequency (horizontal dashed line), at Ind_{Rec} <1 fishing frequency is less than the predicted recovery period and at Ind_{Rec} fishing frequency exceeds the recovery period. BT: Beam Trawl, OT: Otter Trawl and ScD: Scallop Dredge. Source: Foden *et al*., 2010.

4.5 Table 13. Assessment of trawling activity on moderate energy circalittoral rock, high energy circalittoral rock, moderate energy infralittoral rock, high energy infralittoral rock, Bouldnor cliff geological feature, subtidal chalk and peat and clay exposures.

Feature	Attribute	Target	Potential pressure(s) and Associated Impacts	Likelihood of Impacts Occurring/Level of Exposure to Pressure	Current mitigation measures
Moderate energy circalittoral rock; high energy circalittoral rock; moderate energy infralittoral rock; high energy infralittoral rock	Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and influential species; Structure: species composition of component communities	Not available	Abrasion/disturbance of the substrate on the surface of the seabed and penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion were identified as potential pressures. Bottom towed fishing gear directly impacts on rock habitats through physical passage of fishing gear over the seabed. The otter doors, chains and net bag found on trawl gear scrape the surface and can lead to the damage and removal of erect epifaunal species (Van Dolah *et al*. 1987; Halls-Spencer *et al*. 2002; Fossa et al., 2002). Scientific evidence of trawling on rocky reef habitats is relatively sparse. Some studies based over rocky reef habitats (Boutcott and Howell, 2011; Boutcott *et al*. 2014) reported a lack of widespread damage or impact on structurally and potentially vulnerable species. The reason for this is thought to be because of the lack of continuous contact with the	Light otter trawling takes place at a very low level (4 times a year) in the site. Pre 2016 two trawl sightings were made in the southern half of the site. Outside of the sighting multiple trawl sightings have been made over the past 11 years, with one offshore of Yarmouth harbour being made in the most recent 3-year period. Sightings show that trawl activity occurs over subtidal coarse sediment, subtidal mixed sediment/sheltered muddy gravels in the southern half of the site. Additional information gathered of historic trawl tracks in the site indicates that trawl activity has taken place throughout the entire site, in the subtidal areas of these three features, at a very low level. There is a lack of information surrounding the biotope and species present within the Yarmouth to Cowes MCZ. A species list is provided within the post-survey site report, however no information on the substrate type certain species are found is provided, making it hard to ascertain site-specific impacts of trawling on associated communities. The generic description of the habitat's high energy circalittoral and infralittoral rock tends to be dominated by large kelps and smaller red seaweeds. In between these sponges, sea squirts, sea mats, mussels and barnacles will be attached to the rocks. Moderate energy circalittoral and infralittoral rocks may supports kelp, seaweeds, cup corals, sea fans, anemones, sponges, and echinoderms. Scientific literature generally highlights that whilst trawling has lesser impacts on rock habitats than scallop dredging, the trawl gear can lead to the removal and damage of erect and branching species. These species often take a long time to recover, and recovery periods have been estimated to be more than 13 years.	Bottom Towed Fishing Gear byelaw – prohibits bottom towed fishing gear over sensitive features. Vessel Used in Fishing byelaw – prohibits commercial fishing vessels over 12 metres from the Southern IFCA district. The reduction in vessel size also restricts the type of gear that can be used, with vessels often using lighter towed gear and restricted to

			substrate, however the damage is likely to be incremental in nature, increasing with repeated tows (Boulcott and Howell, 2011). Studies on the recovery of rocky reef habitat shows that after 4 years of closures to bottom towed fishing gear, recovery is still uncertain (Attrill *et al*., 2012). Prolonged recovery times of over 5 years to 10 years are estimated for Lyme Bay reefs, a reef system located adjacent to Chesil beach and Stennis Ledges MCZ (Hiddink *et al*., 2006; Kaiser, Unpublished). A study which looked at long term damage and recovery to deep water trawled rocky habitats found significant damage and abundance of sponges and erect species (Malecha & Heifetz 2017).	Hall et al. (2008) assessed the sensitivity of similar rock habitats to have medium to high sensitivity to a single pass of both trawl and dredge habitats. Foden et al. (2010) reviewed literature for recovery periods of reef habitats and found that recovery times could be between up to 2922 days for otter trawling. The lack of site-specific information on biotope and associated communities makes assessing the impacts of trawling disturbance difficult. Trawling is known to occur in the site over mixed, coarse and sheltered muddy gravel sediments. Sensitivity of the rock habitats to the activities is medium to high. Therefore, due to the potential for the activity to accidentally interact with the features and medium to high sensitivity to this level it is believed that trawling will pose a significant risk to the feature and therefore will hinder the ability of the moderate energy circalittoral rock; high energy circalittoral rock; moderate energy infralittoral rock and high energy infralittoral rock to achieve its 'recover' general management approach (GMA). It is worth noting that in the absence of a condition assessment for the site, Natural England undertook a vulnerability assessment for each feature as a proxy for condition. This assessment considers the activities which take place in the site and determines the GMA for each feature. However, such an assessment is relatively generic and does not take into a number of site-specific factors.	carry less static gear.
	Extent and distribution; Structure: physical structure of rocky substrate;	Not available	Physical impacts on the seabed from trawling include scraping and ploughing, creation of depressions, trenches, scouring and flattening of the seabed, and dragging of large boulders/rock features. Studies on the effects of otter trawling in variable habitats have revealed trawling can lead to the removal of	Addressed above	Addressed above

			biogenic structures, moved or overturn stones and boulders, smooth the seafloor and exposed sediment/shell fragments.		
	Supporting processes: water quality – turbidity; Supporting processes: sedimentation rate	Not available	Smothering and siltation rate changes (Light) and Changes in suspended solids (water clarity) were identified as potential pressures. The resuspension of sediment can impact upon benthic communities through smothering, burial and increased turbidity. These effects may extend to organisms living a distance away from the fished area. The timescale for recovery after trawling disturbance largely depends on sediment type, associated fauna and rate of natural disturbance, and variation in recovery arises from characteristics specific to the site. Generally speaking, locations subject to high levels of natural disturbance, the associated fauna are likely to be adapted to withstand and recover from disturbance.	Light otter trawling takes place at a very low level (4 times a year) in the site. Pre 2016 two trawl sightings were made in the southern half of the site. Outside of the sighting multiple trawl sightings have been made over the past 11 years, with one offshore of Yarmouth harbour being made in the most recent 3-year period. Sightings show that trawl activity occurs over subtidal coarse sediment, subtidal mixed sediment/sheltered muddy gravels in the southern half of the site. Additional information gathered of historic trawl tracks in the site indicates that trawl activity has taken place throughout the entire site, in the subtidal areas of these three features, at a very low level. There is a lack of information surrounding the biotope and species present within the Yarmouth to Cowes MCZ. A species list is provided within the post-survey site report, however no information on the substrate type certain species are found is provided, making it hard to ascertain site-specific impacts of trawling on associated communities. The generic description of the habitat's high energy circalittoral and infralittoral rock tends to be dominated by large kelps and smaller red seaweeds. In between these sponges, sea squirts, sea mats, mussels and barnacles will be attached to the rocks. Moderate energy circalittoral and infralittoral rocks may supports kelp, seaweeds, cup corals, sea fans, anemones, sponges, and echinoderms. Scientific literature generally highlights that whilst trawling has lesser impacts on rock habitats than scallop dredging, the trawl gear can lead to the removal and damage of erect and branching species. These species often take a long time to recover, and recovery periods have been estimated to be more than 13 years. Research has found that high levels of sediment and regular exposure can cause sever impacts. Increased turbidity can inhibit respiratory and feeding	Addressed above

				functions of benthic organisms, and cause hypoxia or anoxia. Small organisms and immobile species are particularly vulnerable to smothering. The severity of the impact is determined by sediment type, the level of sediment burden and the sensitivity of organisms which is largely related to their biology (i.e. size, relationship to substrate, life history, mobility). The Solent is known to be highly variable in terms of suspended sediment concentrations. At Southampton Water's mouth concentrations can vary from around 25 to 40 mg/l, and in peak spring tides reach 60 mg/l (ABP Mer, 2014). Tidal streams in the Solent take this water out from the mouth of the Solent and east past Bembridge MCZ. Therefore, natural turbidity in Bembridge MCZ is expected to be high. Hall et al. (2008) assessed the sensitivity of similar rock habitats to have medium to high sensitivity to a single pass of both trawl and dredge habitats. Tillin et al. (2010) assessed the sensitivity of these habitats to increased siltation rates to be not sensitive for high and moderate energy infralittoral rock, high energy circalittoral rock to be medium to high and moderate energy circalittoral rocks not sensitive to high. Foden et al. (2010) reviewed literature for recovery periods of reef habitats and found that recovery times could be between up to 2922 days for otter trawling. The lack of site-specific information on biotope and associated communities makes assessing the impacts of trawling disturbance difficult. Trawling is known to occur in the site over mixed, coarse and sheltered muddy gravel sediments. The site is thought to be exposed to high levels of natural disturbance and turbidity levels. Sensitivity of the habitats to the activities is not sensitive to medium. Therefore, due to the light intensity of the fishing activity (up to 4 times per year) and low sensitivity to this level it is believed that changes in sedimentation will not pose a significant risk to the feature and will therefore not hinder the ability of the moderate energy circalittoral rock; high energy circalittoral rock; moderate energy infralittoral rock and high	

				energy infralittoral rock to achieve its 'recover' general management approach (GMA). It is worth noting that in the absence of a condition assessment for the site, Natural England undertook a vulnerability assessment for each feature as a proxy for condition. This assessment considers the activities which take place in the site and determines the GMA for each feature. However, such an assessment is relatively generic and does not take into a number of site-specific factors.	
Subtidal chalk peat and clay exposures	Distribution: presence and spatial distribution of biological communities; Structure and function: presence and abundance of key structural and influential species; Structure: species composition of component communities	Not available	Abrasion/disturbance of the substrate on the surface of the seabed and penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion were identified as potential pressures. Bottom towed fishing gear directly impacts on rock habitats through physical passage of fishing gear over the seabed. The otter doors, chains and net bag found on trawl gear scrape the surface and can lead to the damage and removal of erect epifaunal species (Van Dolah *et al*. 1987; Halls-Spencer *et al*. 2002; Fossa et al., 2002). Chalk clay and peat support a sparse fauna as the substrate is easily eroded by storm and wave action, but too hard for most sedimentary species. Therefore, burrowing piddocks are most commonly	Light otter trawling takes place at a very low level (4 times a year) in the site. Pre 2016 two trawl sightings were made in the southern half of the site. Outside of the sighting multiple trawl sightings have been made over the past 11 years, with one offshore of Yarmouth harbour being made in the most recent 3-year period. Sightings show that trawl activity occurs over subtidal coarse sediment, subtidal mixed sediment/sheltered muddy gravels in the southern half of the site. Additional information gathered of historic trawl tracks in the site indicates that trawl activity has taken place throughout the entire site, in the subtidal areas of these three features, at a very low level. There is a lack of information surrounding the biotope and species present within the Yarmouth to Cowes MCZ. A species list is provided within the post-survey site report, however no information on the substrate type certain species are found is provided, making it hard to ascertain site-specific impacts of trawling on associated communities. The generic description of subtidal chalk indicates that it is dominated by burrowing piddock shells, sponges, edible crabs and velvet swimming crabs. In deeper waters rare species of sponge may be present. Peat and clay exposures can be buried under other sediments and then exposed again on a regular basis. Little is known about the plants and animals which live in these deeper water habitats. No literature studies examine the effects of trawling on these habitats has been completed. However, piddocks are known to be common species occurring in these habitats, and are able to rapidly recolonize area's due to their planktonic larval stage (Knight 1984). Other species such as red and	Addressed above

			found on these substrate types. Piddocks have a planktonic larval stage (Knight 1984) an can therefore disperse beyond the immediate population, enabling recovery of diminished stocks.	green seaweeds are likely to be able to rapidly re-establish as they will be species which are adapted to living on areas which experience natural erosion through waves and storms. Hall et al 2008 assessed the sensitivity of the most relevant habitat type Mussels & Piddocks on intertidal clay and peat to a single pass of fishing gear as medium sensitivity. The lack of site-specific information on biotope and associated communities makes assessing the impacts of trawling disturbance difficult. Trawling is known to occur in the site over mixed, coarse and sheltered muddy gravel sediments. Sensitivity of the chalk, peat and clay habitats to the activities is medium to a single pass, however the communities associated with the habitat are thought to be able to rapidly recolonize due to their life history characteristics. Therefore, due to the light intensity of the fishing activity (up to 4 times per year) and life history characteristics of the species it is believed that trawling will not pose a significant risk to the feature communities and will therefore not hinder the ability of the subtidal chalk and peat and clay exposures to achieve their 'recover' general management approach (GMA). It is worth noting that in the absence of a condition assessment for the site, Natural England undertook a vulnerability assessment for each feature as a proxy for condition. This assessment considers the activities which take place in the site and determines the GMA for each feature. However, such an assessment is relatively generic and does not take into a number of site-specific factors.	
	Extent and distribution; Structure: physical structure of rocky substrate;	Not available	Abrasion/disturbance of the substrate on the surface of the seabed, penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion and physical change to another seabed type were identified as potential pressures.	Light otter trawling takes place at a very low level (4 times a year) in the site. Pre 2016 two trawl sightings were made in the southern half of the site. Outside of the sighting multiple trawl sightings have been made over the past 11 years, with one offshore of Yarmouth harbour being made in the most recent 3-year period. Sightings show that trawl activity occurs over subtidal coarse sediment, subtidal mixed sediment/sheltered muddy gravels in the southern half of the site. Additional information gathered of historic trawl tracks in the site indicates that trawl activity has taken place throughout the entire site, in the subtidal areas of these three features, at a very low level.	Addressed above

			Physical impacts on the seabed from trawling include scraping and ploughing, creation of depressions, trenches, scouring and flattening of the seabed, and dragging of large boulders/rock features. Physical change to another seabed type could occur as a result of repeated impact of gear over soft rock (chalk/peat/clay) habitats by changing the habitat structure via the fragmentation of the flat rock surface to a cobbled/boulder habitat type. Studies on the effects of otter trawling in variable habitats have revealed trawling can lead to the removal of biogenic structures, moved or overturn stones and boulders, smooth the seafloor and expose sediment/shell fragments.	The generic description of subtidal chalk indicates that it is dominated by burrowing piddock shells, sponges, edible crabs and velvet swimming crabs. In deeper waters rare species of sponge may be present. Peat and clay exposures can be buried under other sediments and then exposed again on a regular basis. Hall *et al.,* 2008 assessed the sensitivity of the most relevant habitat type mussels and piddocks on intertidal clay and peat to a single pass of fishing gear as medium sensitivity. No literature studies examining the effects of trawling on these habitats has been completed. However, subtidal chalk and clay deposits are formed in prehistoric periods and can therefore not be renewed by transport of sediments in the water column. It is possible that repeated impact from the fishing gear could lead to a permanent change in the habitat type. Therefore, bottom towed fishing gears which could cause the direct removal or damage to the substrate could lead to the disappearance or change in structure of the feature, as there is no mechanism by which the substratum can be replaced (Tillin & Hill, 2016). Trawling is known to occur in the site over mixed, coarse and sheltered muddy gravel sediments. Sensitivity of the chalk, peat and clay habitats to the activities is medium to a single pass, in the feature can be permanently damaged altering it structure from which it cannot be renewed by as it was formed in pre historic times. Therefore, due to the vulnerability of the habitat structure it is believed that trawling will pose a significant risk to the feature and could therefore hinder the ability of the subtidal chalk and peat and clay exposures to achieve their 'recover' general management approach (GMA). It is worth noting that in the absence of a condition assessment for the site, Natural England undertook a vulnerability assessment for each feature as a proxy for condition. This assessment considers the activities which take place in the site and determines the GMA for each feature. However, such an assessment is relatively generic and does not take into a number of site-specific factors.	
	Supporting processes: water quality - turbidity	Not available	Smothering and siltation rate changes (Light) and Changes in suspended solids (water clarity) were identified as potential pressures.	Light otter trawling takes place at a very low level (4 times a year) in the site. Pre 2016 two trawl sightings were made in the southern half of the site. Outside of the sighting multiple trawl sightings have been made over the past 11 years, with one offshore of Yarmouth harbour being made in the most recent 3-year period.	Addressed above

	Supporting processes: sedimentation rate		The resuspension of sediment can impact upon benthic communities through smothering, burial and increased turbidity. These effects may extend to organisms living a distance away from the fished area. The timescale for recovery after trawling disturbance largely depends on sediment type, associated fauna and rate of natural disturbance, and variation in recovery arises from characteristics specific to the site. Generally speaking, locations subject to high levels of natural disturbance, the associated fauna are likely to be adapted to withstand and recover from disturbance.	Sightings show that trawl activity occurs over subtidal coarse sediment, subtidal mixed sediment/sheltered muddy gravels in the southern half of the site. Additional information gathered of historic trawl tracks in the site indicates that trawl activity has taken place throughout the entire site, in the subtidal areas of these three features, at a very low level. There is a lack of information surrounding the biotope and species present within the Yarmouth to Cowes MCZ. A species list is provided within the post-survey site report, however no information on the substrate type certain species are found is provided, making it hard to ascertain site-specific impacts of trawling on associated communities. The generic description of subtidal chalk indicates that it is dominated by burrowing piddock shells, sponges, edible crabs and velvet swimming crabs. In deeper waters rare species of sponge may be present. Peat and clay exposures can be buried under other sediments and then exposed again on a regular basis. Little is known about the plants and animals which live in these deeper water habitats. Research has found that high levels of sediment and regular exposure can cause sever impacts. Increased turbidity can inhibit respiratory and feeding functions of benthic organisms, and cause hypoxia or anoxia. Small organisms and immobile species are particularly vulnerable to smothering. The severity of the impact is determined by sediment type, the level of sediment burden and the sensitivity of organisms which is largely related to their biology (i.e. size, relationship to substrate, life history, mobility). The Solent is known to be highly variable in terms of suspended sediment concentrations. At Southampton Water's mouth concentrations can vary from around 25 to 40 mg/l, and in peak spring tides reach 60 mg/l (ABP Mer, 2014). Tidal streams in the Solent take this water out from the mouth of the Solent and east past Bembridge MCZ. Therefore, natural turbidity in Bembridge MCZ is expected to be high. Hall et al. (2008) assessed the sensitivity of similar habitats to have medium sensitivity to a single pass of both trawl and dredge activities.	

				Tillin et al. (2010) assessed the sensitivity of these habitats to increased siltation rates to be not sensitive to medium. The lack of site-specific information on biotope and associated communities makes assessing the impacts of trawling disturbance difficult. Trawling is known to occur in the site over mixed, coarse and sheltered muddy gravel sediments. The site is thought to be exposed to high levels of natural disturbance and turbidity levels. Sensitivity of the habitats to the activities is not sensitive to medium. Therefore, due to the light intensity of the fishing activity (up to 4 times per year) and low sensitivity to this level it is believed that changes in sedimentation will not pose a significant risk to the feature and will therefore not hinder the ability of the subtidal chalk, and peat and clay exposures to achieve its 'recover' general management approach (GMA). It is worth noting that in the absence of a condition assessment for the site, Natural England undertook a vulnerability assessment for each feature as a proxy for condition. This assessment considers the activities which take place in the site and determines the GMA for each feature. However, such an assessment is relatively generic and does not take into a number of site-specific factors.	
Bouldnor cliff geological feature.	Not available	Not available	Abrasion/disturbance of the substrate on the surface of the seabed and penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion were identified as potential pressures. Physical impacts on the seabed from trawling include scraping and ploughing, creation of depressions, trenches, scouring and flattening of the seabed, and dragging of large boulders/rock features.	Bouldnor geological feature covers a submerged 8,000-year-old Mesolithic landscape at around 11m depth, 1km east of Yarmouth, Isle of Wight. The site stretches a further 1km west to east and contains five sites in which archaeological evidence can be found. In these sites a range of important structures has been found including worked flints, a habitat of oak forest and herbaceous plants, and a boat building site. The site is eroded by the Solent's strong tides regularly revealing more archaeological evidence. Light otter trawling takes place at a very low level (4 times a year) in the site. Pre 2016 two trawl sightings were made in the southern half of the site. Outside of the sighting multiple trawl sightings have been made over the past 11 years, with one offshore of Yarmouth harbour being made in the most recent 3-year period. Sightings show that trawl activity occurs over subtidal coarse sediment, subtidal mixed sediment/sheltered muddy gravels in the southern half of the site. Additional information gathered of historic trawl tracks in the site indicates that trawl activity has taken place throughout the entire site, in the subtidal areas of these three features, at a very low level.	Addressed above

			Studies on the effects of otter trawling in variable habitats have revealed trawling can lead to the removal of biogenic structures, moved or overturn stones and boulders, smooth the seafloor and expose sediment/shell fragments.	Trawling activity can cause abrasion and penetration to the seabed surface. These pressures if they were to occur over the Bouldnor geological feature would cause damage to the feature, by breaking up parts of structures, bringing up small artefacts in the trawl, and moving and removing the sediments which cover the feature. Therefore, it is believed that trawling activity will pose a significant risk to the feature and will therefore hinder the ability of the Bouldnor geological feature to achieve its 'maintain' general management approach (GMA).	

5 Proposed management measures

In recognition of the potential pressures of bottom towed fishing gear (particularly trawling) upon designated features, Southern IFCA will follow the process of introducing permanent bottom towed fishing gear (BTFG) closure areas in order to protect the following features in the Yarmouth to Cowes MCZ:

- moderate energy circalittoral rock;
- high energy circalittoral rock;
- moderate energy infralittoral rock;
- high energy infralittoral rock,
- subtidal chalk,
- peat and clay exposures and;
- Bouldnor Cliff geological feature.

The bottom towed fishing gear closed areas have been chosen based on feature presence data provided by Natural England. Both of the bottom towed gear fishing closure areas are designed to fully protect the above features against BTFG, by completely prohibiting all types of bottom towed fishing, including trawling and dredging, over the features within the site. Each area has been designed to incorporate a buffer around the feature data. The buffer distance is determined by the following formula: Deepest feature depth * 4 +10m. The buffer ensures that if fishing were to occur along the line of the closed area, the actual trawl/dredge location would not occur over the feature itself.

One-point location of the designated features has not been protected. This point location has not been included in a bottom towed fishing gear closed area. This is because there is uncertainty over the feature data as the exact location has been assigned to two feature types.

The measures presented are draft and used to illustrate protection based purely on location. When developing management other evidence such as fishing activity and consultation with the local community may feed into the development of spatial closed areas

Management will be introduced in the upcoming update to the Southern IFCA Bottom towed Fishing Gear Byelaw 2016. The primary reason for management options is to protect the above features, which are known to be highly sensitive to BTFG against the impacts caused by bottom towed fishing gear.

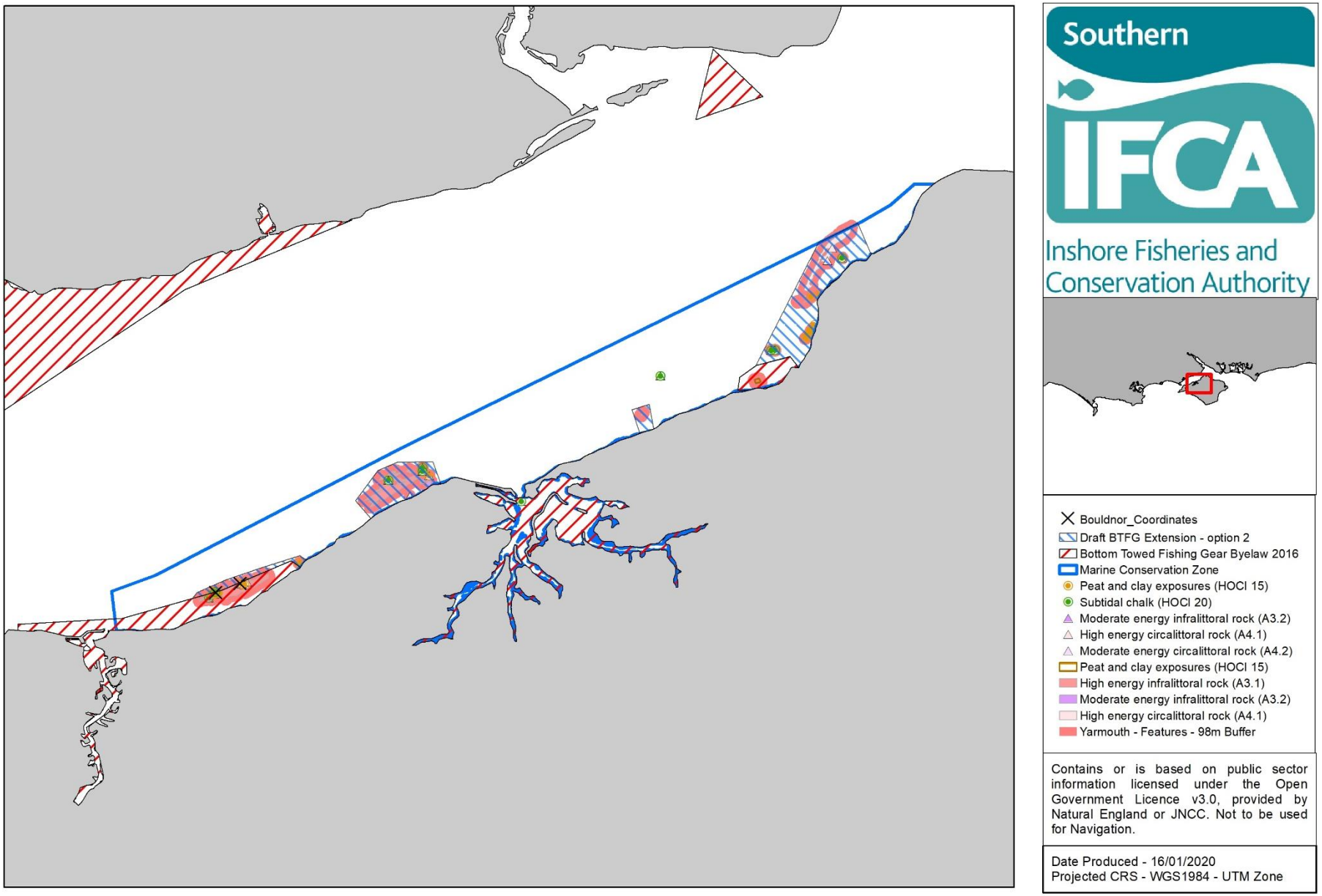


Figure 4. Option 2 - Draft Bottom Towed Fishing Gear closed areas for Yarmouth to Cowes MCZ.

6 Conclusion

In order to conclude whether types of bottom towed fishing gear (trawls) pose a significant risk, it is necessary to assess whether the impacts of the activities will hinder the achievement of the general management approach of the designated feature (moderate energy circalittoral rock; high energy circalittoral rock; moderate energy infralittoral rock; high energy infralittoral rock, subtidal chalk, peat and clay exposures and Bouldnor Cliff geological feature) of 'recover to favourable condition' and (subtidal sands) to achieve its 'maintain at favourable condition' and the sites conservation objectives, namely:

"The conservation objective of each of the zones is that the protected habitats:

1. are maintained in favourable condition if they are already in favourable condition

2. be brought into favourable condition if they are not already in favourable condition

For each protected feature, favourable condition means that, within a zone:

1. its extent is stable or increasing

2. its structure and functions, its quality, and the composition of its characteristic biological communities (including diversity and abundance of species forming part or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate

Any temporary deterioration in condition is to be disregarded if the habitat is sufficiently healthy and resilient to enable its recovery.

The review of the research into the impacts of bottom towed fishing gear on moderate energy circalittoral rock; high energy circalittoral rock; moderate energy infralittoral rock; high energy infralittoral rock (rock with erect and branching species, erect and branching spp. very slow growing, rock with low-lying fast-growing faunal turf, rock with erect and branching species, shallow subtidal rock with kelp) reported the habitat to have medium to high sensitivity to a single pass. Therefore, it is concluded that the potential for fishing activity to occur over or in close proximity to the features of the site could prevent the ability of moderate energy circalittoral rock; high energy circalittoral rock; moderate energy infralittoral rock and high energy infralittoral rock to attain their 'recover' general management approach.

Having reviewed a wide range of evidence, including scientific literature, IFCO knowledge, habitat feature mapping (including bathymetric data), it has been concluded that bottom towed fishing gear is likely to pose a significant risk to moderate energy circalittoral rock; high energy circalittoral rock; moderate energy infralittoral rock; high energy infralittoral rock within the Yarmouth to Cowes MCZ. The rationale for this conclusion is summarised below:

- IFCO knowledge indicates that trawling occurs within the site over subtidal sediment which border the subtidal rock features, at a low intensity of up to four times a year by two vessels.
- No sightings of the activities have been made in the site.
- A review of scientific literature demonstrated that bottom towed fishing gear at any intensity can lead to the direct removal, damage and mortality of non-target species found on rock habitats. However, it is important to note that the few studies which have been completed have little relevance as they focus on deep water habitats.
- Sensitivity of these rock habitats to pressures associated with trawls is medium to high.

- Recovery of rocky reef habitats are 8+ years.

The review of the research into the impacts of bottom towed fishing gear on subtidal chalk and peat and clay exposures (mussels & piddocks on intertidal clay and peat) reported the habitat to have a medium sensitivity to a single pass. These features were created during prehistoric times and therefore cannot be replace through sediment transport or other mechanism if they were to be abraded/ penetrated or changed by fishing gear. Therefore, it is concluded that the fishing activity will prevent the ability of subtidal chalk and peat and clay exposures to attain their 'recover' general management approach.

Having reviewed a wide range of evidence, including scientific literature, IFCO knowledge, habitat feature mapping (including bathymetric data), it has been concluded that bottom towed fishing gear is likely to pose a significant risk to subtidal chalk and peat and clay exposures within the Yarmouth to Cowes MCZ. The rationale for this conclusion is summarised below:

- IFCO knowledge indicates that trawling occurs within the site over subtidal sediments in which the chalk and clay are found, at a low intensity of up to four times a year by two vessels.
- No sightings of the activities have been made in the site.
- A review of scientific literature found no available evidence on the impacts of the activity to the feature. However, the activity is known to move boulders on the seabed, scour and penetrate sediment and cause furrows. Therefore, it can be concluded that the activity could lead to direct damage and removal of the feature if they were to interact.
- Sensitivity of these habitats to pressures associated with trawls is medium.
- Subtidal chalk and peat and clay exposures were formed in historic periods and therefore the feature itself cannot recover.

The Bouldnor Cliff geological feature is an 8,000-year-old archaeological site, containing meso lithic artefacts of early human settlement. Trawling can cause the seabed to be abraded and penetrated, boulders can be dragged and sediments can be scoured and sculpted. Therefore, it is concluded that the fishing activity will prevent the ability of Bouldnor Cliff Geological feature to attain its 'maintain' general management approach.

Having reviewed a wide range of evidence, including scientific literature, IFCO knowledge, habitat feature mapping (including bathymetric data), it has been concluded that bottom towed fishing gear is likely to pose a significant risk to Bouldnor Cliff Geological feature within the Yarmouth to Cowes MCZ. The rationale for this conclusion is summarised below:

- IFCO knowledge indicates that trawling occurs within the site over subtidal sediments in which the chalk and clay are found, at a low intensity of up to four times a year by two vessels.
- No sightings of the activities have been made in the site.
- A review of scientific literature found no available evidence on the impacts of the activity to the feature. However, the activity is known to move boulders on the seabed, scour and penetrate sediment and cause furrows. Therefore, it can be concluded that the activity could lead to direct damage and removal of the feature if they were to interact.
- The site was formed 8,000 years ago and therefore the feature itself cannot recover.

It is therefore recognised that the activities have the potential to pose a significant risk upon the moderate energy circalittoral rock; high energy circalittoral rock; moderate energy infralittoral rock and high energy infralittoral rock attributes:

- Extent and distribution
- Structure: physical structure of rocky substrate
- Distribution: presence and spatial distribution of biological communities
- Structure and function: presence and abundance of key structural and influential species
- Structure: species composition of component communities

It is therefore recognised that the activities have the potential to pose a significant risk upon the subtidal chalk and peat and clay exposures attributes:

- Extent and distribution
- Structure: physical structure of rocky substrate

It is also recognised that the activities have the potential to pose a significant risk upon the Bouldnor Cliff geological feature, however as there is not currently any conservation advice available for this feature specific attributes of the feature cannot be specified.

Upon the above conclusions, including conservation advice for the site, and up to date habitat maps, Southern IFCA feel it is now appropriate for refinement to the spatial extent of the current closures and inclusion of additional bottom towed fishing gear closed areas. This is to support the general management approach to ‘recover’ and ‘maintain’ the features discussed to/at a favourable condition. The primary reason for management is to protect the designated habitat features and geological features from the effects caused by bottom towed fishing gear.

When the above evidence, fishing activity levels, current and proposed management measures are considered it has been concluded that bottom towed fishing gear will not pose a significant risk to the achievement of sites conservation objectives to ‘recover’ and to ‘maintain’ the features to/at favourable condition. Fishing activity will continue to be monitored.

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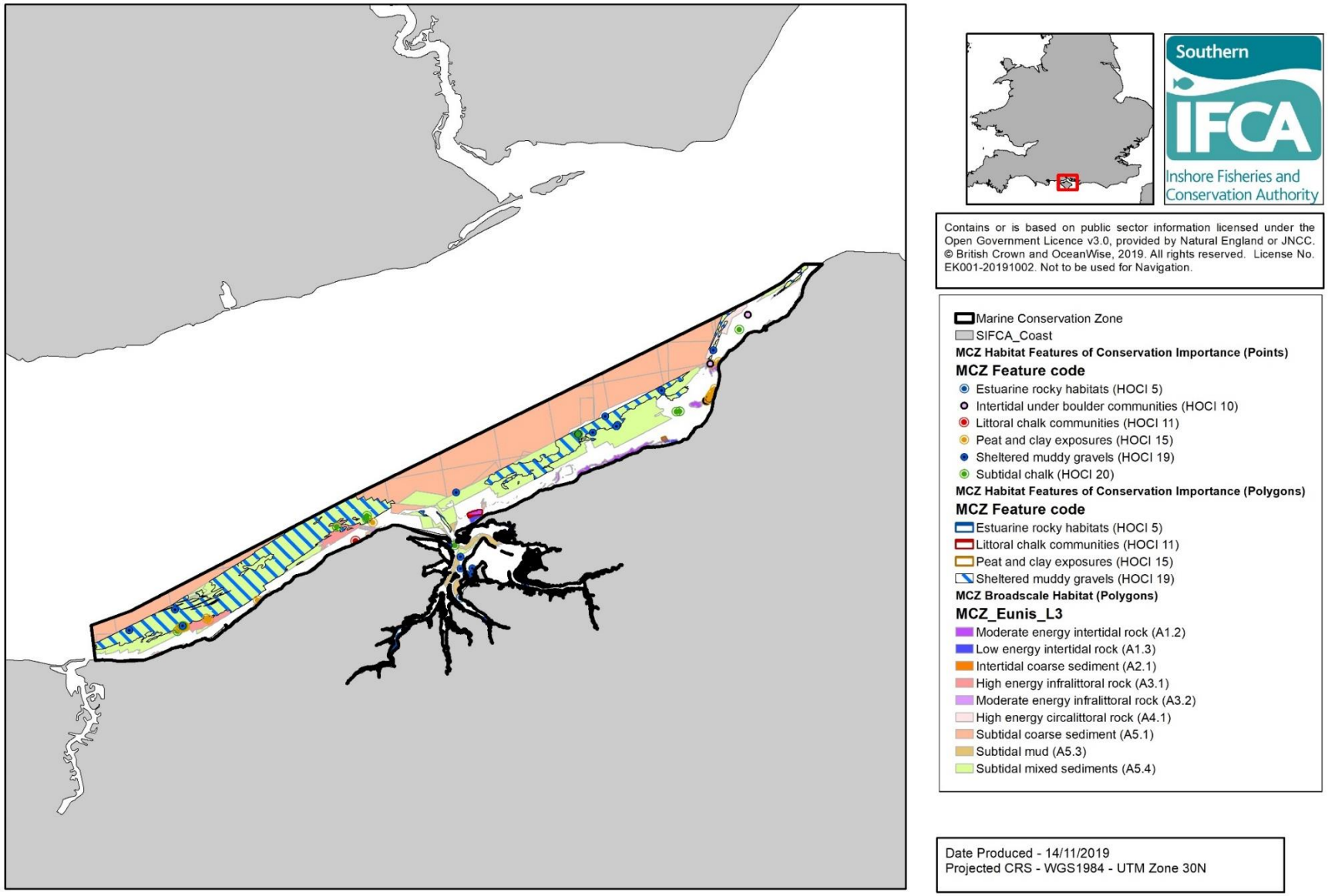
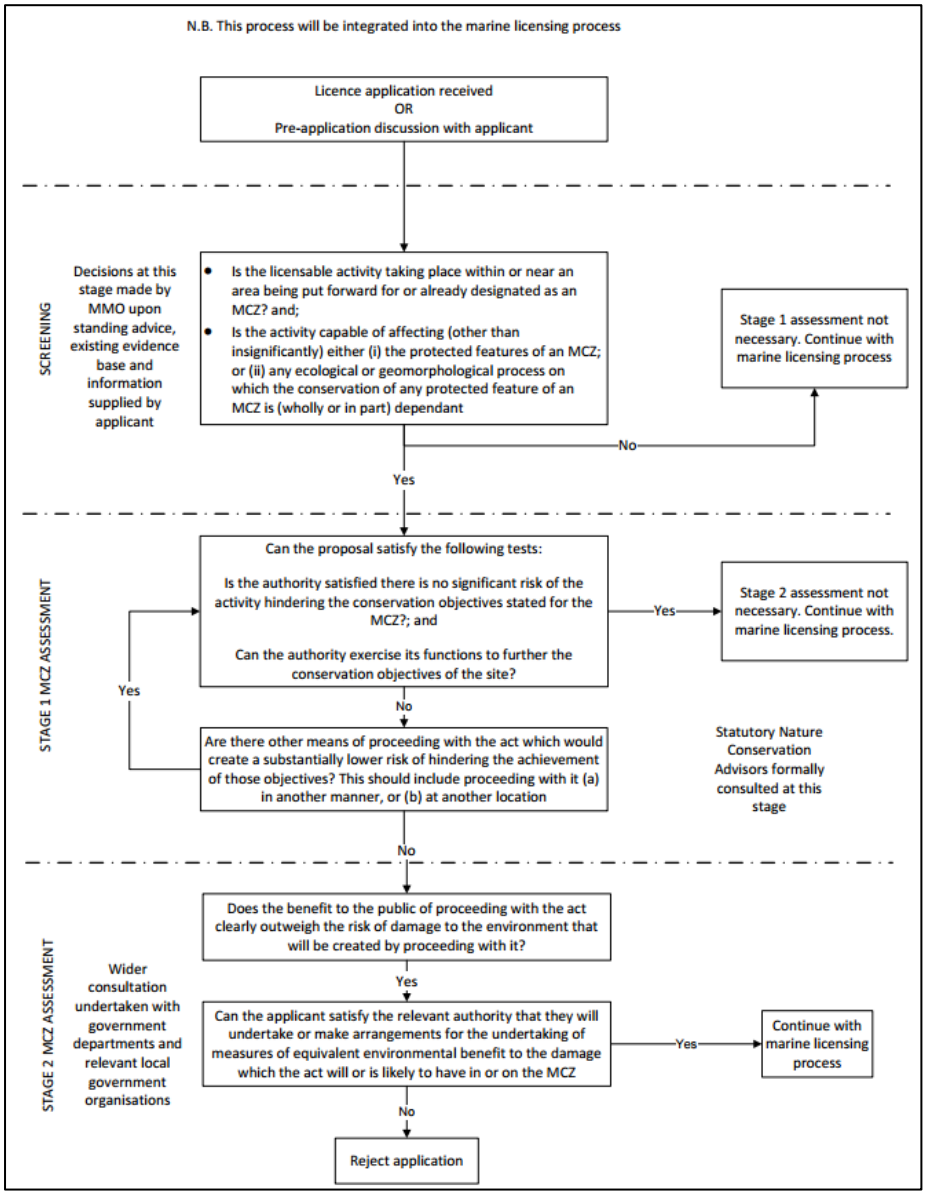
Annex 1 Broad scale habitat, and habitat and species of conservation importance map for the Yarmouth to Cowes MCZ.



Annex 2 Summary of MMO assessment process for MCZs



Annex 3 Initial screening of commercial fishing activities in the Yarmouth to Cowes MCZ.

Broad Gear Type (for assessment)	Aggregated Gear Type (EMS Matrix)	Fishing gear type	Does it Occur?	Details	Sources of Information	Potential for Activity Occur/ Is the activity anticipated to occur?	Justification	Suitable for Part A Assessment?	Priority
Bottom towed fishing gear	**Towed (demersal)**	**Beam trawl (whitefish)**	N		Local IFCO	Y	Vessels in the area actively light otter trawl. Some of these have beam trawl equipment and so this activity has the potential to occur (i.e. suitable trawl ground due to coarse substrate). If the activity were to occur, it would most likely be on an irregular basis on the fringes of the site and has not been seen in the site. The likelihood of the activity occurring is therefore considered to be low.	Y	Medium to High
		Beam trawl (shrimp)	N		Local IFCO	N	Target species does not occur.		
		Beam trawl (pulse/wing)	N		Local IFCO	N	Prohibited via Electric fishing byelaw.		
		Heavy otter trawl	N		Local IFCO	N	The activity has the potential to occur but is not anticipated to occur. The boats which operate within the district (and the Solent) are small in nature (restricted to 12 m or less in length) and so are restricted in the size of gear used. This means light otter trawls are used instead of heavy otter trawls.		

		Multi-rig trawls	Unknown		Local IFCO	Y	Has not historically occurred and is not currently known to occur, however one vessel operating within the surrounding area has recently started operating a multi-rig (triple) trawl and this vessel has histroically fished in the surrounding area of the site with a light otter trawl. If the activity were to occur, it would most likely be on an irregular basis on the fringes of the site. The likeliood of the activity occuring is therefore considered to be low.	N	Medium to High
		Light otter trawl	Y	2 boats operate this gear in the area. One vessel operates for four weeks in each year in the area, the other vessel less than this. Target species include sole.	Local IFCO	Y	Activity is known to occur.	Y	High
		Pair trawl	N		Local IFCO	N	It is not anticipated to occur as it has not historically occurred. Furthermore, there is limited potential due to the space required to accommodate two vessels and the size/power of vessels needed.		

		Anchor seine	N		Local IFCO	N	Gear type has not been historically used within the area and is not anticipated to occur. Activity needs a large area and, in the site, considered would be limited. In addition, large vessels are also required for this gear type and vessels over 12 m in length are prohibited from fishing within the Southern IFCA district.		
		Scottish/ fly seine	N		Local IFCO	N	Gear type has not been historically used within the area and is not anticipated to occur. Activity needs a large area and, in the site, considered would be limited. In addition, large vessels are also required for this gear type and vessels over 12 m in length are prohibited from fishing within the Southern IFCA district.		
Pelagic towed fishing gear	**Towed (pelagic)**	**Mid-water trawl (single)**	N		Local IFCO	N	Gear type has not been historically used within the area. Activity has the potential to occur however this gear type does not come into contact with the seabed and therefore there is no chance for interaction with designated features.		
		Mid-water trawl (pair)	N		Local IFCO	N	Gear type has not been historically used within the area and is not anticipated to occur. Activity needs a large area and, in the site, considered would be limited. In addition, large vessels are also required for this gear type and vessels over 12 m in length are prohibited from fishing within the Southern IFCA district.		
		Industrial trawls	N		Local IFCO	N	Activity is not able to occur due to the size of vessel required. Vessels over 12 m are prohibited from		

							fishing within the Southern IFCA district.		
Bottom towed fishing gear	**Dredges (towed)**	**Scallops**	N		Local IFCO	N	The target species does not occur within the site and therefore the activity is not anticipated to occur.		
		Mussels, clams, oysters	N		Local IFCO	N	Clam and mussel target species are not known to occur within the site. Oyster dredging has historically taken place within the Solent which the site within. The Solent oyster population has since been in decline and there are currently no indications of recovery, however restoration efforts commenced in 2015 and continue to do so. Based on the current status of the Solent oyster population and the direction of decline (from west to east) in the Solent, the activity is not anticipated to occur within the site within the foreseeable future.		
		Pump scoop (cockles, clams)	N		Local IFCO	N	The target species (clam and cockle) are not known to occur within the site and therefore it is not anticipated the activity would occur.		
Suction	**Dredges (other)**	**Suction (cockles...)**	N		Local IFCO	N	Suction dredging for cockles, clams, mussels and oysters is prohibited (by default) in the Southern IFCA district (by Southern IFCA byelaws).		
Tractor		**Tractor**	N		Local IFCO	N	The activity has not historically occurred within the site. The potential for activity to occur is limited due to limited access and substrate suitability.		

Intertidal work	**Intertidal handwork**	**Hand working (access from vessel)**	N		Local IFCO	N	Hand working with access from a vessel infers a muddy habitat where there difficulty accessing areas. At this site, the dominance of coarse and rocky substrate means there is limited need for a vessel as the substrate means the area is accessible on foot.		
		Hand work (access from land)	N		Local IFCO	Y	In certain areas of the site suitable habitat exists which supports the target species. The activity has historically taken place within the site at very low levels but is not anticipated to occur due to land ownership. In other areas there is limited potential for the activity to take place due to a dominance of unsuitable substrate for hand gathering activities.	Y	Medium
Static - pots/traps	**Static - pots/ traps**	**Pots/creels (crustacea/ gastropods)**	Y	One vessel in known to pot for crabs and lobsters in the area. Other vessels pot for cuttlefish throughout the Solent and are likely to fish here.	Local IFCO	Y	Activity is known to occur.	Y	Medium
		Cuttle pots	Y	See pots/creels	Local IFCO	Y	See pots/creels		Medium
		Fish traps	N		Local IFCO	N	Activity has not historically occurred within the site and is not anticipated to occur.		

Demersal nets/lines	**Static - fixed nets**	**Gill nets**	Y		Local IFCO	Y	Activity know to occur.	Y	Low to Medium
		Trammels	Y		Local IFCO	Y	See 'gill nets'		Low to Medium
		Entangling	Y		Local IFCO	Y	See 'gill nets'		Low to Medium
Pelagic nets/lines	**Passive - nets**	**Drift nets (pelagic)**	N		Local IFCO	N	Activity is not anticipated to occur and potential for the activity is limited by the tide that effects the site, particularly the outer areas.		
Demersal nets/lines		**Drift nets (demersal)**	N		Local IFCO	N	Activity is not anticipated to occur and potential for the activity is limited by the tide that effects the site, particularly the outer areas.		
	Lines	**Longlines (demersal)**	Unknown		Local IFCO	Y	It is anticipated that demersal longlines are used within the western Solent and therefore there is potential that the activity is occurring within the site.	Y	Low to Medium
Pelagic nets/lines		**Longlines (pelagic)**	Unknown	See longlines (demersal)	Local IFCO	Y	See longlines (demersal)		
		Handlines (rod/gurdy etc)	Y		Local IFCO	Y	The activity is known to occur however this gear type does not come into contact with the seabed and therefore there is no chance for interaction with designated features.	Y	Low to medium
		Jigging/trolling	Y	See 'handlines (rod/gurdy etc)'	Local IFCO		See 'handlines (rod/gurdy etc)'		
Purse seine	**Seine nets and other**	**Purse seine**	N		Local IFCO	N	Activity has not historically occurred within the site and is not anticipated to occur.		
Demersal nets/lines		**Beach seines/ring nets**	N		Local IFCO	N	Activity has not historically occurred within the site and is not anticipated to occur.		

Miscellaneous		**Shrimp push-nets**	N		Local IFCO	N	It is not anticipated to occur as it is not thought to have occurred historically within the site.		
EA Only		**Fyke and stake nets**			EA Only				
Miscellaneous	**Miscellaneous**	**Commercial diving**	N			N	Activity has not historically occurred and is not anticipated to occur as the site does not support the target species.		
Bottom towed fishing gear		**Bait dragging**	N			N	Activity has not historically occurred within the site and is not anticipated to occur. The majority substrate present is not suitable for the activity to take place. As such, the target species are also not present.		
Miscellaneous		**Crab tiling**	N			N	Activity has not historically occurred within the site or Southern IFCA district and therefore is not anticipated to occur.		
Intertidal work	**Bait collection**	**Digging with forks**	Y			Y	Activity is known to occur.	Y	Medium

Annex 4 Advice on operations for commercial fishing activities in The Needles MCZ (Demersal trawl only)

Pressure Name	Habitat										Species		
	High energy infralittoral rock	Moderate energy infralittoral rock	Seagrass beds	Sheltered muddy gravels	Subtidal chalk	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Moderate energy circalittoral rock	Native oyster	Peacock's tail	Stalked jellyfish (Calvadosia campanulata)
Abrasion/disturbance of the substrate on the surface of the seabed	S	S	S	S	S	S	S	S	S	S	S	S	S
Changes in suspended solids (water clarity)	S	S	S	S	S	S	S	S	S	S	S	NS	S
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion		S	S	S	S	S	S	S	S	S	S		S
Removal of non-target species	S	S	S	S	S	S	S	S	S	S	S	S	S
Smothering and siltation rate changes (Light)	NS	S	S	S	S	IE	S	S	S	S	S	S	S
Deoxygenation	IE	S	NS	S	IE	S	S	S	S	S	NS	NS	IE
Hydrocarbon & PAH contamination	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Introduction of light	S	S	S	IE	S	IE	IE	NS	S	IE	NS	NS	IE

Introduction or spread of invasive non-indigenous species (INIS)	S	S	S	S	S	IE	S	S	S	S	S	IE	IE
Litter	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nutrient enrichment	S	NS	S	NS	NS	NS	NS	NS	NS	NS	NS	NS	S
Organic enrichment	S	S	S	S	NS	S	S	S	S	S	IE	NS	S
Physical change (to another seabed type)	S	S		S						S	S	S	S
Physical change (to another sediment type)			S		S	S	S	S	S		NS		S
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Transition elements & organo-metal (e.g. TBT) contamination	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Underwater noise changes							NS	NS	NS	NS			
Visual disturbance		NS			NS		NS	NS	NS	NS			

Annex 5 Advice on operations for commercial fishing activities in Coquet to St Marys MCZ (Demersal trawl only)

Pressure Name	Habitat															
	High energy intertidal rock	Intertidal under boulder communities	Low energy intertidal rock	Moderate energy intertidal rock	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Peat and clay exposures	High energy infralittoral rock	Moderate energy infralittoral rock	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Moderate energy circalittoral rock
Abrasion/disturbance of the substrate on the surface of the seabed		S	S	S	NS	S	S	S	S	S	S	S	S	S	S	S
Changes in suspended solids (water clarity)		S	S	S	NS	S	S	S	NS	S	S	S	S	S	S	S
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion		S	S	S	NS	S	S	S	S		S	S	S	S	S	S
Removal of non-target species		S	S	S		S	S	S	S	S	S	S	S	S	S	S
Smothering and siltation rate changes (Light)		S	S	S	NS	S	S	S	S	NS	S	S	S	S	S	S
Deoxygenation		NS	S	S	NS	NS	NS	S	IE	IE	S	S	S	S	S	S
Hydrocarbon & PAH contamination		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Introduction of light		S	S	S		IE	NS	S	IE	S	S	IE	IE	NS	S	IE

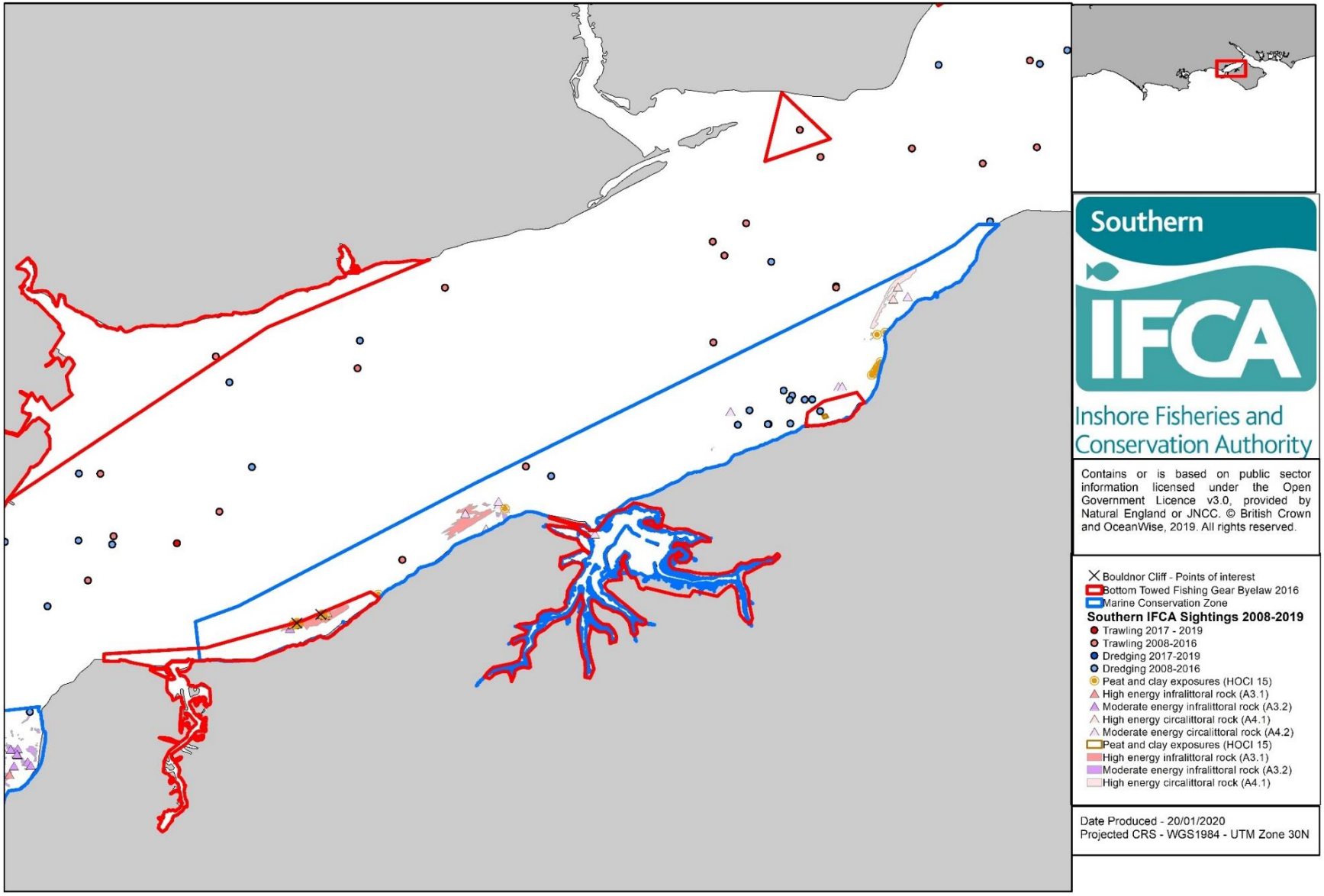
Introduction or spread of invasive non-indigenous species (INIS)		S	S	S		S	S	S	NS	S	S	S	S	S	S	S
Litter		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nutrient enrichment		NS	IE	IE	NS	NS	NS	NS	NS	S	S	NS	NS	NS	NS	NS
Organic enrichment		NS	S	S	NS	NS	NS	NS	IE	S	S	NS	IE	S	S	S
Physical change (to another seabed type)		S	S	S						S	S					S
Physical change (to another sediment type)					S	S	S	S	S			S	S	S	S	
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Transition elements & organo-metal (e.g. TBT) contamination		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Underwater noise changes			IE										NS			NS
Visual disturbance								NS	NS					NS	NS	NS

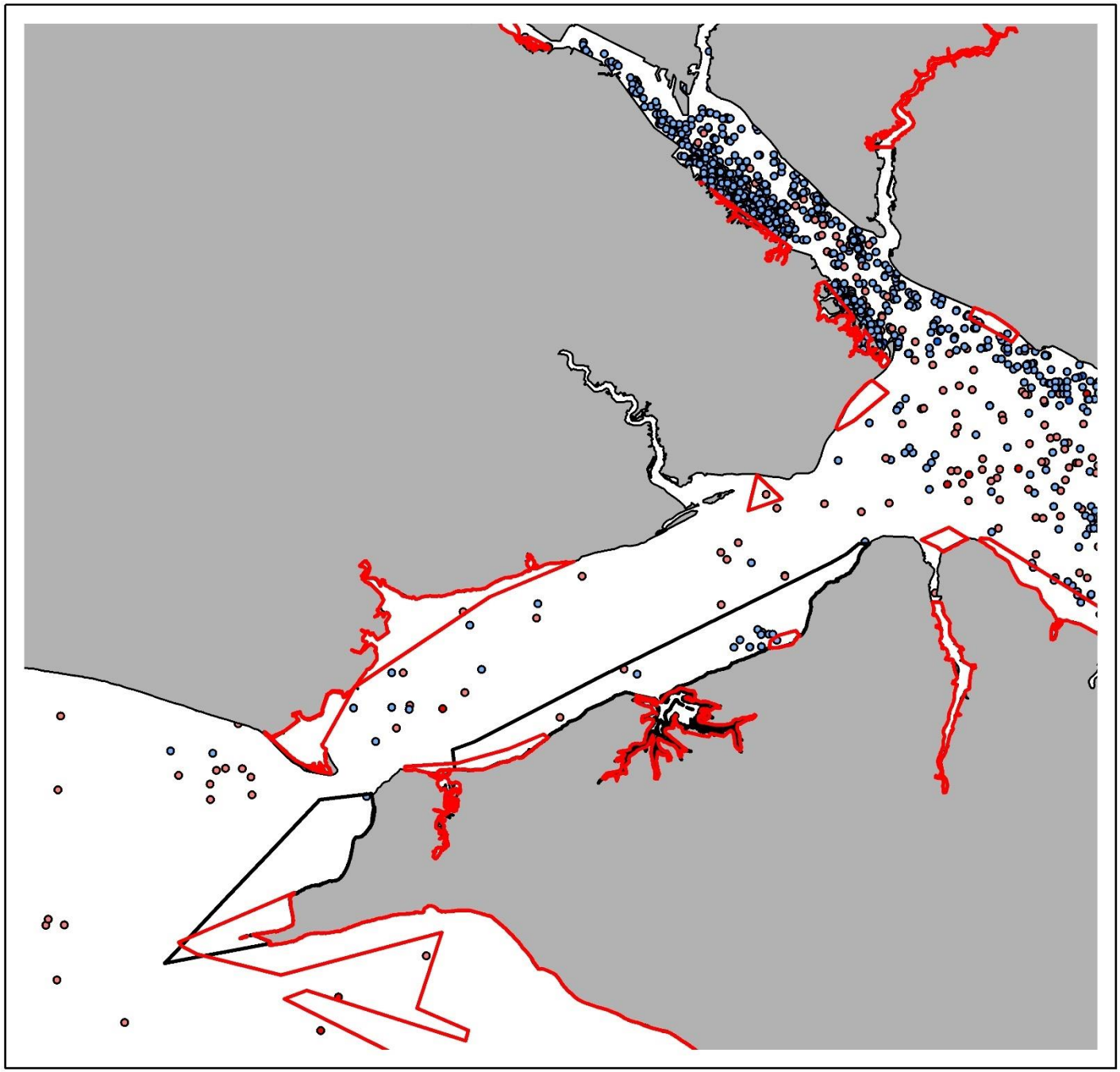
Annex 6 Advice on operations for commercial fishing activities in Beach Head West MCZ (Demersal trawl only)

	Habitat												Species	
Pressure Name	Littoral chalk communities	Intertidal coarse sediment	Infralittoral rock and thin sandy sediment	Blue mussel beds	Infralittoral muddy sand	Infralittoral sandy mud	Subtidal chalk	Subtidal mixed sediments	Subtidal mud	Subtidal sand	High energy circalittoral rock	Moderate energy circalittoral rock	Short snouted seahorse	Native oyster
Abrasion/disturbance of the substrate on the surface of the seabed	S	NS	S	S	S	S	S	S	S	S	S	S	IE	S
Changes in suspended solids (water clarity)	S	NS	S	NS	S	S	S	NS	NS	S	S	S	S	S
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	S	NS		S	S	S	S	S	S	S	S	S		S
Removal of non-target species	S		S	S	S	S	S	S	S	S	S	S	S	S
Smothering and siltation rate changes (Light)	S	NS	S	S	NS	NS	S	S	NS	NS	S	S		S
Collision BELOW water with static or moving objects not naturally found in the marine environment													IE	
Deoxygenation	NS	NS	S	NS	S	S	IE	S	S	S	S	S	S	NS
Hydrocarbon & PAH contamination	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Introduction of light	S		S	IE	S	S	S	IE	NS	S	NS	IE		NS
Introduction or spread of invasive non-indigenous species (INIS)	S		S	S	S	S	S	S	S	S	S	S	IE	S
Litter	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	IE	NA
Nutrient enrichment	IE	NS	S	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS
Organic enrichment	IE	NS	S	NS	NS	S	NS	S	S	S	S	S		IE
Physical change (to another seabed type)			S								S	S		S
Physical change (to another sediment type)		S		S	S	S	S	S	S	S				NS
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Transition elements & organo-metal (e.g. TBT) contamination	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Underwater noise changes					NS	NS		NS	NS	NS	NS		S	
Visual disturbance	NS						NS		NS			NS	S	

Annex 7 Fishing activity maps using trawl and dredge sightings data from 2008-2019 in (a) Yarmouth to Cowes MCZ and (b) Western Solent.





Southern IFCA
Inshore Fisheries and Conservation Authority

Bottom Towed Fishing Gear Byelaw 2016
Marine Conservation Zone

Sightings-BTFG-2008-2019

Southern IFCA Sightings 2008-2019

- Trawling 2017 - 2019
- Trawling 2008-2016
- Dredging 2017-2019
- Dredging 2008-2016

Date Produced - 14/11/2019
Projected CRS - WGS1984 - UTM Zone 30N