Document Control

Title	**DRAFT Studland Bay Marine Conservation Zone MMO Non-licensable Activity Assessment 2020**
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DRAFT Studland Bay Marine Conservation Zone MMO Non-Licensable Activity Assessment 2020

Contents

1. Summary

Table 1 shows a summary of the outcomes of this assessment regarding the impact of non-licensable activities on the features of the site.

Table 1: Assessment Summary

Features (sub-features)	Activity	Part A outcome	Part B outcome	In-combination assessment
Intertidal coarse sediment	Powerboating or sailing with an engine: mooring and/or anchoring **and** Sailing without an engine: mooring and/or anchoring	Capable of affecting (other than insignificantly)	No significant risk of hindering conservation objectives	No significant risk of hindering the achievement of the site's conservation objectives
Long-snouted seahorse (*Hippocampus guttulatus*)			Significant risk of hindering conservation objectives	
Subtidal sand				
Seagrass beds				
Intertidal coarse sediment	Powerboating or sailing with an engine: launching and recovery, participation	Not capable of affecting (other than insignificantly)	N/A	No significant risk of hindering the achievement of the site's conservation objectives
Seagrass beds		Capable of affecting (other than insignificantly)	Significant risk of hindering conservation objectives	
Subtidal sand		Not capable of affecting (other than insignificantly)	N/A	
Long-snouted seahorse (*Hippocampus guttulatus*)		Capable of affecting (other than insignificantly)	Significant risk of hindering conservation objectives	
Intertidal coarse sediment	Sailing without an engine: launching	Not capable of affecting (other than insignificantly)	N/A	

Seagrass beds	and recovery, participation	Capable of affecting (other than insignificantly)	No significant risk of hindering conservation objectives	
Subtidal sand		Not capable of affecting (other than insignificantly)	N/A	
Long-snouted seahorse (*Hippocampus guttulatus*)		Capable of affecting (other than insignificantly)	Significant risk of hindering conservation objectives	
Intertidal coarse sediment	Non-motorised water craft (e.g. kayaks, windsurfing, dinghies)	Not capable of affecting (other than insignificantly)	N/A	No significant risk of hindering the achievement of the site's conservation objectives
Long-snouted seahorse (*Hippocampus guttulatus*)				
Subtidal sand				
Seagrass beds				
Long-snouted seahorse (*Hippocampus guttulatus*)	Recreational diving and snorkelling	Capable of affecting (other than insignificantly)	Significant risk of hindering conservation objectives	No significant risk of hindering the achievement of the site's conservation objectives
Intertidal coarse sediment		Not capable of affecting (other than insignificantly)	N/A	
Subtidal sand				
Seagrass beds				

2. Introduction

Table 2 shows the name and legal status of the site.

Table 2: Site details

Name and legal Status of site(s):	Name of site(s)	Legal status
	Studland Bay	Marine Conservation Zone (MCZ)

Studland Bay MCZ is an inshore site that covers an area of approximately 4 km². It is located on the south coast of Dorset in the eastern English Channel. The site encompasses Studland Bay stretching from the edge of Shell Bay in the north to Old Harry Rocks in the south.

Studland Bay is sheltered from prevailing south-westerly winds and waves, and the shallow, sandy seabed provides the ideal habitat for dense seagrass meadows to form. Seagrasses provide cover and shelter for a variety of fish and invertebrate species including worms, crustaceans (such as crabs and lobsters) and molluscs (such as mussels and oysters). Seagrass roots are a vital stabiliser of surrounding sediments, reducing coastal erosion. Seagrass meadows have been identified as intense carbon sinks, accumulating large carbon stocks in their sediments (Duarte and Krause-Jensen, 2017). Furthermore, seagrass meadows also have a role as sources of carbon to adjacent ecosystems, with seagrass meadows exporting, on average, 24.3% of their net primary production, which may be used by fauna or remineralised (Duarte and Krause-Jensen, 2017).

The seagrass within Studland Bay provides a valuable home to seahorses. Two species are known to be present within the site. Many other species can be found within the seagrass and surrounding areas of sand, such as pipefish, wrasses and juvenile species of commercially important fish, such as bass, bream, sole and plaice.

The areas of coarse gravelly and sandy sediment found between high and low tide and below the low water mark are ecologically important, supporting a wide variety of species including algae, crustaceans (such as crabs and lobsters) and sea stars.

This site became a MCZ in May 2019. Table 3 shows the features for which the site has been designated and the associated conservation objectives. Further detail related to targets of individual attributes for the features are available in the supplementary advice on Conservation Objectives[1] and Table 11. Sections 2.1 to 2.4 detail characteristics of the features within the site (Table 3).

[1] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UKMCZ0072&SiteName=studland%20bay&SiteNameDisplay=Studland+Bay+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=,0

Table 3: Designated features and conservation objectives

Feature	Conservation objectives of the Marine Conservation Zone
Intertidal coarse sediment Long-snouted seahorse (*Hippocampus guttulatus*) Subtidal sand Seagrass beds	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

2.1 Intertidal coarse sediment

Within Studland Bay MCZ, intertidal coarse sediment is primarily located along the upper shore at South Beach with a small patch present towards the northern end of Middle Beach (MESL, 2013). The present day sediment sources are also thought to include inputs from the erosion of cliffs and coastal slopes in the southern part of Studland Bay (Royal Haskoning, 2010). Characterising taxa found associated with this sediment include worms belonging to the family Enchytraeidae and the phylum Nematoda (MESL, 2013).

2.2 Long-snouted seahorse (*Hippocampus guttulatus*)

Studland Bay is a known breeding location for long-snouted seahorse. Long-snouted seahorses can be up to 15 cm in length and are characterised by their long snouts (Neish, 2007). They have fleshy protuberances on the back of the neck, from the head to dorsal fin, and can be coloured from greenish-yellow through to reddish brown (Neish, 2007). Long-snouted seahorses are present in shallow waters, especially amongst algae and seagrasses, clinging by the tail or swimming upright (Neish, 2007). Long-snouted seahorses are also commonly known as spiny seahorses.

2.3 Subtidal sand

Subtidal sand is the most common subtidal sediment habitat type in Studland Bay MCZ and supports the seagrass beds (Environment Agency, 2018; UKSeaMap, 2018). Hook Sands is a sandbank situated over the old channel out of Poole Harbour. Hook Sands provides an important sediment feed to Studland and it is important to maintain this overall circulation of sediment within this local system (Royal Haskoning, 2011). Within Studland Bay MCZ many species can be found within the seagrass and surrounding areas of subtidal sand, such as undulate ray (*Raja undulata)*, pipefish, wrasses and juvenile species of commercially important fish (Seasearch Dorset, 2014).

2.4 Seagrass beds

Seagrass beds are primarily found within the south and southwest corners of Studland Bay to approximately 4m depth and have been shown to have an important role in sequestering atmospheric carbon (Jackson et al., 2013b; (Environment Agency, 2018; Green et al., 2018). The seagrass beds support a high diversity of fish, including pipefish, wrasses and undulate ray (*Raja undulata)*, and provide a

nursery area for commercially important fish and shellfish, such as black bream (*Spondyliosoma cantharus)*, pollack (*Pollachius pollachius)*, cuttlefish (*Sepia officinalis)*, sole (*Solea solea)* and plaice (*Pleuronectes platessa)*. Studland Bay is a known location for pregnant males for both indigenous species of seahorse (long-snouted and short-snouted seahorse) and all six species of pipefish have been recorded, including the rare Nilsson's pipefish (*Syngnathus rostellatus)* (Seasearch Dorset, 2014). The beds are also an important food source for overwintering wildfowl such as brent geese (*Branta bernicla*) (Jackson et al., 2013b).

2.5 Scope of this assessment

The geographic scope of this assessment covers the entire site and includes all designated features (Figure 1). The entire site falls within 6 nautical miles (nm).

This document assesses marine non-licensable activities only[2]. Marine non-licensable activities are those that do not require a marine licence under section 66 of the Marine and Coastal Access Act 2009[3]. These include shore based activities such as bait collection and beach recreation as well as water based activities such as sailing and motor boating. The Marine Management Organisation (MMO) is responsible for the management of marine non-licensable activities which take place within its jurisdiction (0-12nm). However there are many foreshore activities, which already fall within the remit of existing Regulators. The MMO does not propose adding further layers of management unnecessarily and as such considers the following activities outside of scope due to existing regulatory presence:

- Walking (including dog walking)
- Motorised and non-motorised land craft
- General beach recreation
- Wildlife watching from the land
- Coasteering
- Bait collection

Under section 66 of Marine and Coastal Access Act 2009[3], moorings may require a marine licence as they are 'deposits on the seabed'. This means moorings are a licensable activity. The MMO has decided to include mooring in this assessment due to the potential risks of this activity to achieving the conservation objectives of the site. Any management put in place for mooring would work alongside the marine licensing process.

[2] Those activities requiring a marine licence e.g. moorings, are assessed via MMO marine licensing.
[3] www.legislation.gov.uk/ukpga/2009/23/section/66

Figure 1: Studland Bay MCZ designated features.

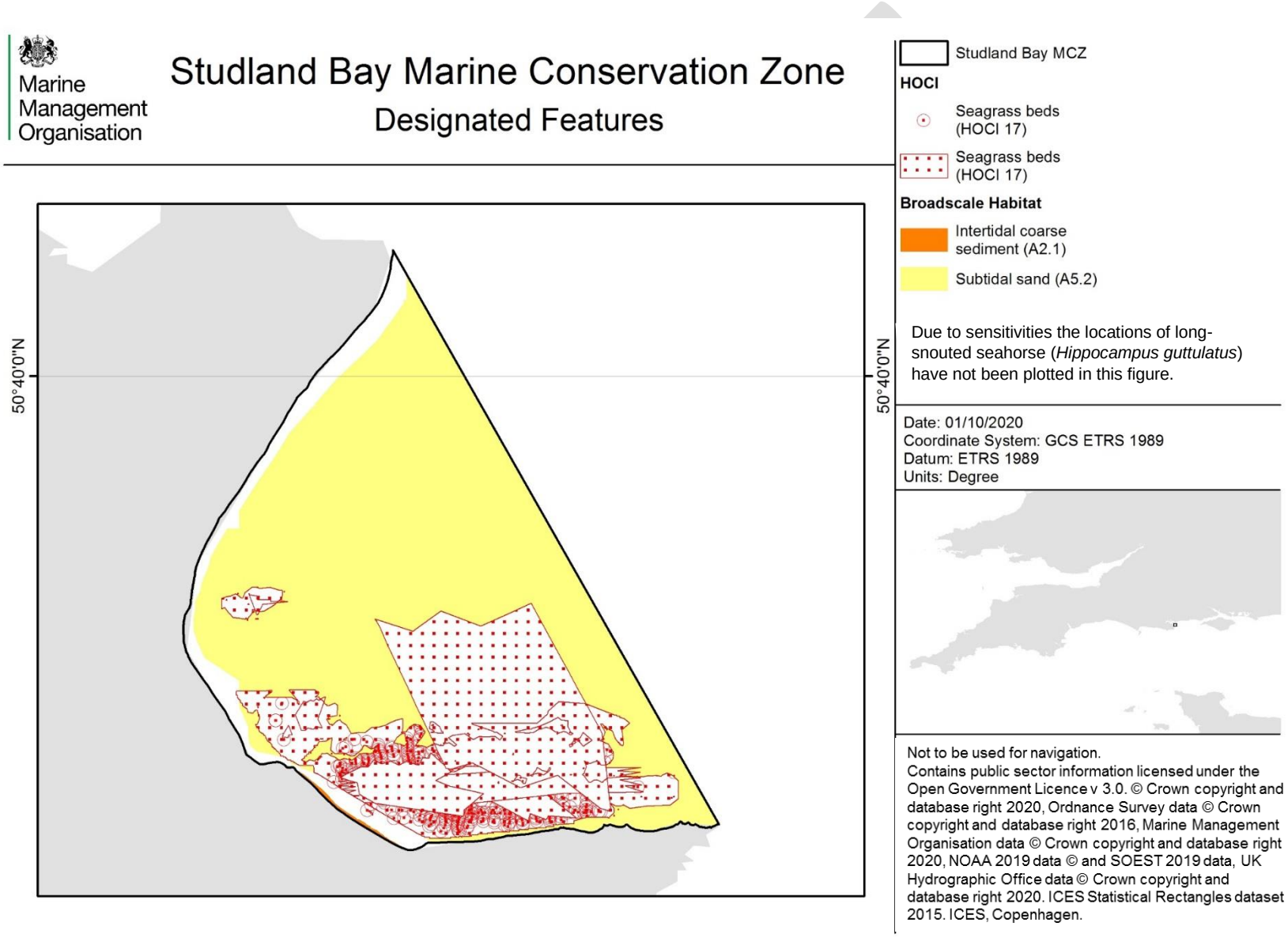
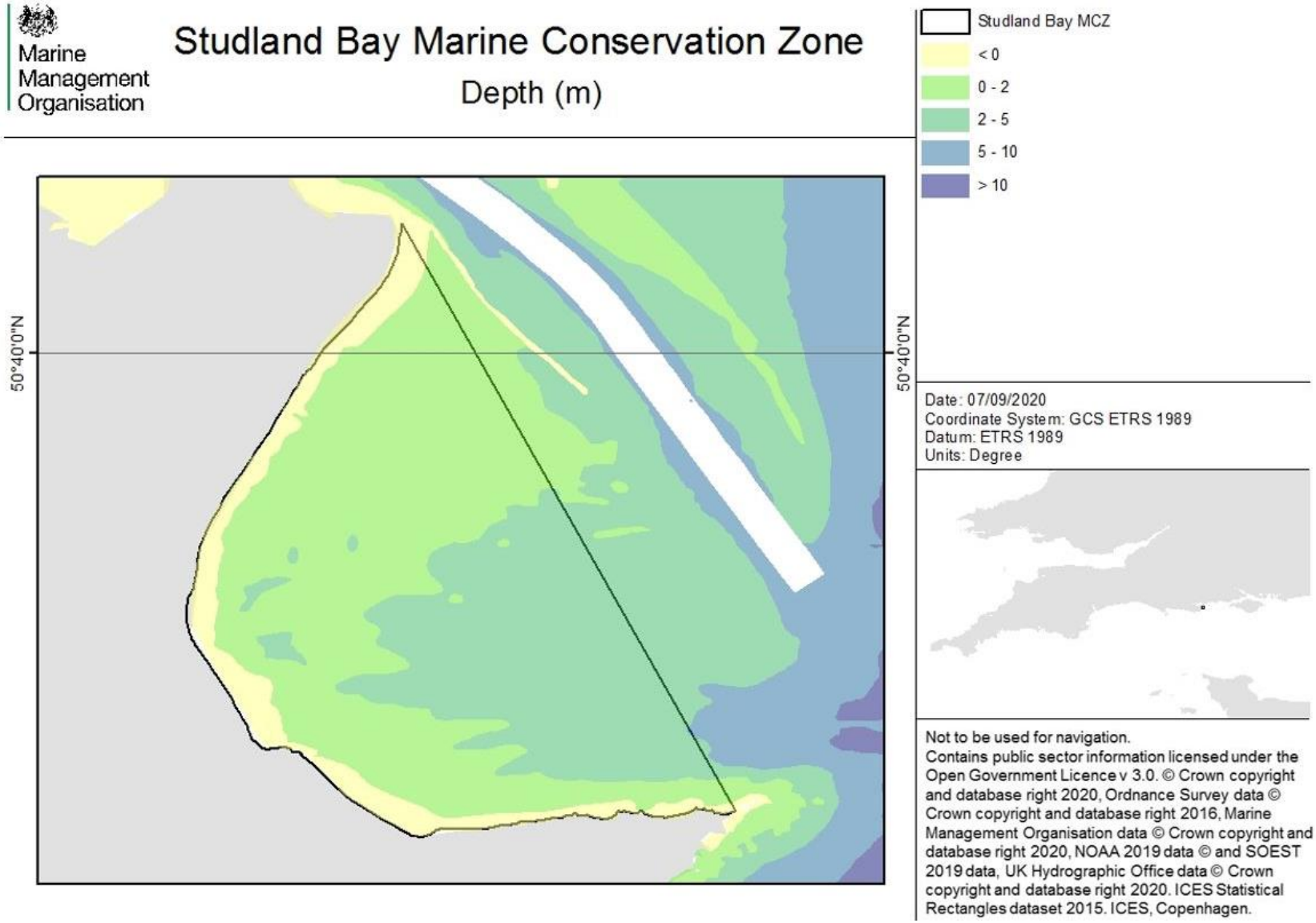


Figure 2: A map displaying the depth values in meters for Studland Bay MCZ. Source – UK Hydrographic Office (UKHO).



3. Part A Assessment

Table 4 shows the Natural England conservation advice package used to inform this assessment. Please note, this conservation advice is draft and so may be subject to change. Once this advice is published as formal advice it becomes Natural England's statutory advice and replaces the draft advice. In the interim, the draft advice has been used as a basis for informing this assessment as it reflects the most up-to-date evidence held by Natural England.

Table 4: Advice packages used for assessment

Feature	Package	Link
Intertidal coarse sediment Long-snouted seahorse (*Hippocampus guttulatus*) Seagrass beds Subtidal sand	Natural England Conservation Advice for Marine Protected Areas Studland Bay MCZ - UKMCZ0072	https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UKMCZ0072&SiteName=studland&SiteNameDisplay=Studland%20BayMCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=&HasCA=1

Part A of this assessment was carried out in a manner that is consistent with the 'capable of affecting (other than insignificantly)' test required by section 126(1)(b) of the Marine and Coastal Access Act 2009[4].

For each activity, a series of questions were asked:

1. Does the activity take place, or is it likely to take place in the future?
2. What are the potential pressures exerted by the activity on the feature?
3. Are the pressures capable of affecting (other than insignificantly) the protected features of the MCZ?

For each activity assessed in Part A, there were two possible outcomes for each identified pressure-feature interaction:

1. The pressure-feature interactions were not included for assessment in Part B if:
    a. the feature is not exposed to the pressure, and is not likely to be in the future; or
    b. the pressures are not capable of affecting (other than insignificantly) the protected features of the MCZ.

[4] www.legislation.gov.uk/ukpga/2009/23/section/126

2. The pressure-feature interactions were included for assessment in Part B if:
    a. the feature is exposed to the pressure, or is likely to be in the future; and
    b. the pressure is capable of affecting (other than insignificantly) the feature; or
    c. it is not possible to determine whether the pressure is capable of affecting (other than insignificantly) the feature.

Consideration of exposure to or effect of a pressure on a protected feature of the MCZ includes consideration of exposure to or effect of that pressure on any ecological or geomorphological process on which the conservation of the protected feature is wholly or in part dependent.

3.1 Activities included in the assessment

Advice from MMO coastal officers indicates that, in addition to activities excluded from the scope of this assessment as described in section 2.5, there are no additional water-based activities to be excluded from this assessment as they do not take place.

Activities covered by this assessment include:

- Powerboating or sailing with an engine: mooring and/or anchoring
- Sailing without an engine: mooring and/or anchoring
- Powerboating or sailing with an engine: launching and recovery, participation
- Sailing without an engine: launching and recovery, participation
- Non-motorised watercraft (e.g. kayaks, windsurfing, dinghies)
- Recreational diving and snorkelling

3.2 Potential pressures exerted by the activities on the feature

For the remaining activities, potential pressures were identified using the advice on operations section of the Natural England Conservation advice. Table 5 shows the potential pressures identified for each activity.

Table 5: Potential pressures for identified recreational activities on the features of the site

Activity	Feature	Potential pressures
Powerboating or sailing with an engine: mooring and/or anchoring **and** Sailing without an	Intertidal coarse sediment	Abrasion/disturbance of the substrate on the surface of the seabed
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion
		Physical change (to another sediment type)
		Hydrocarbon & PAH contamination[5]
		Litter

[5] Pressure only relevant to powerboating or sailing with an engine.

engine: mooring and/or anchoring		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)
		Transition elements & organo-metal (e.g. TBT) contamination
		Organic enrichment
	Seagrass beds **and** Subtidal sand	Abrasion/disturbance of the substrate on the surface of the seabed
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion
		Physical change (to another sediment type)
		Hydrocarbon & PAH contamination[5]
		Introduction of light
		Introduction or spread of invasive non-indigenous species (INIS)
		Litter
		Organic enrichment
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)
		Transition elements & organo-metal (e.g. TBT) contamination
	Subtidal sand	Visual disturbance
	Long-snouted seahorse	Abrasion/disturbance of the substrate on the surface of the seabed
		Hydrocarbon & PAH contamination[5]
		Introduction or spread of invasive non-indigenous species (INIS)
		Litter
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)
		Transition elements & organo-metal (e.g. TBT) contamination
		Underwater noise changes
		Visual disturbance
Powerboating or sailing with an engine: launching and recovery, participation **and**	Intertidal coarse sediment	Abrasion/disturbance of the substrate on the surface of the seabed
		Hydrocarbon & PAH contamination[5]
		Litter
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion

Sailing without an engine: launching and recovery, participation		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)
		Transition elements & organo-metal (e.g. TBT) contamination
	Seagrass beds **and** Subtidal sand	Abrasion/disturbance of the substrate on the surface of the seabed
		Introduction of light
		Introduction or spread of invasive non-indigenous species (INIS)
		Litter
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)
		Transition elements & organo-metal (e.g. TBT) contamination
	Subtidal sand	Visual disturbance
		Underwater noise changes[5]
	Long-snouted seahorse	Abrasion/disturbance of the substrate on the surface of the seabed
		Collision BELOW water with static or moving objects not naturally found in the marine environment
		Hydrocarbon & PAH contamination[5]
		Introduction or spread of invasive non-indigenous species (INIS)
		Litter
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)
		Transition elements & organo-metal (e.g. TBT) contamination
		Underwater noise changes[5]
		Visual disturbance
Non-motorised watercraft (e.g. kayaks, windsurfing, dinghies)	Intertidal coarse sediment **and** Seagrass beds	Abrasion/disturbance of the substrate on the surface of the seabed
		Litter
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion
	Seagrass beds	Introduction or spread of invasive non-indigenous species (INIS)
		Abrasion/disturbance of the substrate on the surface of the seabed

Recreational diving and snorkelling [6]	Intertidal coarse sediment **and** Seagrass beds **and** Subtidal sand **and** Long-snouted seahorse	Hydrocarbon & PAH contamination
		Litter
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)
		Transition elements & organo-metal (e.g. TBT) contamination
	Seagrass beds **and** Subtidal sand **and** Long-snouted seahorse	Introduction or spread of invasive non-indigenous species (INIS)
	Intertidal coarse sediment **and** Seagrass beds **and** Subtidal sand	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion
	Seagrass beds **and** Subtidal sand	Introduction of light
	Subtidal sand **and** Long-snouted seahorse	Underwater noise changes
		Visual disturbance
	Long-snouted seahorse	Collision BELOW water with static or moving objects not naturally found in the marine environment

[6] Recreational diving and snorkelling is not a category in Natural England Conservation Advice, 'Diving' as a form of fishing has been used to assess pressures alongside Natural England advice. Pressures determined to be relevant to fishing whilst diving have been removed (e.g. removal of target species).

3.3 Significance of effects/impacts

To determine whether each potential effect or impact is capable of affecting (other than insignificantly) the site's feature(s), the sensitivity assessments and risk profiling of pressures from the advice on operations section of the Natural England conservation advice were used.

Table 6 to Table 9 identify the pressures from particular activities which are capable of affecting (other than insignificantly) each feature. Where a pressure from a particular activity is identified as not likely to have a significant effect, justification is provided. Features with similar sensitivities have been considered together.

To ensure the effects of recreational activities in-combination with other activities (including other recreational activities) are fully assessed, the pressures from activities which are not capable of affecting (other than insignificantly) but which do interact with the feature are included in the in-combination assessment (Part C).

Table 6: Summary of pressures from specific activities taken to Part B for intertidal coarse sediment.

Potential pressures	Powerboating or sailing with an engine: mooring and/or anchoring **and** Sailing without an engine: mooring and/or anchoring	Powerboating or sailing with an engine: launching and recovery, participation **and** Sailing without an engine: launching and recovery, participation	Non-motorised water craft (e.g. kayaks, windsurfing, dinghies)	Recreational diving and snorkelling
Physical change (to another sediment type)	Capable of affecting (other than insignificantly) - feature has high sensitivity to this pressure from this activity.	N/A	N/A	N/A
Abrasion/disturbance of the substrate on the surface of the seabed	Not capable of affecting (other than insignificantly) – this feature is not sensitive to this pressure. Too shallow for mooring and anchoring in area feature is located.	Not capable of affecting (other than insignificantly) – this feature is not sensitive to this pressure from this activity		
Hydrocarbon & PAH contamination	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – pressure does not occur at a level of concern.		N/A	Not capable of affecting (other than insignificantly) – pressure does not occur at a level of concern.
Litter	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – MARPOL Annex V generally prohibits the discharge of all litter into the sea. Unless expressly provided otherwise, Annex V applies to all ships including recreational boats. There are substantial penalties for offenders dumping refuse at			

	sea and there are rules for ports and terminal operators to provide adequate disposal facilities ashore. Pressure from these activities are unlikely to be at a high enough level to be significant and other activities such as general beach recreation are likely to cause higher levels of litter.		
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.	N/A	Not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.
Transition elements & organo-metal (e.g. TBT) contamination	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.	N/A	Not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Not capable of affecting (other than insignificantly) – this feature is not sensitive to this pressure from this activity		

Table 7: Summary of pressures from specific activities taken to Part B for seagrass beds.

Potential pressures	Powerboating or sailing with an engine: mooring and/or anchoring **and** Sailing without an engine: mooring and/or anchoring	Powerboating or sailing with an engine: launching and recovery, participation **and** Sailing without an engine: launching and recovery, participation	Non-motorised water craft (e.g. kayaks, windsurfing, dinghies)	Recreational diving and snorkelling
Abrasion/disturbance of the substrate on the surface of the seabed	Capable of affecting (other than insignificantly) - feature has medium sensitivity to this pressure from this activity.	Capable of affecting (other than insignificantly) – for powerboating or sailing with an engine there is potential for abrasion of the seagrass during participation due to propellers and propeller wash.	Not capable of affecting (other than insignificantly) – These activities will mainly occur on the surface of the water or in the water column. Water crafts will be underway prior to reaching feature. Therefore this pressure does not occur at a level of concern from these activities.	Not capable of affecting (other than insignificantly) – Abrasion/disturbance is likely to be minimal due to diving and snorkelling and therefore this pressure does not occur at a level of concern from these activities.
Penetration and/or disturbance of the substratum below the surface of the seabed,	Capable of affecting (other than insignificantly) - feature has high sensitivity to this pressure from this activity.	Not capable of affecting (other than insignificantly) – Boating and non-motorised water craft activities will mainly occur on the surface of the water or in the water column. Water crafts will be underway prior to reaching feature. Diving and snorkelling is unlikely to cause penetration and or disturbance of the substratum below the surface of the seabed. Therefore this pressure does not occur at a level of concern from these activities.		

including abrasion				
Physical change (to another sediment type)	Capable of affecting (other than insignificantly) - feature has high sensitivity to this pressure from this activity.	N/A	N/A	N/A
Hydrocarbon & PAH contamination	Not capable of affecting (other than insignificantly) – Accidental discharge of oil and fuel and potential overboard discharge of oil-contaminated bilge water from recreational boats may negatively impact the feature. However, boat owners can take simple measures such as those outlined in the Green Blue[7] to minimise accidental releases by carefully refuelling and maintaining their engines so they operate efficiently[8]. Although there may be periods of high boating activity within the MCZ, boats are unlikely to be re-fuelling or conducting maintenance operations due to the lack of facilities available, and with voluntary measures in place to minimise accidental releases of fuel and oil, it is considered that this pressure does not occur at a level of concern.		N/A	Not capable of affecting (other than insignificantly) – pressure does not occur at a level of concern.
Introduction of light	Not capable of affecting (other than insignificantly) - This refers to direct inputs of light from anthropogenic activities. As these activities are unlikely to produce		N/A	Not capable of affecting (other than insignificantly) –

[7] https://thegreenblue.org.uk/you-your-boat/info-advice/water-pollution-prevention/oil-fuel/
[8] www.rya.org.uk/knowledge-advice/environmental-advice/Pages/oil-and-fuel.aspx

	continuous and long-lasting inputs of light, it is most likely to be minimal and therefore not significant.		pressure does not occur at a level of concern.
Introduction or spread of invasive non-indigenous species (INIS)	Not capable of affecting (other than insignificantly) - hull fouling has been identified as a potential pathway of introduction of non-native species. In Studland Bay several invasive non-indigenous species (INIS) are present in the subtidal sediments, most likely spread due to hull fouling. These species include wireweed *Sargassum muticum*, leathery sea squirt *Styela clava*, San Diego sea squirt *Botrylloides diegensis* and slipper limpet *Crepidula fornicate* (Environment Agency, 2018; Seasearch Dorset, 2015). Prevention of introductions and spread of INIS is the most economic management strategy (Leung et al., 2002; Lodge et al., 2006). Therefore voluntary measures and legislation have been implemented to reduce the risk of INIS. For example, since 2011 the government has been running the *Check Clean Dry* (CCD) public awareness campaign aimed at improving biosecurity amongst water users[9]. An EU Regulation on Invasive Alien Species came into force in 2015, which sought to address the problem of Invasive Alien Species across Europe through prevention, early warning, rapid response and management[10]. A European Code of	Not capable of affecting (other than insignificantly) – pressure does not occur at a level of concern	

[9] www.gov.uk/government/news/stop-the-spread-for-invasive-species-week
[10] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014R1143

	Conduct on Recreational Boating[11] was also developed in 2016 under the Bern Convention. Under domestic legislation, the Wildlife and Countryside Act (1981) (as amended) provides a general prohibition on the release or allowing the escape of most non-native species of animal and many plants in England[12]. Although there may be periods of high boating activity within the MCZ, through voluntary measures and legislation, the risk of introduction and spread of INNS through recreational boating is likely to minimal and not at a level of concern for this pressure.			
Litter	Not capable of affecting (other than insignificantly) – MARPOL Annex V generally prohibits the discharge of all litter into the sea[13]. Unless expressly provided otherwise, Annex V applies to all ships including recreational boats. There are substantial penalties for offenders dumping refuse at sea and there are rules for ports and terminal operators to provide adequate disposal facilities ashore[14]. Pressure from these activities are unlikely to be at a high enough level to be significant and other activities such as general beach recreation are likely to cause higher levels of litter.			
Organic enrichment	Not capable of affecting (other than insignificantly) – Toilet systems from craft discharging directly to the water may lead to localised pollution. The effect of raw and treated sewage discharge from	N/A	N/A	N/A

[11] https://rm.coe.int/1680746815
[12] www.legislation.gov.uk/ukpga/1981/69/section/14
[13] www.imo.org/en/OurWork/Environment/PollutionPrevention/Garbage/Pages/Default.aspx
[14] www.rya.org.uk/knowledge-advice/environmental-advice/Pages/waste-management.aspx

	boats in fast flushing coastal areas is negligible. In this area it is likely to be localised only and not at significant levels.			
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.		N/A	Not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.
Transition elements & organo-metal (e.g. TBT) contamination	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.		N/A	Not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.

Table 8: Summary of pressures from specific activities taken to Part B for subtidal sand.

Potential pressures	Powerboating or sailing with an engine: mooring and/or anchoring **and** Sailing without an engine: mooring and/or anchoring	Powerboating or sailing with an engine: launching and recovery, participation **and** Sailing without an engine: launching and recovery, participation	Recreational diving and snorkelling
Abrasion/disturbance of the substrate on the surface of the seabed	Capable of affecting (other than insignificantly) - feature has medium sensitivity to this pressure from this activity.	Not capable of affecting (other than insignificantly) – These activities will mainly occur on the surface of the water or in the water column. Therefore this pressure does not occur at a level of concern from these activities.	
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Capable of affecting (other than insignificantly) - feature has high sensitivity to this pressure from this activity.	Not capable of affecting (other than insignificantly) – this pressure does not occur at a level of concern from this activity.	
Physical change (to another sediment type)	Capable of affecting (other than insignificantly) - feature has high sensitivity to this pressure from this activity.	N/A	N/A
Hydrocarbon & PAH contamination	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – Accidental discharge of oil and fuel and potential overboard discharge of oil-contaminated bilge water from recreational boats may negatively impact the feature. However, boat owners can take simple measures such as those outlined in the Green Blue[7] to minimise accidental		Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – pressure does not occur at a level of concern.

	releases by carefully refuelling and maintaining their engines so they operate efficiently[8]. Although there may be periods of high boating activity within the MCZ, boats are unlikely to be re-fuelling or conducting maintenance operations due to the lack of facilities available, and with voluntary measures in place to minimise accidental releases of fuel and oil, it is considered that this pressure does not occur at a level of concern.	
Introduction of light	Not capable of affecting (other than insignificantly) – As these activities are unlikely to produce continuous and long-lasting inputs of light, it is most likely to be minimal and therefore not significant.	
Introduction or spread of invasive non-indigenous species (INIS)	Not capable of affecting (other than insignificantly) - hull fouling has been identified as a potential pathway of introduction of non-native species. In Studland Bay several invasive non-indigenous species (INIS) are present in the subtidal sediments, most likely spread due to hull fouling. These species include wireweed *Sargassum muticum*, leathery sea squirt *Styela clava*, San Diego sea squirt *Botrylloides diegensis* and slipper limpet *Crepidula fornicate* (Environment Agency, 2018; Seasearch Dorset, 2015). Prevention of introductions and spread of INIS is the most economic management strategy (Leung et al., 2002; Lodge et al., 2006). Therefore voluntary measures and legislation have been implemented to reduce the risk of INIS. For example, since 2011 the government has been running the *Check Clean Dry* (CCD) public awareness campaign aimed at improving biosecurity amongst water users[9]. An EU Regulation on Invasive Alien Species came into force in 2015, which sought to address the problem of Invasive Alien Species across Europe through prevention, early warning, rapid response and management[10]. A European Code of Conduct on Recreational Boating[11] was also developed in 2016 under the Bern Convention. Under domestic legislation, the Wildlife and Countryside Act (1981) (as amended) provides a general	Not capable of affecting (other than insignificantly) – pressure does not occur at a level of concern.

	prohibition on the release or allowing the escape of most non-native species of animal and many plants in England[12]. Although there may be periods of high boating activity within the MCZ, through voluntary measures and legislation, the risk of introduction and spread of INNS through recreational boating is likely to minimal and not at a level of concern for this pressure.		
Litter	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – MARPOL Annex V generally prohibits the discharge of all litter into the sea[13]. Unless expressly provided otherwise, Annex V applies to all ships including recreational boats. There are substantial penalties for offenders dumping refuse at sea and there are rules for ports and terminal operators to provide adequate disposal facilities ashore[14]. Pressure from these activities are unlikely to be at a high enough level to be significant and other activities such as general beach recreation are likely to cause higher levels of litter.		
Organic enrichment	Not capable of affecting (other than insignificantly) – Toilet systems from craft discharging directly to the water may lead to localised pollution. The effect of raw and treated sewage discharge from boats in fast flushing coastal areas is negligible. In this area it is likely to be localised only and not at significant levels.	N/A	N/A
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.		

Transition elements & organo-metal (e.g. TBT) contamination	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.	
Visual disturbance	Not capable of affecting (other than insignificantly) – this feature is not sensitive to this pressure.	
Underwater noise changes	N/A	Not capable of affecting (other than insignificantly) – this feature is not sensitive to this pressure.

Table 9 : Summary of pressures from specific activities taken to Part B for long-snouted seahorse.

Potential pressures	Powerboating or sailing with an engine: mooring and/or anchoring **and** Sailing without an engine: mooring and/or anchoring	Powerboating or sailing with an engine: launching and recovery, participation **and** Sailing without an engine: launching and recovery, participation	Recreational diving and snorkelling
Abrasion/disturbance of the substrate on the surface of the seabed	Insufficient evidence to assess – required to be taken to further assessment.	Not capable of affecting (other than insignificantly) – this pressure does not occur at a level of concern from this activity.	
Hydrocarbon & PAH contamination	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – Accidental discharge of oil and fuel and potential overboard discharge of oil-contaminated bilge water from recreational boats may negatively impact the feature. However, boat owners can take simple measures such as those outlined in the Green Blue[7] to minimise accidental releases by carefully refuelling and maintaining their engines so they operate efficiently[8]. Although there may be periods of high boating activity within the MCZ, boats are unlikely to be re-fuelling or conducting maintenance operations		Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – pressure does not occur at a level of concern.

	due to the lack of facilities available, and with voluntary measures in place to minimise accidental releases of fuel and oil, it is considered that this pressure does not occur at a level of concern.	
Introduction or spread of invasive non-indigenous species (INIS)	Not capable of affecting (other than insignificantly) - hull fouling has been identified as a potential pathway of introduction of non-native species. In Studland Bay several invasive non-indigenous species (INIS) are present in the subtidal sediments, most likely spread due to hull fouling. These species include wireweed *Sargassum muticum*, leathery sea squirt *Styela clava*, San Diego sea squirt *Botrylloides diegensis* and slipper limpet *Crepidula fornicate* (Environment Agency, 2018; Seasearch Dorset, 2015). Prevention of introductions and spread of INIS is the most economic management strategy (Leung et al., 2002; Lodge et al., 2006). Therefore voluntary measures and legislation have been implemented to reduce the risk of INIS. For example, since 2011 the government has been running the *Check Clean Dry* (CCD) public awareness campaign aimed at improving biosecurity amongst water users[9]. An EU Regulation on Invasive Alien Species came into force in 2015, which sought to address the problem of Invasive Alien Species across Europe through prevention, early warning, rapid response and management[10]. A European Code of Conduct on Recreational Boating[11] was also developed in 2016 under the Bern Convention. Under domestic legislation, the Wildlife and Countryside Act (1981) (as amended) provides a general prohibition on the release or allowing the escape of most non-native species of animal and many plants in England[12]. Although there may be periods of high boating activity within the MCZ, through voluntary measures and legislation, the risk of introduction and	Insufficient Evidence to assess in Advice on Operations, deemed not capable of affecting (other than insignificantly) – pressure does not occur at a level of concern.

	spread of INNS through recreational boating is likely to minimal and not at a level of concern for this pressure.		
Litter	Insufficient Evidence to assess in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – MARPOL Annex V generally prohibits the discharge of all litter into the sea[13]. Unless expressly provided otherwise, Annex V applies to all ships including recreational boats. There are substantial penalties for offenders dumping refuse at sea and there are rules for ports and terminal operators to provide adequate disposal facilities ashore[14]. Pressure from these activities are unlikely to be at a high enough level to be significant and other activities such as general beach recreation are likely to cause higher levels of litter.		
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.		
Transition elements & organo-metal (e.g. TBT) contamination	Not assessed in Advice on Operations. Deemed not capable of affecting (other than insignificantly) – likely to be localised only and not at significant levels.		
Collision BELOW water with static or moving objects not naturally found in the marine environment	N/A	Insufficient Evidence to assess in Advice on Operations, deemed not capable of affecting (other than insignificantly) – this pressure does not occur at a level of concern from this activity.	
Underwater noise changes	Capable of affecting (other than insignificantly) – feature has high sensitivity to this pressure from this activity. (Relevant to vessels with engines only).		Not capable of affecting (other than insignificantly) – noise associated with SCUBA gear is likely to be minimal and highly localised. This

		pressure does not occur at a level of concern from this activity.
Visual disturbance	Capable of affecting (other than insignificantly) – feature has high sensitivity to this pressure from this activity.	

4. Part B Assessment

Part B of this assessment was carried out in a manner that is consistent with the significant risk test required by Section 126(2) of the Marine and Coastal Access Act 2009[4].

Table 10 shows the activities and pressures included for assessment in Part B. Pressures with similar potential impacts to a particular feature were grouped to save repetition during this assessment.

Relevant targets for favourable condition for each feature were identified or inferred from Natural England supplementary advice on conservation objectives. Important targets are highlighted in Table 11. 'Important' in this context means only those targets relating to attributes that will most efficiently and directly help to define condition. These attributes should be clearly capable of identifying a change in condition. The impacts of pressures on features were then assessed against these targets to determine whether the activities causing the pressures are compatible with the sites conservation objectives.

Table 10: Activities and pressures included for Part B assessment

Natural England Aggregated Method	**Feature**	**Pressures**
Powerboating or sailing with an engine: mooring and/or anchoring **and** Sailing without an engine: mooring and/or anchoring	Intertidal coarse sediment	Physical change (to another sediment type)
	Seagrass beds **and** Subtidal sand	Abrasion/disturbance of the substrate on the surface of the seabed
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion
		Physical change (to another sediment type)
	Long-snouted seahorse	Abrasion/disturbance of the substrate on the surface of the seabed
		Visual disturbance
		Underwater noise changes
Powerboating or sailing with an engine (launching, recovery and participation) **and**	Long-snouted seahorse	Underwater noise changes
		Visual disturbance
		Abrasion/disturbance of the substrate on the surface of the seabed

Sailing without an engine: launching and recovery, participation		
Recreational diving and snorkelling	Long-snouted seahorse	Visual disturbance

Table 11: Relevant favourable condition targets for identified pressures to intertidal coarse sediment, subtidal sand, seagrass beds and long-snouted seahorse. Red = targets that have been identified as important.

Feature	Attribute	Targets	Relevance/justification for Part B conclusion
Intertidal coarse sediment Subtidal sand Seagrass beds	Distribution: presence and spatial distribution of biological communities	• Maintain the presence and spatial distribution of intertidal coarse sediment, subtidal sand and seagrass bed communities.	Relevant to all pressures except visual disturbance and underwater noise changes
	Structure: species composition of component communities	• Maintain the species composition of component communities for subtidal sand and intertidal coarse sediment. • Recover the species composition of component communities for seagrass beds	
	Structure and function: presence and abundance of key structural and influential species	• Maintain the abundance of listed species[15], to enable each of them to be a viable component of the subtidal sand and intertidal coarse sediment features.	
		• Recover the abundance of listed species[15], to enable each of them to be a viable component of the seagrass feature.	
	Extent and distribution	• Recover the total extent and spatial distribution of seagrass beds.	
		• Maintain the total extent and spatial distribution of intertidal coarse sediment and subtidal sand.	Relevant to all pressures except visual disturbance and

[15] Listed species described in Marine Ecological Surveys Ltd. - November 2013 Report No. NESBMCZ1113

	Structure: sediment composition and distribution	• Maintain the distribution of sediment composition types across the feature/sub feature.	underwater noise changes
Seagrass beds	Extent of supporting habitat	• Maintain the area of habitat that is likely to support the sub feature.	Relevant to all pressures except visual disturbance and underwater noise changes
	Structure: biomass	• Recover the leaf / shoot density, length, percentage cover, and rhizome mat across the feature at natural levels (as far as possible), to ensure a healthy, resilient habitat.	
	Structure: rhizome structure and reproduction	• Recover the extent and structure of the rhizome mats across the site, and conditions to allow for regeneration of seagrass beds.	
	Supporting processes: morphology	• Maintain the natural physical form and coastal processes that shape the seagrass bed.	Relevant to all pressures except visual disturbance and underwater noise changes
	Supporting processes: sedimentation rate	• Maintain the natural rate of sediment deposition.	
Long-snouted seahorse	Population: population size	• Recover the population size within the site.	Relevant to all pressures
	Population: recruitment and reproductive capability	• Maintain the reproductive and recruitment capability of the species.	
	Presence and spatial distribution of the species	• Maintain the presence and spatial distribution of the species and their ability to undertake key life cycle stages and behaviours.	
	Structure and function: biological connectivity	• Recover connectivity of the habitat within sites and the wider environment to ensure larval dispersal and recruitment, and / or to allow movement of migratory species.	Relevant to all pressures except visual disturbance and underwater noise changes
	Supporting habitat:	• Recover the extent and spatial distribution of the following supporting habitats: seagrass.	

	extent and distribution		
Intertidal coarse sediment	Structure: sediment total organic carbon content	Maintain the total organic carbon (TOC) content in the sediment at existing levels	Anchoring/mooring activities do not occur over the intertidal coarse sediment feature.
	Structure: topography	Maintain the presence of topographic features, while allowing for natural responses to hydrodynamic regime, by preventing erosion or deposition through human-induced activity.	
Intertidal coarse sediment Subtidal sand Seagrass beds	Supporting processes: energy / exposure	Maintain the natural physical energy resulting from waves, tides and other water flows, so that the exposure does not cause alteration to the biotopes and stability, across the habitat.	Pressures will not alter natural physical energy.
	Supporting processes: sediment contaminants	Restrict surface sediment contaminants (<1cm from the surface) to below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL)	Pressures will not significantly introduce contaminants.
Seagrass beds	Supporting processes: light levels	Maintain the natural light availability to the seagrass bed.	Pressures will not significantly impact light levels.
All features	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Pressures will not significantly introduce non-native species and pathogens.
	Supporting processes: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the Water Framework Directive, avoiding deterioration from existing levels.	Pressures will not significantly introduce contaminants.

All features	Supporting processes: physico-chemical properties	Maintain the natural physico-chemical properties of the water.	Pressures will not alter physico-chemical properties of the water.
	Supporting processes: water quality - dissolved oxygen	Maintain the dissolved oxygen (DO) concentration at levels equating to High Ecological Status avoiding deterioration from existing levels.	Pressures will not cause excessive nutrients or high turbidity, factors which can impact dissolved oxygen levels.
	Supporting processes: water quality - nutrients	Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features [avoiding deterioration from existing levels].	Pressures will not cause high nutrient concentrations.
	Supporting processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Pressures will not cause a significant increase in turbidity.

4.1 Non-licensable activity evidence

4.1.1 Existing management

The National Trust is the landowner of Studland Bay and have established the following water management measures (Figure 3) which are detailed online:

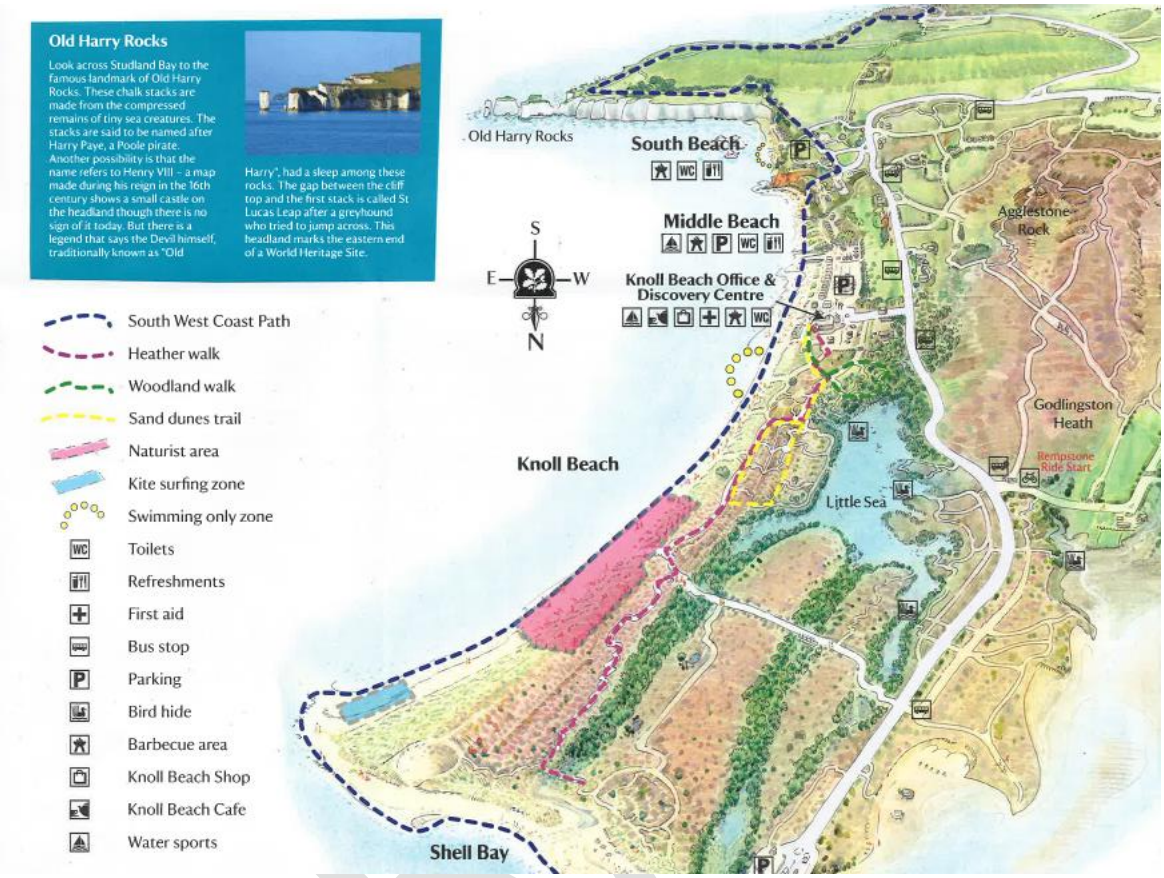
- Swimmers only zones at Knoll Beach and South Beach during the summer (no life guard service in place). These have been in place for approximately 18 years and are mainly used by families for swimming due to the shallow depths (National Trust, *pers comms).* 03058308 Knoll Beach and 03098208 South beach.
- Permit access kite surfing zone between Shell Bay and Knoll Beach[16].
- Jet ski and motorboats over 20hp are prohibited.

Dorset District Council (previously Purbeck District Council) have a byelaw which implements a 5 knot speed limit between 15th March and 30th September for pleasure boats. This is marked by yellow buoys during the summer. This byelaw has been made under section 76 of the Public Health Act 1961 for the prevention of danger, obstruction or annoyance to persons bathing in the sea or using the seashore. These management measures are not designed to achieve the

[16] National Trust kite surfing permit access: https://nt.global.ssl.fastly.net/studland-bay/documents/studland-kite-surfing-permit-2015.pdf

conservation objectives of the site and rather have been implemented due to health and safety concerns.

Figure 3: A map from the National Trust outlining the facilities and water management measures in Studland Bay



Long-snouted seahorses (*Hippocampus guttulatus*) are protected under the Wildlife and Countryside Act 1981 (as amended) for the offences listed below. A wildlife licence is required from the MMO for any activity which may disturb seahorses.

- Possess or keep
- Capture
- Intentionally or recklessly disturb
- Intentionally kill
- Intentionally injure
- Intentionally or recklessly damage or destroy place of shelter or protection of a seahorse

All species of seahorse are protected under the Convention for International Trade in Endangered Species (CITES).

The Royal Yachting Association (RYA) have produced a leaflet in collaboration with Natural England, Dorset Wildlife Trust, Hampshire & Isle of Wight Wildlife Trust and

the Boat Owners Response Group which provides guidance on anchoring with care in Studland Bay[17]. This includes best practice measures for boat users.

A Voluntary No-Anchoring Zone (VNAZ) was introduced in October 2009 to test for differences in seagrass health with and without anchoring activity (Axelsson et al., 2012). The VNAZ remained in place until 2013.

Southern IFCA has a network of areas closed to Bottom Towed Fishing Gear[18], some of which are relatively close to the site. These closed areas are likely to produce positive benefits to marine organisms and habitats (Southern IFCA, *pers comms)*.

4.1.2 Evidence Sources

- MPASum Inspections
- Automatic Identification System (AIS) data for recreational vessels
- Expert opinion provided by MMO coastal officers
- Permanent moorings data layer (Source - The Crown Estate)

Table 12 summarises the description, strengths and limitations of some of the evidence sources used. For more information about the evidence sources used, please see Annex 1. Little data is currently available with regards to recreational diving and snorkelling.

Table 12: Summary of generic confidence associated with recreational activity evidence

Evidence source	Confidence	Description, strengths and limitation
MPASum Inspections	High/ Moderate	MPASum inspections are carried out by MMO Marine Officers. This involves counting the occurrence of water-based activities within the site.
Automatic Identification System data	Low	AIS transmits information which is manually input and therefore is only as reliable as the operator. As not all vessels are required to have AIS this data is likely to be an underrepresentation of the activity within the site.
Expert opinion	Low / Moderate	Expert opinion provided by MMO coastal and IFCA officers. Confidence depends on the area, and the knowledge of the area from MMO and IFCA staff.
Permanent moorings data	Low/ Moderate	2016 GIS dataset from TCE indicating where areas of seabed have been leased for

[17] RYA Anchoring with care: www.rya.org.uk/SiteCollectionDocuments/legal/Web%20Documents/Environment/AnchoringWithCare_Studland.pdf

[18] www.southern-ifca.gov.uk/byelaws

layer (Source – TCE)		moorings. Moorings may have been removed since this dataset was produced.

4.1.3 Activity descriptions

4.1.3.1 Mooring and anchoring

Powerboating or sailing with an engine: mooring and/or anchoring

This activity refers to anchoring and/or mooring by powerboats or sailing boats with an engine. This is defined as the use of motorised vessels, including motorboats (powerboats) and yachts in marine waters (Natural England, 2017a).

Sailing without an engine: mooring and/or anchoring

This activity refers to anchoring and/or mooring by sailing boats without an engine. Sailing boats without an engine may include dinghies, day boats or other small keelboats which area usually taken out of water at end of use (Natural England, 2017b).

Mooring definition

Mooring includes recreational vessels with a mooring such as a conventional swing mooring, trot mooring or advanced mooring systems (AMS), more commonly known as ‘eco-mooring’. Swing moorings are the most widely used and consist of a buoy attached by chain to an anchoring point (block or anchor) (Griffiths et al., 2017). Trot moorings are deployed in rows of multiple, connected moorings (Griffiths et al., 2017). A large ground chain is laid along the seabed and anchored at each end, with multiple ‘riser’ chains with buoys attached at regular distances (Griffiths et al., 2017). Alternative “eco-friendly mooring” systems are available that avoid the placement of large mooring blocks on the seabed and chain abrasion through the use of alternate mooring systems (Griffiths et al., 2017). Fixing methods including swivel and screws and the use of floats or elastic lines to avoid chain abrasion (Griffiths et al., 2017).

Anchoring definition

Anchored recreational vessels are watercrafts with a device which secures a vessel to the seabed, temporarily, in order to prevent it drifting with the wind or current (Griffiths et al., 2017). Anchors are designed to dig into or hook onto the seabed. In order to create hold, the anchor is dropped and a length of chain is laid out on the seabed to hold it horizontally on the seabed (Griffiths et al., 2017). The anchor is ‘set’ (fixed in position) as some pulling force is exerted on the chain but not enough to drag it and break it free (Griffiths et al., 2017).

Activity levels

Due to its location, Studland Bay offers significant shelter from prevailing weather conditions which makes it a popular anchorage for all vessels (MMO Coastal Officer, *pers comms*). The area is also popular due to its pleasant beaches and scenery (MMO Coastal Officer, *pers comms*). A small percentage of vessels appear to moor

overnight and use tenders to access South Beach and visit local amenities within walking distance (MMO Coastal Officer, *pers comms*).

4.1.3.2 Powerboating or sailing with an engine: launching and recovery, participation

This activity is defined as the launching and recovery of motorised vessels or motorised vessels which are underway on the water. Motorised vessels include motorboats, powerboats and yachts which have an engine (Natural England, 2017a). This also includes watersports that are towed behind a motorised vessel, including wakeboarding, waterskiing and parascending (Natural England, 2017a). In general, these activities take place in coastal, inshore and offshore waters where marina and berthing facilities or launch facilities are available (Natural England, 2017a). Most of motorised watercrafts is most concentrated around the South East and South coast, where there is the highest concentration of Royal Yachting Association (RYA) marinas and clubs (Natural England, 2017a). Powerboating and sailing take place all year round, although the intensity of these activities is generally higher in the summer (Natural England, 2017a).

Vessels visit Studland Bay from across the South coast, coming from places such as the Isle of Wight, Poole, Weymouth, Portland, Christchurch and other marinas along the coastline (MMO Coastal Officer, *pers comms*).

4.1.3.3 Sailing without an engine: launching and recovery, participation

This activity is defined as the launching and recovery of sailing boats or sailing boats which are underway on the water. This includes sailing boats which do not have an engine. This activity has the potential to be undertaken along much of the UK coast and is only constrained by the availability of suitable launching spots (e.g. public slipways) (Natural England, 2017d). While non-motorised watercraft activity is undertaken widely along the UK coast, popular areas in England include the South East, South and South West coasts (Natural England, 2017d).

As described in 4.1.3.2, vessels visit Studland Bay from across the South coast, coming from places such as the Isle of Wight, Poole, Weymouth, Portland, Christchurch and other marinas along the coastline (MMO Coastal Officer, *pers comms*).

4.1.3.4 Recreational diving and snorkelling

This activity is defined as swimming either underwater or on the surface, using Self Contained Underwater Breathing Apparatus (SCUBA) or snorkelling equipment (Natural England, 2017c). Recreational diving and snorkelling take place along sections of the coast that have suitable water clarity and interesting underwater features such as rocky reefs, wrecks and wildlife (Natural England, 2017c). In 2015, approximately 350,000 people were involved in SCUBA diving activity in the UK (Arkenford, 2015, cited in Natural England, 2017c). No statistics were available for snorkelling, but the activity is widely undertaken (Natural England, 2017c).

Recreational diving and snorkelling activity within Studland Bay MCZ is not thoroughly studied. Although it is renowned for its seahorse population, the seagrass offers a very diverse selection of sea life and this is appreciated by those who dive and snorkel in the area (MMO Coastal Officer, *pers comms*). It is also a shallow area which makes it perfect for secondary, recovery dives in a pleasant location for those who have been on deeper dives elsewhere and are returning to Poole following these activities (MMO Coastal Officer, *pers comms*). Recreational diving activity occurs from vessels and from divers entering the water from South Beach & Middle Beach (MMO Coastal Officer, *pers comms*). This happens at all states of the tide and throughout the day (MMO Coastal Officer, *pers comms*).

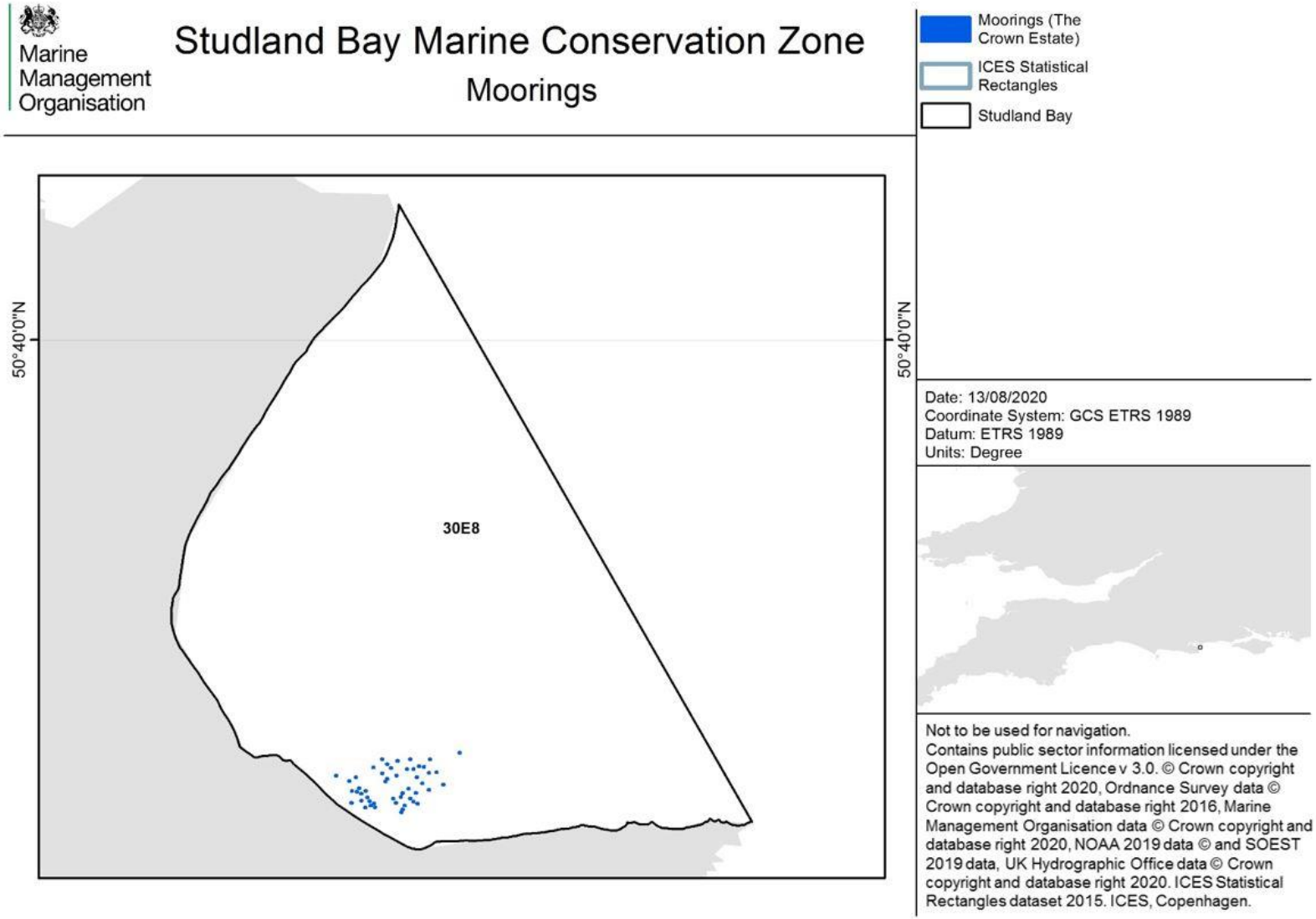
4.1.4 Permanent moorings data

Under the Marine and Coastal Access Act, 2009[19], the installation of moorings can be a licensable marine activity, although certain exemptions can apply[20].

Figure 4 displays GIS data from The Crown Estate (TCE) which indicates the boundary of mooring areas and shows that there are 50 fixed moorings within the MCZ (see Annex 1 for methodology). These moorings are located within the seagrass feature of the MCZ. These moorings are not licensed by The Crown Estate (TCE, *pers comms*) and it is thought that they pre-date the current marine licensing system (Griffiths et al., 2017). There are no MMO licenced moorings within Studland Bay MCZ.

[19] www.legislation.gov.uk/ukpga/2009/23/part/4
[20] www.legislation.gov.uk/uksi/2011/409/article/25

Figure 4: Map of Studland Bay MCZ indicating the boundary of mooring areas. Source – TCE (see Annex 1).



4.1.5 Automatic Identification System (AIS) Data

Figure 5 to Figure 7 show AIS track line data for recreational vessels between 2015 and 2017 in Studland Bay MCZ. These figures show that recreational vessel activity within the site is high. It also demonstrates that activity occurs over the seagrass feature. AIS track line data does not indicate where vessels are anchored or moored, however, evidence for this is included in further sections. Please see Annex 1 for details on AIS data sources.

Table 13 shows the number of AIS tracks from recreational vessels occurring within the site by month. This demonstrates that activity is highest in the summer months, from June to September.

Table 13: Count of AIS tracks from recreation vessels located within Studland Bay MCZ between 2015 and 2017.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	1	0	3	59	49	81	136	149	140	35	14	11
2016	0	4	5	44	91	117	149	164	96	40	15	5
2017	2	14	6	62	39	97	174	152	135	29	24	7

The south and south west sections of Studland Bay are known preferred locations for mooring and anchoring of recreational vessels (MMO Coastal Officer, *pers comms*). The sheltered conditions in the south and southwest corners that favour the growth of the seagrass feature also make an appealing area to stop. Therefore it can be assumed that stationary vessels indicated by AIS data are anchored or moored. Live AIS data was used to count the number of vessels that were stationary over the seagrass feature at different times between 11/07/20 and 26/07/20. The full dataset for is included in Annex 2.

This data shows that a high number of vessels end transit within Studland Bay MCZ. The majority of these records are situated over the seagrass feature in the site. AIS data indicates that during the time period studied, vessel numbers ending transit reach up to 28.

Figure 5: 2015 AIS Track data for recreational vessels in Studland Bay MCZ.

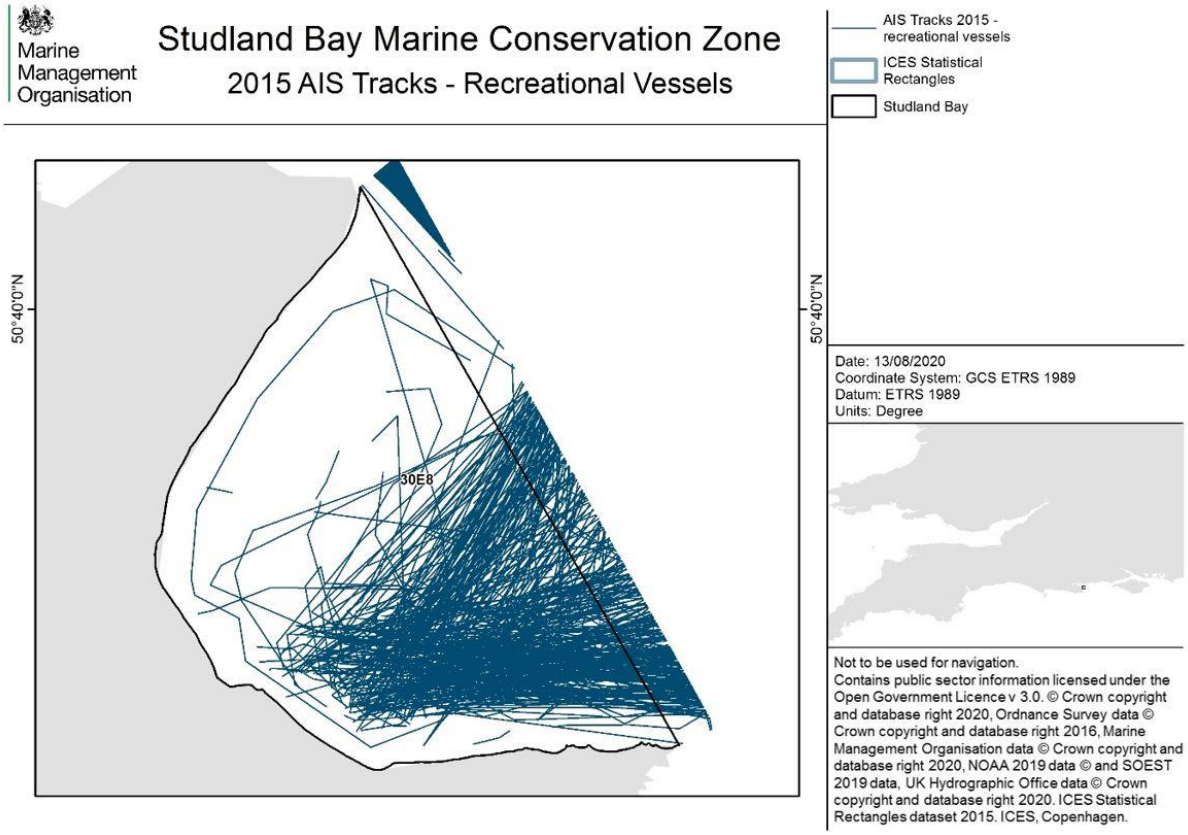


Figure 6: 2016 AIS Track data for recreational vessels in Studland Bay MCZ.

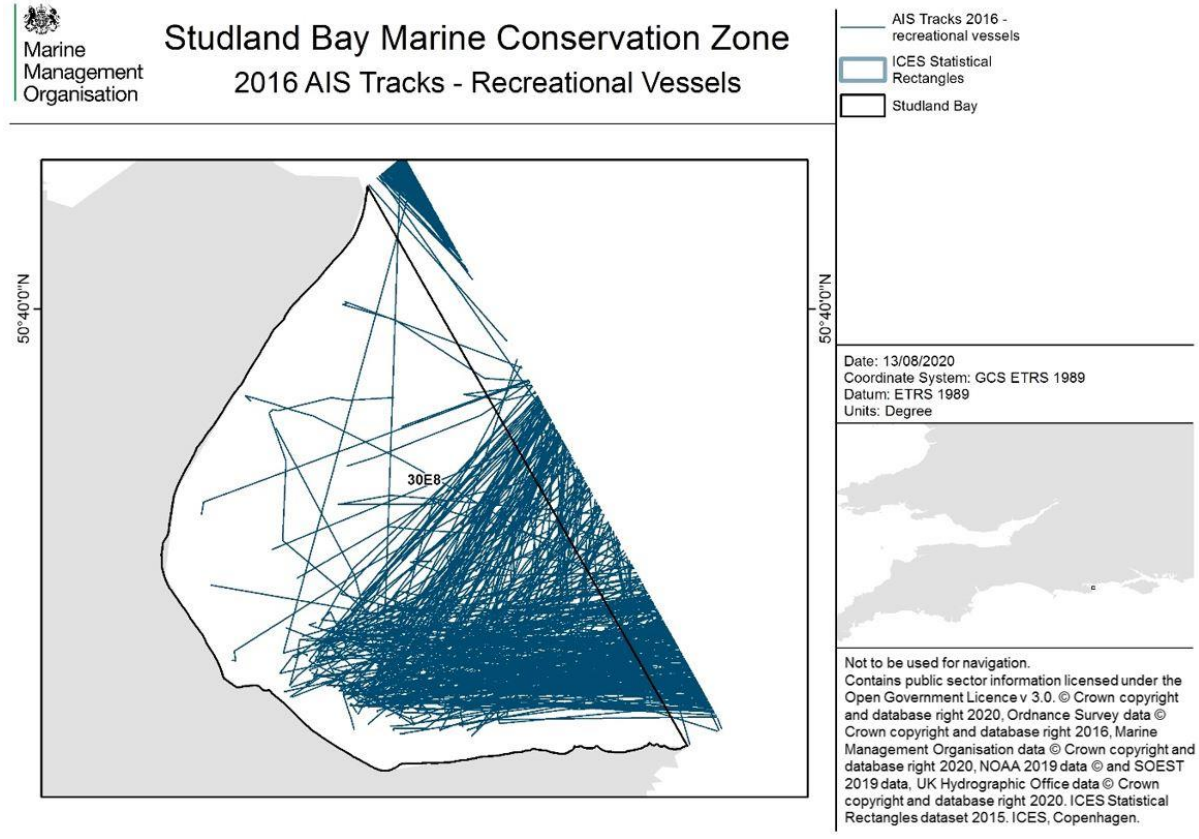


Figure 7: 2017 AIS Track data for recreational vessels in Studland Bay MCZ

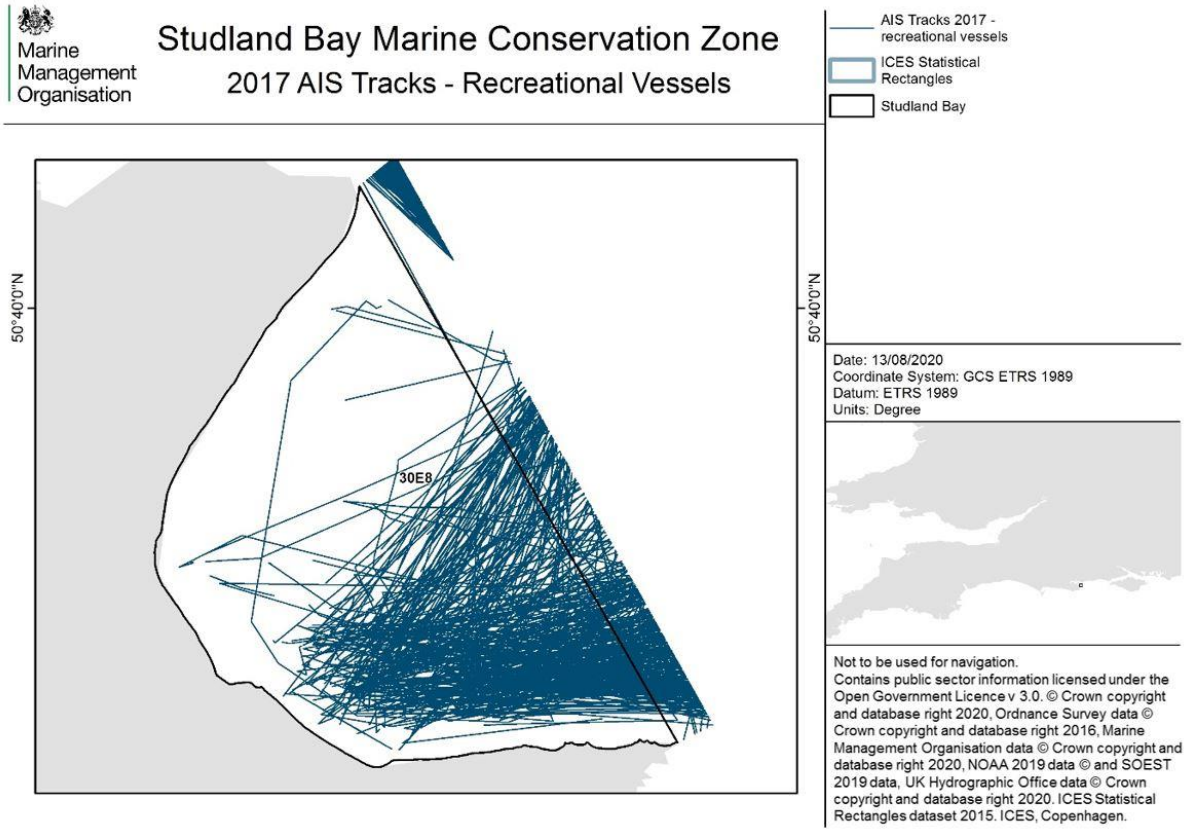
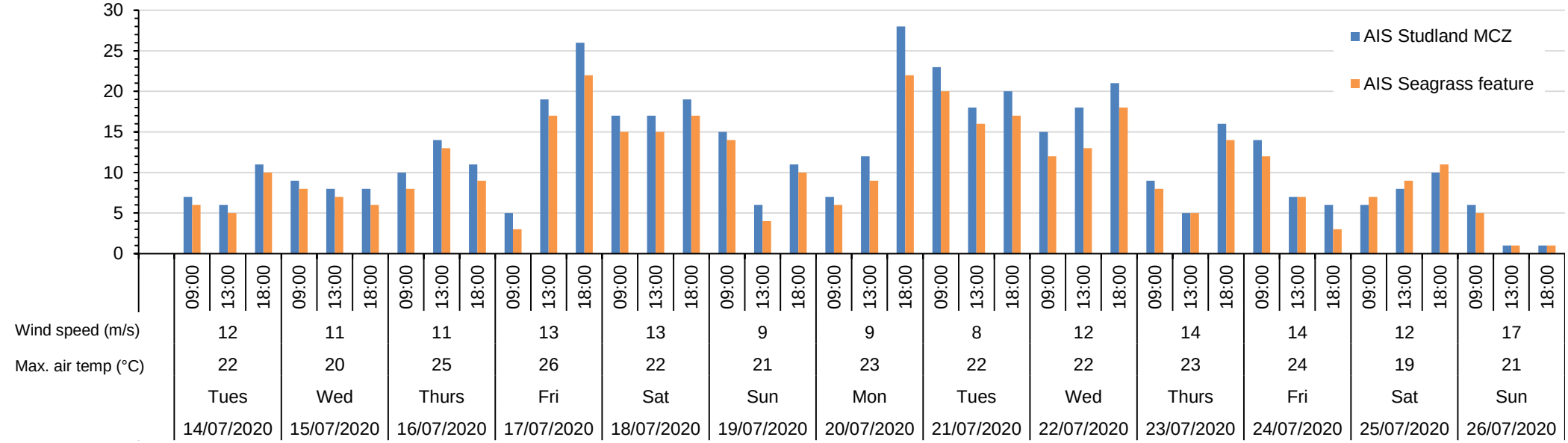


Figure 8: Stationary AIS points in Studland Bay MCZ and stationary AIS points over seagrass feature. Source - Marine Traffic.



4.1.6 MPASum Inspections data

Figure 9 and Figure 10 display results for MPASum inspections carried out during summer 2020. The full MPASum inspection dataset can be found in Annex 3. Inspections were carried out from the beach in the south of Studland Bay (see Annex 1), due to the location of the seagrass feature in this area. The feature map for the site (Figure 1) shows that the seagrass feature covers a large area from the shore of South Beach extending outwards. Therefore the activities recorded are likely to be occurring over the seagrass feature.

This data indicates that a large number of vessels moor or anchor in this area. A maximum of 129 vessels on any one day was recorded on Sunday 12th July 2020. This information indicates that the estimated numbers of vessels stopping within the MCZ using AIS data is an underrepresentation. This is due to the absence of AIS on board many recreational vessels. Furthermore, local experts state the number of vessels mooring or anchoring in the area peaks in August and as the count is a snapshot it is likely that additional vessels will be visiting the area throughout the day. Therefore it is likely that during the peak season there may be hundreds of vessels anchoring or mooring in the area across summer.

The data also indicates that there are high numbers of swimmers and snorkelers within the site. Between 1st June and 10th August 2020, over the course of 14 inspections, 261 swimmers and snorkelers were recorded in the southern area of the bay. With regards to diving, 4 divers and 1 dive boat with an unknown number of divers was recorded within this time frame.

MMO coastal officers report that Studland Bay is a seasonal location, which experiences significantly higher visitor numbers during the warmer months, than the rest of the year (MMO Coastal officer, *pers comms)*. The height of activity in the area is between June and September, although periods of fine weather during school holidays will also increase the activity levels (MMO Coastal officer, *pers comms)*. Activity occurs throughout the day, beginning from early morning (National Trust beach car parks open at 9:00 am) through to early evening. Local knowledge from MMO Coastal Officers is that Studland Bay has always attracted large numbers of people (recreational diving, snorkelling, visiting the beach, anchoring yachts and motor-boats) and this does not appear to have changed significantly in 2020 (MMO Coastal officer, *pers comms)*.

Figure 9: Results of MPASum inspections for Studland Bay MCZ showing count data for mooring and anchoring activities.

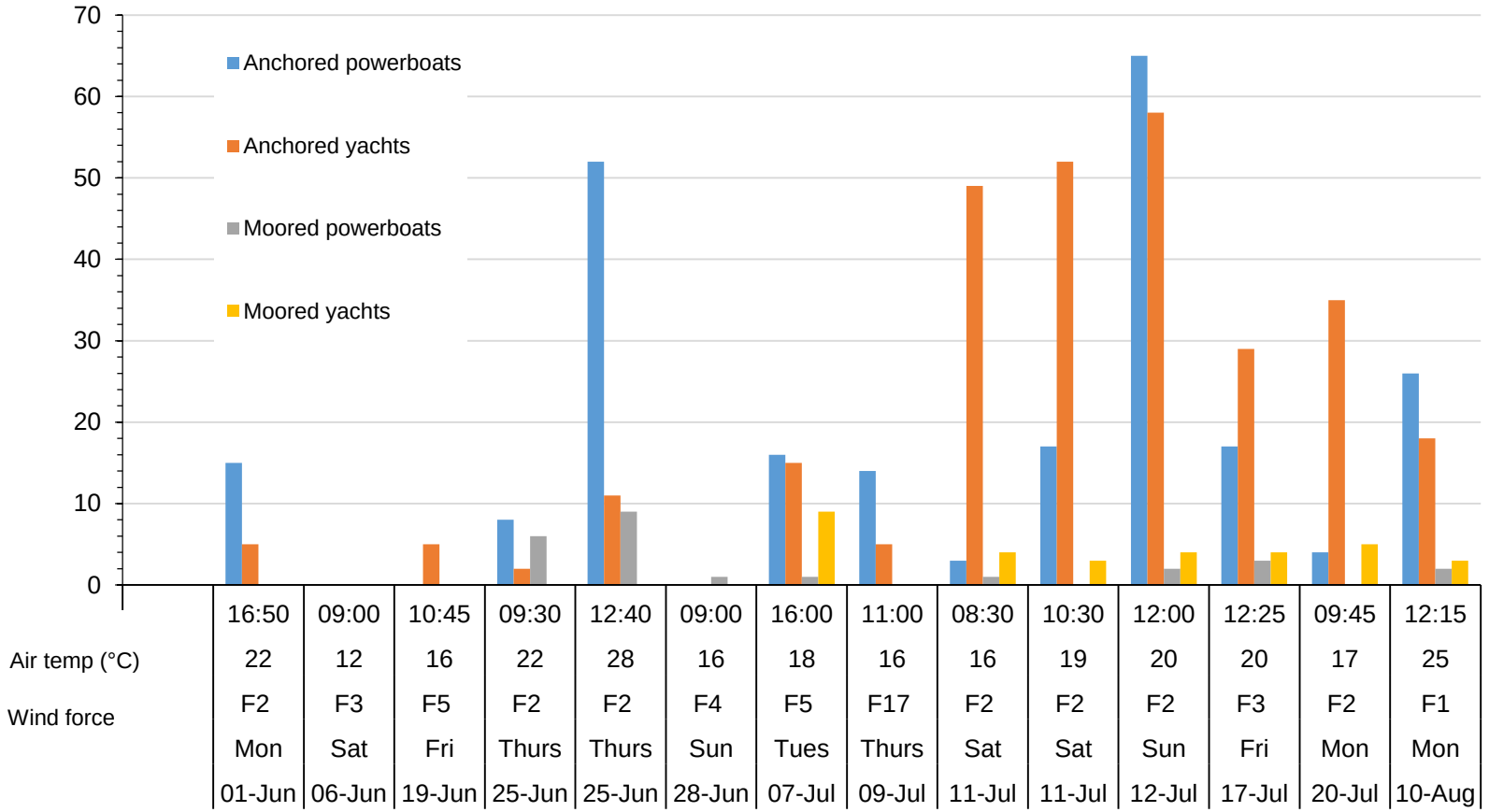
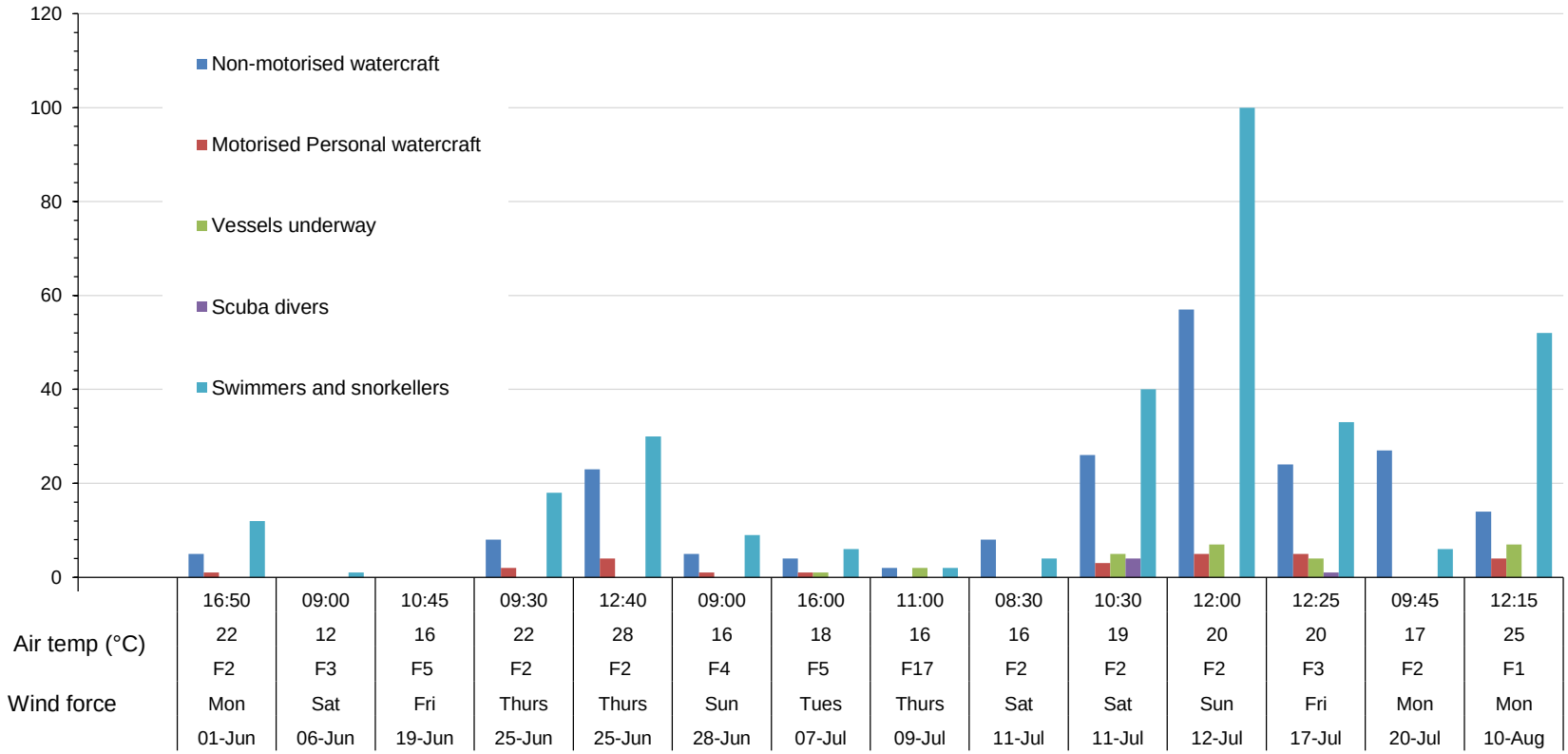


Figure 10: Results of MPASum inspections for Studland Bay MCZ showing count data for non-licensable activities excluding anchored or moored vessels (displayed in Figure 9).



4.1.7 Summary

The evidence in the preceding sections indicate that there is an interaction between non-licensable activities and features within Studland Bay MCZ. The sections below investigate the pressures that each activity type exerts on the features of the site.

For pressures where potential impacts to features are of a similar nature, those pressures have been consolidated to avoid repetition during this stage of the assessment. For each subsequent pressure, new information regarding the potential effects that pressure could have on the feature has been discussed. This does not mean that the narrative discussed in previous pressure discussions is not transferable to the pressure being discussed.

4.2 Abrasion/disturbance of the substrate on the surface of the seabed AND Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion

This pressure is relevant to powerboating or sailing with/without an engine (mooring and/or anchoring and launching, recovery and participation). These impacts are related to seagrass beds, subtidal sand and long-snouted seahorse

4.2.1 Impacts of mooring and anchoring on seagrass beds

Conventional swing moorings have a chain connected to a block or anchor on the seabed. Multiple studies have shown that as the chain moves with winds and the tides on the seabed, it clears areas of seagrass in the vicinity (Walker et al., 1989; Lenihan et al., 1990; Hastings et al., 1995; Creed and Amado Filho, 1999; Francour et al., 1999; Marbà et al., 2002; Milazzo et al., 2004; Montefalcone et al., 2008). Seagrass is cleared as the heavy chains associated with moorings uproot rhizomatous tissue and tear shoots of seagrass (Bourque et al., 2015). Sediment scour may also occur around anchoring blocks due to eddying of currents, and the anchors themselves may create a hard structure for the settlement of competitive algae (Jackson et al., 2013a). Swing moorings have been shown to produce significant seagrass scour, for example, one study reported an approximate nine metre radius of seagrass cleared around the mooring (Demers et al., 2013). In an earlier study, Walker et al. (1989) found that circular or semi-circular depressions of bare sand caused by mooring chains within seagrass beds could range from 3 to 300m^2 depending on boat size (cited from Jackson et al., 2013a). Permanent moorings mean that there is persistent pressure via abrasion from the chain dragging on the seabed (Jackson et al., 2013a).

The deployment, dragging and recovery of anchor chains can also have direct impacts on seagrass via surface abrasion and sub-surface penetration (Collins et al., 2010). When deployed, anchors penetrate into the seabed, with the penetration depth of anchors depending on the anchor type and weight. Small vessel anchors have been found to cause surface 'scars' of typically 1-4 m^2 (Collins et al., 2002). A study in the Mediterranean Sea demonstrated that an average of 20 *P. oceanica* shoots were damaged when the anchor locks in to the bottom and a further 14 on

average when it is retrieved (Francour et al., 1999). During the process of anchors locking in and being retrieved, the number of uprooted seagrass shoots was significantly greater than the number of broken shoots (Francour et al., 1999). Impacts are shown to be higher where rhizome mat compactness is weak and there is high rhizome baring (the length of rhizome above the sediment) (Francour et al., 1999). Where rhizome mats have been penetrated by anchors, storm and wave action mobilises and disperses unprotected sediment, reducing cohesion of sediment and forming a depression or 'scar' (Collins et al., 2010).

In a study at Studland Bay by Collins et al. (2010), scar sites from mooring and anchoring were shown to have significantly lower average shear stress than in the seagrass beds, indicating that sediment within scars is less cohesive and more mobile. An impact on the biological communities of the bay was also demonstrated with a, total fauna seagrass to scar ratio of 1134:339 (Collins et al., 2010). The diversity within seagrass was also higher, with 50 families/species compared to 38 in scars (Collins et al. 2010).

A survey investigating the effectiveness of a Voluntary No Anchor Zone (VNAZ) compared to an anchoring area in Studland Bay found a significantly lower thickness and coverage of seagrass in the anchoring area (Dewey, 2012). The same study suggested further monitoring was required to assess impacts on shoot density (Dewey, 2012).

Multiple studies have estimated seagrass loss in Studland Bay due to mooring activity. Jackson et al. (2013b) estimated the total area of seagrass loss in Studland Bay, attributable to the presence of 27 swing boat moorings at the time, to be 2,624 m^2. Unsworth et al. (2017) found that in Studland Bay, seagrass canopy height and percentage cover increased with increasing distance away from swing moorings, and an estimated 1504.7m^2 of seagrass had been lost from 20 mooring scars, with an average scar radius of 4.25 m. In addition to this evidence, mooring scars can be seen in aerial photographs of Studland Bay MCZ (see Annex 4).

There is evidence to suggest that seagrass beds are able to recover from disturbance via abrasion and penetration when anchoring and mooring activities cease. *Zostera marina* can produce large quantities of seeds and exhibit rapid rhizome growth indicating the potential for recovery after physical disturbance (Erftemeijer and Lewis, 2006). Despite the potential for recovery, the permanence of the moorings installed in Studland Bay and regular anchoring activity mean that recovery of the seagrass feature is unlikely.

AIS data demonstrates that recreational boating activity is high over the seagrass feature. MPASum inspections data confirms that a large number of boats visiting this area either anchor or moor over the feature. Figure 4 also demonstrates that fixed moorings exist over the seagrass feature in the bay. Considering scars are estimated to be 1-4 m^2 for anchors and 4.25m radius for moorings, the potential impacts on the seagrass are large.

With regards to the discussion above, the MMO concludes that **impacts by abrasion or penetration from mooring and anchoring on the seagrass feature**

may result in a significant risk of hindering the achievement of the site's conservation objectives.

4.2.2 Impacts of mooring and anchoring on long-snouted seahorse

This pressure is discussed in relation to the impact on the supporting habitats of long-snouted seahorse as abrasion impacts the substrate rather than the species.

Hippocampus guttulatus prefers complex habitats, including dense seagrass meadows, algal beds, and epifaunal communities that colonize hard substrates (Natural England, 2020). Seahorses use their tails to attach to benthic structures, such as seagrass blades, to shelter and hunt for zooplankton prey (Natural England, 2020).

A total of 145 spiny seahorse records exist for Studland Bay between 2004 and 2017, with 11 confirmed sightings within the 6 years prior to designation (Natural England, 2020). Records over 2004-2017 include 44 females and 74 males, of which 25 were recorded as pregnant males, and 29 records stated as juvenile/young seahorses (Natural England, 2020). Up to January 2020, there were been just 4 records from the last 6 years, despite volunteer dive surveys being carried out by the Seahorse Trust in 2019 (Natural England, 2020). However, on 22nd May 2020, The Seahorse Trust reported sightings of at least 16 seahorses within the MCZ, and further reported a total of 98 sightings from surveys completed between 22nd May 2020 and 26th July 2020 (The Seahorse Trust, *pers comms*). This increase has been suggested to be associated with a decrease in recreational vessel activity within the MCZ due to government restrictions put in place in response to COVID-19 (The Seahorse Trust, *pers comms*). However, there may also be additional factors which lead to an increase in seahorse numbers such as benign weather conditions in April and May.

The removal of areas of seagrass by mooring and anchoring described in section 4.2.1 reduces the available habitat to seahorses, with scars reducing habitat connectivity and spatial distribution of seagrass. Vegetation such as seagrass are used as holdfasts or foraging areas for seahorses. Damage to and/or removal of this vegetation increases the vulnerability of seahorses during storms and reduces the likelihood of them breeding. This suggests that the target to recover the population size of long-snouted seahorses requires protection of the seagrass habitat.

With regards to the discussion above, the MMO concludes that **indirect impacts to long-snouted seahorses through abrasion or penetration from mooring and anchoring on seagrass beds may result in a significant risk of hindering the achievement of the site's conservation objectives.**

4.2.3 Impacts of mooring and anchoring on subtidal sand

The seagrass and subtidal sand features of the site overlap, with seagrass being a sediment biotope of subtidal sand. As such, the impacts described for seagrass beds are relevant to subtidal sand. Anchors will penetrate into subtidal sand features and chains associated with both anchors and moorings may cause abrasion. Impacts discussed in sections 4.2.1 and 4.2.2 indicate that these activities are not compatible

with the site's conservation objectives due to impacts on the seagrass biotope itself as well as the species associated with the seagrass biotope.

AIS data indicates that recreational boating occurs over areas where only the subtidal sand feature is present. Potential mooring and anchoring by vessels in this area will therefore reduce the ability for seagrass beds to expand.

In terms of the subtidal sand feature alone, it is unlikely that mooring and anchoring will reduce its extent and distribution. With regards to species found within subtidal sand only, observational records have found that the shallow water and sandy plains of Studland Bay support a number of species. These include a range of burrowing bivalves and worms such as lugworm (*Arenicola sp*.) and sandmason worm (*Lanice conchilega*), hermit and masked crabs, as well as a variety of commercially important flatfish such as plaice (*Pleuronectes platessa*) and sole (*Solea solea*) (Seasearch Dorset, 2015). The position of infaunal benthic communities within the sediment mean they are relatively protected from temporary surface disturbance such as scour from anchor/mooring chains (Griffiths et al., 2017). Fine sands are relatively cohesive and therefore resistant to erosion following surface disturbance (Griffiths et al., 2017). Actively burrowing, robust bivalves typical of sand shores and sandbanks, are likely to be more tolerant of abrasion and subsurface pressure than thin-shelled species found in stable muds (Griffiths et al., 2017).

With regards to the subtidal sand feature alone, the MMO concludes that **impacts by abrasion or penetration from mooring and anchoring will not result in a significant risk of hindering the achievement of the site's conservation objectives.** With regards to the seagrass biotope of the subtidal sand feature, the MMO concludes that **impacts by abrasion or penetration from mooring and anchoring may result in a significant risk of hindering the achievement of the site's conservation objectives.**

4.2.4 Impacts of powerboating or sailing with/without an engine (launching, recovery and participation) on seagrass beds

Recreational vessels and watercrafts are launched and recovered from the shores of Studland Bay. The seagrass features are not found on the shore and are instead submerged in water depths of at least 0.3 m. Launched vessels will be underway by the time they reach these features. Furthermore, these vessels and watercrafts are likely to be small in size and so the draft is unlikely to be deep enough to interact with the protected features of the site during launching and recovery.

During participation boats passing in close proximity to seagrass beds can cause abrasion through propeller wash and propellers tearing the seagrass. Turbulence from propeller wash and boat wakes can resuspend sediments, break off leaves, dislodge sediments and uproot plants (d'Avack et al, 2014). Koch (2002) established that physical damage from boat wakes was greatest at low tide but concluded that negative impacts of boat-generated waves were marginal on seagrass habitats.

Engine propellers can shear leaves and in severe cases when operating in too shallow water, can tear through the rhizomal mat of seagrass beds (Zieman 1976; Dawes et al. 1997), creating unvegetated, linear troughs of varying lengths (Madley

et al. 2004). The amount of destruction from a scar-producing event depends on water depth and the size, speed and path of the vessel (Madley et al. 2004). Scars may expand and merge to form larger denuded areas.

A study in Florida determined that recovery of seagrass to propeller impact depended on species, with recovery times ranging from 1.4 -9.5 years (Kenworthy et al 2002). However, it is not appropriate to assume that recovery rates will be similar in a different geographic area and species of seagrass.

Studland Bay is a shallow site with depth across the MCZ ranging from dry areas to approximately 10 m depth (Figure 3). As stated previously, AIS data demonstrates that recreational boating activity is high over the seagrass feature, with MPASum inspections data confirming that a large number of boats visiting this area either to anchor or moor over the feature. It may be possible that boats tend to use this area to primarily anchor or moor within and any participation is mainly related to travelling to or from anchoring or mooring.

There is no current evidence of impacts from propellers or propeller wash in Studland Bay. It is unlikely that boats will operate in too shallow water which would result in the most severe impacts, and anchoring and mooring is likely to cause more damage to seagrass beds. However, due to many of the conservation objectives requiring the recovery of seagrass, even minimal impacts due to participation could hinder the achievement of the site's conservation objectives.

With regards to the discussion above, the MMO concludes that impacts via abrasion/disturbance of the substrate on the surface of the seabed from powerboating or sailing with an engine (launching, recovery and participation) on seagrass beds may result in a significant risk of hindering the achievement of the site's conservation objectives.

4.2.5 Pressure conclusion

The discussion above indicates that mooring and anchoring is likely to cause impacts to the protected features of Studland Bay MCZ through surface abrasion and sub-surface penetration and disturbance. This pressure predominantly causes impacts to the seagrass feature along with the associated biological community. **Powerboating or sailing with an engine (launching, recovery and participation) is also likely to cause impacts to seagrass beds in Studland Bay MCZ through surface abrasion.**

The **MMO conclude that abrasion/disturbance of the substrate on the surface of the seabed AND Penetration and/or disturbance of the substratum below the surface of the seabed may result in a significant risk of hindering the achievement of the site's conservation objectives (Table 14).**

Table 14: Abrasion/disturbance of the substrate on the surface of the seabed AND Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion assessment for mooring and anchoring and powerboating or sailing with/without an engine (launching, recovery and participation)

Pressure	Activity	Interest feature	Favourable condition target	Compatible with conservation objectives?
Abrasion/disturbance of the substrate on the surface of the seabed **and** Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Powerboating or sailing with/without an engine (mooring and/or anchoring)	Subtidal sand	• Maintain the presence and spatial distribution of subtidal sand communities.	N (seagrass biotope)
			• Maintain the total extent and spatial distribution of subtidal sand.	Y
			• Maintain the abundance of listed species[15], to enable each of them to be a viable component of the habitat.	N (seagrass biotope)
			• Maintain the distribution of sediment composition types across the feature/sub feature.	Y
			• Maintain the species composition of component communities for subtidal sand.	N (seagrass biotope)
	Powerboating or sailing with/without an engine (launching, recovery and participation) **and** Powerboating or sailing with/without an engine (mooring and/or anchoring)	Seagrass beds	• Maintain the presence and spatial distribution of seagrass bed communities.	N
			• Recover the total extent and spatial distribution of seagrass beds.	N
			• Maintain the distribution of sediment composition types across the feature/sub feature.	N
			• Recover the species composition of component communities for seagrass beds	N
			• Maintain the area of habitat that is likely to	N

			support the sub feature.	
			• Recover the leaf / shoot density, length, percentage cover, and rhizome mat across the feature at natural levels (as far as possible), to ensure a healthy, resilient habitat.	N
			• Recover the extent and structure of the rhizome mats across the site, and conditions to allow for regeneration of seagrass beds.	N
			• Maintain the natural physical form and coastal processes that shape the seagrass bed.	N
			• Maintain the natural rate of sediment deposition.	N
	Powerboating or sailing with/without an engine (mooring and/or anchoring)	Long-snouted seahorse	• Recover the population size within the site.	N
			• Maintain the reproductive and recruitment capability of the species.	Insufficient evidence
			• Maintain the presence and spatial distribution of the species and their ability to undertake key life cycle stages and behaviours.	N
			• Recover connectivity of the habitat within sites and the wider environment to ensure larval dispersal and recruitment, and / or to allow movement of migratory species.	N

			• Recover the extent and spatial distribution of the following supporting habitats: seagrass.	N

4.3 Physical change (to another sediment type)

This pressure is relevant to powerboating or sailing with/without an engine (mooring and/or anchoring). These impacts are related to seagrass beds, subtidal sand and intertidal coarse sediment.

4.3.1 Impacts of mooring and anchoring on seagrass beds and subtidal sand

Mooring and anchoring may cause physical change to another sediment type through damage to and removal of the seagrass feature. Mooring and anchoring activity over the subtidal sand feature is only likely to cause physical change to another sediment type where there is seagrass associated with this feature. Impacts are therefore grouped for these features.

As discussed in section 4.2.1, interaction of mooring and anchoring chains with areas of seagrass can cause scars to form where seagrass can no longer survive, thus changing the characteristics of the substrate. Collins et al. (2010) found that mooring and anchoring scars at Studland Bay had a lower silt fraction and organic content than the adjacent seagrass, leading to a coarser sediment structure. It was also demonstrated that anchor scars create a lowering of the sediment, with a 10-20 cm step down from the seagrass along at least one edge (Collins et al., 2010). This leaves the seagrass rhizome mat exposed to wave action and creates the risk of it being undercut, worsening the damage cause by the scar (Collins et al., 2010). *Zostera marina* expands via horizontal elongation of rhizomes and sudden changes in sediment depth can inhibit recovery of seagrass into bare patches (Jackson et al., 2013a). Loss of seagrass exposes the seabed to wave action causing resuspension and increased turbidity (Jackson et al., 2013a). This results in a feedback loop impeding recovery of seagrass (Jackson et al., 2013a). The formation of new patches of seagrass outside existing perennial meadows by sexual propagules or drifting rhizome fragments is rare which means that natural recovery of seagrass is slow (Jackson et al., 2013a). These factors mean that once seagrass is removed by anchoring or mooring pressures, there is a risk that the area will permanently change to a different sediment type.

With regards to the discussion above, the MMO concludes that **impacts via physical change (to another sediment type) from mooring and anchoring on the seagrass feature may result in a significant risk of hindering the achievement of the site's conservation objectives.**

4.3.2 Impacts of mooring and anchoring on intertidal coarse sediment

The intertidal coarse sediment feature is primarily located along the upper shore at South Beach with a small patch present towards the northern end of Middle Beach

(MESL, 2013). Regardless of activity levels, given that the sediment is already classed as coarse, it is unlikely that there is the potential for the broad scale habitat to be changed in this area as any addition of fine sediment is likely to be very minimal. Furthermore, given that this feature is located close to the shore, there are no moorings and anchoring does not take place on this area. This is demonstrated by recreational boating AIS data which shows that vessels are not active over the feature.

Intertidal coarse sediment is therefore not at risk from physical change to another sediment type caused by mooring and anchoring.

The MMO concludes that **impacts via physical change (to another sediment type) from mooring and anchoring on the intertidal coarse sediment will not result in a significant risk of hindering the achievement of the site's conservation objectives.**

4.3.3 Pressure conclusion

The discussion above indicates that mooring and anchoring is likely to cause impacts to some of the protected features of Studland Bay MCZ through physical change to another sediment type. This pressure predominantly causes impacts to the seagrass feature.

The MMO conclude that **physical change (to another sediment type) may result in a significant risk of hindering the achievement of the site's conservation objectives (Table 15).**

Table 15: Physical change (to another sediment type) assessment for mooring and anchoring

Pressure	Activity	Interest feature	Favourable condition target	Compatible with conservation objectives?
Physical change (to another sediment type)	Powerboating or sailing with/without an engine (mooring and/or anchoring)	Subtidal sand	• Maintain the presence and spatial distribution of subtidal sand communities.	N (seagrass biotope)
			• Maintain the total extent and spatial distribution of subtidal sand.	Y
			• Maintain the abundance of listed species[15,] to enable each of them to be a viable component of the habitat.	N (seagrass biotope)
			• Maintain the distribution of sediment composition types across the feature/sub feature.	Y

			• Maintain the species composition of component communities for subtidal sand.	N (seagrass biotope)
		Seagrass beds	• Maintain the presence and spatial distribution of seagrass bed communities.	N
			• Recover the total extent and spatial distribution of seagrass beds.	N
			• Maintain the distribution of sediment composition types across the feature/sub feature.	N
			• Recover the species composition of component communities for seagrass beds	N
			• Maintain the area of habitat that is likely to support the sub feature.	N
			• Recover the leaf / shoot density, length, percentage cover, and rhizome mat across the feature at natural levels (as far as possible), to ensure a healthy, resilient habitat.	N
			• Recover the extent and structure of the rhizome mats across the site, and conditions to allow for regeneration of seagrass beds.	N
			• Maintain the natural physical form and coastal processes that shape the seagrass bed.	N
			• Maintain the natural rate of sediment deposition.	N
		Intertidal coarse sediment	• Maintain the presence and spatial distribution of intertidal coarse sediment communities.	Y
			• Maintain the total extent and spatial distribution	Y

			of intertidal coarse sediment.	
			• Maintain the abundance of listed species[15], to enable each of them to be a viable component of the habitat.	Y
			• Maintain the distribution of sediment composition types across the feature/sub feature.	Y
			• Maintain the species composition of component communities for intertidal coarse sediment.	Y

4.4 Underwater noise changes

This pressure is relevant to powerboating or sailing with an engine (launching, recovery and participation, and mooring and/or anchoring) and impacts on long-snouted seahorses only. The assessment of these activities has been combined due to the similarity in impacts.

Small motorised craft (including recreational craft) produce relatively low levels of noise (75-159 dB re 1µPa m) with the output characteristics highly dependent on speed and other operational characteristics (OSPAR, 2009 cited in Natural England, 2017a). Many of these sources have greater sound energy in higher frequency bands (i.e. above 1,000 Hz) than large ships (Natural England, 2017a). Whilst motorised vessels are anchoring or mooring, the use of engines for positioning will cause underwater noise changes. Vessels may also keep engines running whilst anchored or moored, therefore contributing to this pressure. Additionally, anchoring can cause underwater noise changes due to noise created when the chain is fed out and recovered.

Despite noise levels being described as low, seahorses have been shown to respond negatively to these levels. Anderson et al. (2011) studied responses of seahorses (*Hippocampus erectus)* in noisy (123-137 dBrms re 1 µPa) and quiet (110-119 dBrms re 1 µPa) tanks for one month. Seahorses displayed a chronic stress response and animals in loud tanks showed more irritation behaviour, pathological and distress behaviour, lower weight, worse body condition, higher plasma cortisol and other blood measures indicative of stress, and more parasites in their kidneys (Anderson et al. 2011). In situ experiments on *Hippocampus guttulatus* in Portugal investigated impacts of transient motorboat sound (63.4dB to 127.6dB) and constant sound produced by anchored motorboats (up to 137.1 dB) above seahorses (Palma et al., 2019). Increases in respiratory rate and opercula movements per minute were observed in response to noise levels (Palma et al., 2019). Furthermore, 30.6% of the animals abandoned the observation location in an

attempt to avoid the negative sound stimuli (Palma et al., 2019). Seahorses require contact with holdfasts and shelter due to their poor swimming ability and only abandon these in specific occasions, such as feeding in the absence of currents or due to stress (Palma et al., 2019).

AIS data shows that that there is high recreational vessel activity within the site, particularly over the seagrass feature in the southern area of the bay where long-snouted seahorses are found. Water sports involving motorised vessels such as wake-boarding and water skiing take place off Knoll Beach. Where these take place over the seagrass feature, there may be an impact on seahorses via underwater noise changes.

The MMO conclude that **underwater noise changes from powerboating or sailing with an engine (launching, recovery and participation, and mooring and/or anchoring) may result in a significant risk of hindering the achievement of the site's conservation objectives (Table 16)**

Table 16: Underwater noise changes assessment for powerboating or sailing with an engine (launching, recovery and participation, and mooring and/or anchoring)

Pressure	Activity	Interest feature	Favourable condition target	Compatible with conservation objectives?
Underwater noise changes	Powerboating or sailing with an engine (launching, recovery and participation) **and** Powerboating or sailing with an engine and mooring and/or anchoring)	Long-snouted seahorse	• Recover the population size within the site.	N
			• Maintain the reproductive and recruitment capability of the species.	N
			• Maintain the presence and spatial distribution of the species and their ability to undertake key life cycle stages and behaviours.	N

4.5 Visual disturbance

This pressure is relevant to recreational diving; powerboating or sailing with/without an engine (mooring and/or anchoring, and launching, recovery and participation). These impacts are only related to long-snouted seahorses. Snorkelling has also been considered in this section given the potential impacts of this activity.

4.5.1 Impacts of recreational diving and snorkelling on long-snouted seahorses

Flashlights and interactions with divers can cause behavioural stresses to seahorses which are suggested to negatively impact feeding, breeding, and resting habits (Claassens & Hodgson, 2017; MMO, 2014b). Recreational divers and snorkelers may disturb seahorses by approaching them, for example to take photographs. A study on the effects of photographer approach on seahorse behaviour found that divers using action cameras attached to extension poles approached seahorses more closely, causing significantly more behavioural disruptions such as escape responses as well as physical contact (Giglio et al., 2018). Additionally, seahorses may respond to constant illumination from torches or flash photography by divers by moving away from the stimulus. Stressed seahorses have been shown to change their vocalization in response to disturbance by increasing the number of clicks they produce (Giglio et al., 2018). Seahorses generate sounds during feeding, courtship, competition and stress and therefore a change in sound patterns may result in the separation of pair-bonded individuals (Olivera et al., 2014; Anderson et al., 2011).

MPASum inspections indicate that there are high numbers of swimmers and snorkelers within the site. Between 1st June and 20th July, over the course of 13 inspections, 261 swimmers and snorkelers were recorded in the southern area of the bay. Despite snorkelers not having breathing apparatus, the shallow nature of the sites means that snorkelers, like divers, are able to approach seahorses. With regards to diving, 4 divers and 1 dive boat with an unknown number of divers was recorded within this time frame. Studland Bay is a known dive site for a number of local diving operators as well individuals with personal equipment and so activity levels are likely to be higher than recorded. It is important to note that the easing of UK travel restrictions associated with COVID-19, restrictions on travel abroad as well as increased publicity around seahorses in Studland Bay may have resulted in an increase in recreational diving and snorkelling in 2020. Continued monitoring of activity levels is important to contextualise these events versus usual site activities.

Long-snouted seahorses (*Hippocampus guttulatus*) are protected under the Wildlife and Countryside Act 1981 (as amended) for multiple offences listed (see section 4.1.1). A wildlife licence is required from the MMO for any activity which may disturb seahorses. Recreational divers must have a wildlife licence if they are seeking seahorses or carrying out an activity which is likely to disturb them, for example, photography or filming. If a licence is granted, this provides the applicant with a legal route to cause an offence such as disturbance and therefore some disturbance of seahorses may occur, although this is minimised under a wildlife licence through licence conditions. However, due to incidental encounters with seahorses from divers or snorkelers there may be instances of disturbance which is not regulated through wildlife licensing.

With regards to the discussion above, the MMO concludes that impacts via visual disturbance from recreational diving and snorkelling may result in a significant risk of hindering the achievement of the site's conservation objectives.

4.5.2 Impacts of powerboating or sailing with/without an engine (launching, recovery and participation) on long-snouted seahorses

The launching and recovery of vessels, vessels underway on the water are visual stimuli which may cause disturbance to seahorses. It is not known whether prolonged or recurrent exposure to visual disturbance may induce stress or result in displacement of seahorses (Natural England, 2020). AIS data indicates that recreational boating activity is high over the seagrass feature which long-snouted seahorses inhabit.

Given the sensitivities of seahorses to disturbance and insufficient evidence around impacts of visual disturbance, the precautionary principle suggests this pressure should be considered further.

With regards to the discussion above, the MMO concludes that impacts via visual disturbance powerboating or sailing with/without an engine (launching, recovery and participation) may result in a significant risk of hindering the achievement of the site's conservation objectives.

4.5.3 Impacts of powerboating or sailing with/without an engine (mooring and/or anchoring) on long-snouted seahorses

The deployment of anchor chains is visual stimulus which may cause disturbance to seahorses. It is not known whether prolonged or recurrent exposure to visual disturbance may induce stress or result in displacement of seahorses[21]. MPASum inspection and AIS data indicates that anchoring and mooring activity is high within the seagrass feature which long-snouted seahorses inhabit, particularly during summer months. During peak periods, dropping of anchors will be a recurrent form of visual disturbance.

Given the sensitivities of seahorses to disturbance and insufficient evidence around impacts of visual disturbance, the precautionary principle suggests this pressure should be considered further.

With regards to the discussion above, the MMO concludes that **impacts via visual disturbance powerboating or sailing with/without an engine (mooring and/or anchoring) may result in a significant risk of hindering the achievement of the site's conservation objectives.**

4.5.4 Pressure conclusion

The discussion above indicates that visual disturbance from recreational diving and snorkelling is likely to impact long-snouted seahorses in Studland Bay MCZ. Following the precautionary principle, impacts via visual disturbance from powerboating or sailing with/without an engine (launching, recovery and participation, and mooring and/or anchoring) may also have an impact on this feature.

The MMO conclude that visual disturbance from recreational diving and snorkelling and powerboating or sailing with/without and engine (mooring and/or anchoring, and launching, recovery and participation) may result in a significant risk of hindering the achievement of the site's conservation

[21] http://publications.naturalengland.org.uk/file/5873218494136320

objectives (Table 17).

Table 17: Visual disturbance assessment for recreational diving and snorkeling and powerboating or sailing with/without an engine (mooring and/or anchoring, and launching, recovery and participation)

Pressure	Activity	Interest feature	Favourable condition target	Compatible with conservation objectives?
Visual disturbance	Recreational diving and snorkelling	Long-snouted seahorse	• Recover the population size within the site.	N
			• Maintain the reproductive and recruitment capability of the species.	N
			• Maintain the presence and spatial distribution of the species and their ability to undertake key life cycle stages and behaviours.	N
	Powerboating or sailing with/without an engine (launching, recovery and participation)		• Recover the population size within the site.	N
			• Maintain the reproductive and recruitment capability of the species.	N
			• Maintain the presence and spatial distribution of the species and their ability to undertake key life cycle stages and behaviours.	N
	Powerboating or sailing with/without an engine (mooring and/or anchoring)		• Recover the population size within the site.	N
			• Maintain the reproductive and recruitment capability of the species.	N
			• Maintain the presence and spatial distribution of the species and their ability to undertake key life cycle stages and behaviours.	N

4.6 Part B conclusion

The assessment of non-licensable activity pressures on the subtidal sand, seagrass and long-snouted seahorse features has determined that mooring and anchoring activity may result in a significant risk of hindering the achievement of the site's conservation objectives. It has also been determined that non-licensable activity pressures on seagrass from powerboating and sailing with an engine (launching, recovery and participation), and long-snouted seahorses from recreational diving and snorkelling and powerboating and sailing with/without an engine (launching, recovery and participation) may result in a significant risk of hindering the achievement of the site's conservation objectives.

As such, the **MMO conclude that management measures are required to exclude these pressures from Studland Bay MCZ.** Section 7 contains further details of these measures.

5. PART C - In-combination assessment

This section assesses the effects of activities considered as compatible with the conservation objectives of Studland Bay MCZ in-combination with other relevant activities taking place which includes the following:

- Non-licensable activity/pressure combinations which were excluded in Part A of this assessment but which could have an effect on the feature
- fishing activities
- plans and projects.

5.1 Pressures exerted by all recreational activities

Activity/pressure interactions considered not capable of affecting the site alone in Part A and so excluded from the Part B assessment are now considered in-combination. Despite Part B identifying significant risks from mooring and anchoring, powerboating or sailing with an engine (launching, recovery and participation) and recreational diving and snorkelling these activities are still included in the in-combination assessment for non-significant pressures. Management for the significant pressures may not exclude these pressures in combination with other activities.

Remaining activities which are considered to have a possible in-combination impact are highlighted in red. Activities included in the in-combination assessment are identified in Table 18 to Table 21.

Table 18: Summary of activity/pressure interactions included in in-combination assessment for intertidal coarse sediment

Potential pressures	Powerboating or sailing with an engine: mooring and/or anchoring a**nd** Sailing without an engine: mooring and/or anchoring	Powerboating or sailing with an engine: launching and recovery, participation **and** Sailing without an engine: launching and recovery, participation	Non-motorised watercraft (e.g. kayaks, windsurfing, dinghies)	Recreational diving and snorkelling
Abrasion/disturbance of the substrate on the surface of the seabed	No interaction likely	N/A	No interaction likely	N/A
Hydrocarbon & PAH contamination	No interaction likely	No interaction likely	N/A	No interaction likely
Litter	No interaction likely	No interaction likely	No interaction likely	No interaction likely
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	No interaction likely	No interaction likely	N/A	No interaction likely
Transition elements & organo-metal (e.g. TBT) contamination	No interaction likely	No interaction likely	N/A	No interaction likely
Penetration and/or disturbance of the substratum below the surface of the	No interaction likely	No interaction likely	No interaction likely	No interaction likely

seabed, including abrasion				
Physical change (to another sediment type)	No interaction likely	N/A	N/A	N/A

Table 19: Summary of activity/pressure interactions included in in-combination assessment for subtidal sand

Potential pressures	Powerboating or sailing with an engine: mooring and/or anchoring a**nd** Sailing without an engine: mooring and/or anchoring	Powerboating or sailing with an engine: launching and recovery, participation **and** Sailing without an engine: launching and recovery, participation	Non-motorised watercraft (e.g. kayaks, windsurfing, dinghies)	Recreational diving and snorkelling
Introduction of light	No interaction likely	No interaction likely	N/A	No interaction likely
Hydrocarbon & PAH contamination	No interaction likely	No interaction likely	N/A	No interaction likely
Litter	No interaction likely	No interaction likely	N/A	No interaction likely
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	No interaction likely	No interaction likely	N/A	No interaction likely
Transition elements & organo-metal (e.g. TBT) contamination	No interaction likely	No interaction likely	N/A	No interaction likely

Organic enrichment	No interaction likely	N/A	N/A	N/A
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Significant alone in Part B	No interaction likely	N/A	No interaction likely
Introduction or spread of invasive non-indigenous species (INIS)	No interaction likely	No interaction likely	N/A	No interaction likely
Visual disturbance	No interaction likely	No interaction likely	N/A	No interaction likely
Underwater noise changes	N/A	No interaction likely	N/A	No interaction likely
Abrasion/disturbance of the substrate on the surface of the seabed	Significant alone in Part B	Possible interaction – discussed in section 5.1.1	N/A	Possible interaction – discussed in section 5.1.1
Physical change (to another sediment type)	Significant alone in Part B	N/A	N/A	N/A

Table 20: Summary of activity/pressure interactions included in in-combination assessment for seagrass beds

Potential pressures	Powerboating or sailing with an engine: mooring and/or anchoring a**nd** Sailing without an engine: mooring and/or anchoring	Powerboating or sailing with an engine: launching and recovery, participation **and** Sailing without an engine: launching	Non-motorised watercraft (e.g. kayaks, windsurfing, dinghies)	Recreational diving and snorkelling

		and recovery, participation		
Introduction of light	No interaction likely	No interaction likely	N/A	No interaction likely
Hydrocarbon & PAH contamination	No interaction likely	No interaction likely	N/A	No interaction likely
Litter	No interaction likely	No interaction likely	No interaction likely	No interaction likely
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	No interaction likely	No interaction likely	N/A	No interaction likely
Transition elements & organo-metal (e.g. TBT) contamination	No interaction likely	No interaction likely	N/A	No interaction likely
Organic enrichment	No interaction likely	N/A	N/A	N/A
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Significant alone in Part B	No interaction likely	No interaction likely	No interaction likely
Introduction or spread of invasive non-indigenous species (INIS)	No interaction likely	No interaction likely	No interaction likely	No interaction likely
Abrasion/disturbance of the substrate on the surface of the seabed	Significant alone in Part B	Significant alone in Part B	Possible interaction – discussed in section 5.1.1	
Physical change (to another sediment type)	Significant alone in Part B	N/A	N/A	N/A

Table 21: Summary of activity/pressure interactions included in in-combination assessment for long-snouted seahorse

Potential pressures	Powerboating or sailing with an engine: mooring and/or anchoring a**nd** Sailing without an engine: mooring and/or anchoring	Powerboating or sailing with an engine: launching and recovery, participation	Sailing without an engine: launching and recovery, participation	Non-motorised watercraft (e.g. kayaks, windsurfing, dinghies)	Recreational diving and snorkelling
Hydrocarbon & PAH contamination	No interaction likely	No interaction likely	No interaction likely	N/A	No interaction likely
Litter	No interaction likely	No interaction likely	No interaction likely	N/A	No interaction likely
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	No interaction likely	No interaction likely	No interaction likely	N/A	No interaction likely
Transition elements & organo-metal (e.g. TBT) contamination	No interaction likely	No interaction likely	No interaction likely	N/A	No interaction likely
Underwater noise changes	Significant alone in Part B.	Significant alone in Part B	No interaction likely	N/A	No interaction likely
Visual disturbance	Significant alone in Part B.	Significant alone in Part B.	Significant alone in Part B.	N/A	Significant alone in Part B
Introduction or spread of invasive non-indigenous species (INIS)	No interaction likely	No interaction likely	No interaction likely	N/A	No interaction likely

Abrasion/disturbance of the substrate on the surface of the seabed	Significant alone in Part B	Possible interaction – discussed in section 5.1.1	Possible interaction – discussed in section 5.1.1	N/A	Possible interaction – discussed in section 5.1.1
Collision BELOW water with static or moving objects not naturally found in the marine environment	N/A	No interaction likely	No interaction likely	N/A	No interaction likely

5.1.1 Abrasion/disturbance of the substrate on the surface of the seabed

Recreational diving may cause in-combination impacts via abrasion or disturbance of the substrate for subtidal sand, seagrass beds and long-snouted seahorse. It is assumed that the abrasion and disturbance pressure related to long-snouted seahorse is for the supporting habitats. Snorkelling is not considered a risk via this pressure as participants in this activity do not spend long periods of time on the seabed.

Divers could disturb the substrate during dives by placing a body part or equipment on the features. However, best practice measures such as those outlined below by the Seahorse Trust[22] will reduce the amount of disturbance occurring:

- Maintain good buoyancy control - by swimming just above the seagrass and the seabed and avoiding trailing themselves and their gear in the substrate, divers reduce disturbance to the soft sediments and the seagrass.
- Keep diving gear tidy- attach loose hoses, survey equipment and other dive gear securely. This will also avoid damage to the habitat as well preventing equipment loss which adds to the marine litter.
- Avoid sharp, sudden changes in direction when in the seagrass- fins and the wash created by them can stir up the sediment and potentially damage the seagrass. When in the habitat, change direction slowly and kick gently. Moving with care will also help maintain the visibility.
- Do not pull at or hold onto the seagrass, even if you are drifting. If you need to slow down or stop, brace yourself gently on the seabed and settle carefully.

The amount of diving activity taking place within the MCZ is currently unknown, but any impacts via abrasion are likely to minimal and highly localised. Therefore **the MMO do not consider the pressure from recreational diving and snorkelling likely to cause a significant risk of hindering the achievement of the conservation objectives stated for the MCZ.**

5.2 Pressures exerted by activities and plans or projects

The MMO SPIRIT (Spatial InfoRmatIon Toolkit) system was used to check regulated and unregulated activities that occur within the site, where there could be a pathway for disturbance. These activities are displayed in Table 22.

22 https://www.theseahorsetrust.org/pdf/Diving_protocol_for_seahorse_seagrass_surveys_KD_3.pdf

Table 22: Licensed activities considered in-combination with recreational activities included in this assessment

Relevant activity	Description	Sub features where a pathway exists
Recreational diving	Wildlife licences for surveying seahorses by diving	Subtidal sand, seagrass beds, long-snouted seahorse

There are currently two wildlife licences for surveying seahorses or seagrass beds by diving licensed across English waters (0-12nm) which include Studland Bay MCZ.

These activities have the same pressures and possible interaction as recreational diving, as outlined in section 5.1.1 Abrasion/disturbance of the substrate on the surface of the seabed. They also have the following licence condition: Diving practices outlined in the Seahorses and Sea-grass Diving Protocol[22] published by The Seahorse Trust must be adhered to during all filming dives.

Therefore the **MMO do not consider the pressure from licensed activities are likely to cause a significant risk of hindering the achievement of the conservation objectives stated for the MCZ.**

5.3 Pressures exerted by fishing activities

Expert opinion by the Southern Inshore Fisheries and Conservation Authority (SIFCA) suggested that limited levels of potting and netting may occur in the MCZ. Table 23 outlines the activity/pressure interactions which are included in the in-combination assessment.

Table 23: Summary of activity/pressure interactions included in in-combination assessment for designated features

Potential pressures	Traps	Anchored nets/lines
Abrasion/disturbance of the substrate on the surface of the seabed	Possible interaction – see section 5.3.1 Abrasion/disturbance of the substrate on the surface of the seabed	Possible interaction – see section 5.3.1 Abrasion/disturbance of the substrate on the surface of the seabed
Removal of target species	No interaction likely	No interaction likely
Removal of non-target species	No interaction likely	No interaction likely

5.3.1 Abrasion/disturbance of the substrate on the surface of the seabed

Expert opinion from SIFCA states that there is limited pot fishing activity in Studland Bay MCZ. Activity levels are very low due to the risk of losing gear because of the amount of boats which anchor in Studland bay throughout the summer, and there is also minimal gain in the site due to most of the site being very shallow, tidal and sandy and not ideal potting habitat.

One vessel has been known to set a very small number of crab and lobster pots on the fringes of the site to the north along the 'Training Bank'. This is a bank of rocks laid from the end of Studland peninsula to the north of the bay, forming an underwater barrier which directs currents to stop sand collecting in Poole Harbour (Bird, 1995). The 'Training Bank' is located outside the MCZ. Crab and lobster potting is more likely to occur where the reef features begin around Old Harry Rocks to the far south of the Bay.

There are also very low activity levels for netting due to the reasons outlined above. Based on local knowledge fishers might use fixed nets (for flat fish and other species) in the site with the potential for up to 6 small inshore vessels occasionally working in the area. Due to the shallow nature of the site netting is more likely to take place on the fringes.

Due to the very low activity levels of potting and netting taking place, and the likelihood that the activities will take place on the fringes of the MCZ away from the most sensitive designated features long-snouted seahorse and seagrass features, the **MMO do not consider the pressure from fishing activities likely to cause a significant risk of hindering the achievement of the conservation objectives stated for the MCZ.**

5.4 Part C conclusion

Taking into account options for introducing management for mooring and anchoring (outlined in section 7), the MMO conclude that remaining non-licensable activities, in-combination with licensed and fishing activities, are not adversely affecting the protected features of Studland Bay MCZ.

6. Assessment result

6.1 Non-licensable activity alone

The MMO consider that there is a pathway for disturbance. Mooring and anchoring activities alone are sufficient to affect (other than insignificantly) subtidal sand, seagrass and long-snouted seahorse features of the site and cause a significant risk of hindering the achievement of the conservation objectives stated for the MCZ.

Recreational diving and snorkelling activities alone are sufficient to affect (other than insignificantly) long-snouted seahorse features and cause a significant risk of hindering the achievement of the conservation objectives stated for the MCZ.

Powerboating or sailing with an engine (launching and recovery, participation) activities alone are sufficient to affect (other than insignificantly) seagrass and long-snouted seahorse features and cause a significant risk of hindering the achievement of the conservation objectives stated for the MCZ.

Sailing without an engine (launching and recovery, participation) activities alone are sufficient to affect (other than insignificantly) long-snouted seahorse and cause a significant risk of hindering the achievement of the conservation objectives stated for the MCZ.

6.2 In-combination

The MMO consider that whilst there is a pathway for disturbance, in-combination impacts are not sufficient to affect (other than insignificantly) the features of the site from the following in-combination factors:

- All non-licensable activities and all pressures combined

- All non-licensable activities in-combination with fishing and existing licenced activity within the site.

7. Management options

Under Section 129 of the Marine and Coastal Access Act 2009[23], the MMO may make one or more byelaws for the purpose of furthering the conservation objectives stated for an MCZ in England. These powers are extended to European marine sites under Section 38 of the Conservation of Habitats and Species Regulations 2017.

These byelaw making powers include:

- prohibiting or restricting entry into, or any movement or other activity within, the site by persons or animals;
- prohibiting or restricting entry into, or any movement or other activity within, the site by vessels or (where appropriate) vehicles;
- restricting the speed at which any vessel may move in the site or in any specified area outside the site where that movement might hinder the conservation objectives stated for the site;
- prohibiting or restricting the anchoring of any vessel within the site;
- prohibiting or restricting the killing taking, destruction, molestation or disturbance of animals or plants of any description in the site;
- prohibiting or restricting the doing of anything in the site which would interfere with the sea bed or damage or disturb any object in the site.

7.1 Management options for anchoring

Option 1: No additional management. Introduce a monitoring and control plan within the site.
This monitoring and control plan would be introduced to understand levels of activity and potential impacts on the protected features. From this plan it would be ascertained whether further management measures are required.

Option 2: Voluntary no anchor zones

This option would involve boat users voluntarily avoiding specified areas to drop anchors.

[23] www.legislation.gov.uk/ukpga/2009/23/section/129

Option 3: No anchor zones

This option would involve boat users being prohibited to drop anchor in specified areas via an MMO byelaw.

Option 4: Prohibition of anchoring

This option would involve boat users being prohibited to drop anchor within the whole MCZ via an MMO byelaw.

At this time, the MMO does not believe that management option 1 is sufficient to protect Studland Bay MCZ due to the levels of anchoring activity occurring at the site as well as the evidence for the damage caused by anchoring on the features of the site.

7.2 Management options for mooring

Option 1: No additional management. Introduce a monitoring and control plan within the site.
This monitoring and control plan would be introduced to understand levels of activity and potential impacts on the protected features. From this plan it would be ascertained whether further management measures are required.

Option 2: Voluntary use of advanced mooring systems for mooring applications

This option would involve marine licence applications for new moorings voluntarily installing advanced mooring systems that have minimal impact on the seabed.

Option 3: Prohibit use of 'traditional moorings', only allow use of advanced mooring systems

This option would involve prohibiting use of 'traditional moorings' (for example, standard swing or trot moorings). Only the use of advanced moorings systems would be allowed, with installation subject to a marine licence application.

Option 4: No mooring zones

This option would involve boat users being prohibited to moor in specified areas via an MMO byelaw.

Option 5: Prohibition of mooring

This option would involve the prohibition of moorings within the MCZ via an MMO byelaw.

At this time, the MMO does not believe that management option 1 is sufficient to protect Studland Bay MCZ due to the evidence for the damage caused by mooring systems on the features of the site.

7.3 Management options for powerboating or sailing with an engine (launching and recovery, participation)

Option 1: No additional management. Introduce a monitoring and control plan within the site.

This monitoring and control plan would be introduced to understand levels of activity and potential impacts on the protected features. From this plan it would be ascertained whether further management measures are required.

Option 2: Voluntary speed restrictions within the MCZ

This option would involve voluntary speed restriction for powerboats and sailing boats with engines within the MCZ in order reduce the levels of underwater noise.

Option 3: Speed restrictions within the MCZ

This option would involve implementing speed restriction for powerboats and sailing boats with engines within the MCZ in order reduce the levels of underwater noise.

Option 4: Prohibition of powerboats and sailing boats with an engine within the MCZ

This option would prohibit the use of powerboats and sailing boats with an engine within the MCZ.

7.4 Management options for sailing without an engine (launching and recovery, participation)

Option 1: No additional management. Introduce a monitoring and control plan within the site.
This monitoring and control plan would be introduced to understand levels of activity and potential impacts on the protected features. From this plan it would be ascertained whether further management measures are required.

Option 2: Prohibition of sailing boats without an engine within the MCZ

This option would prohibit the use of sailing boats without an engine within the MCZ.

7.5 Management options for recreational diving and snorkelling

Option 1: No additional management. Introduce a monitoring and control plan within the site.

This monitoring and control plan would be introduced to understand levels of activity and potential impacts on the protected features. From this plan it would be ascertained whether further management measures are required.

Option 2: Introduce code of conduct for recreational diving and snorkelling within the MCZ

This option would involve introducing a code of conduct for diving and snorkelling activities within the MCZ, communicated, for example through signage and public guidance.

Option 3: Prohibition of recreational diving and snorkelling within the seagrass feature of the MCZ

This option would prohibit recreational diving and snorkelling within the MCZ.

The introduction of any management measures will be subject to a separate process, including appropriate levels of consultation.

Studland Bay MCZ lies within the South Marine Plan Area. The South Marine Plans[24] were adopted in 2018. The decision in this assessment will be compliant and made in accordance with relevant policies. Consideration of policies will be detailed in the Regulatory Triage Assessment which will accompany the proposed management.

8. Review of this assessment

MMO will review this assessment every two years or earlier if significant new information is received.

Such information could include:

- updated conservation advice;
- updated advice on the condition of the feature;
- significant change in activity levels.

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

Monitoring of activity levels will occur through a combination of MMO MPA inspections, ongoing monitoring of AIS data and consideration of new sources of data for non-licensable activity. Should activity levels increase significantly or in a manner that could affect the site features, this will trigger further investigation into the level and distribution of the activity, including consultation with Natural England regarding current site condition. Any subsequent evidence gathered would be used to assess the need for further management measures.

[24] http://www.gov.uk/government/collections/south-marine-plans

Possible management measures include an MMO emergency byelaw, which can be implemented immediately for up to 12 months, or a (non-emergency) MMO byelaw which would be subject to public consultation before implementation.

An overview of the monitoring and control process is illustrated in Annex 5.

9. Conclusion

The MMO have had regard to best available evidence and through consultation with relevant advisors and the public, conclude that, provided that the appropriate management measures for the non-licensable activities identified above are implemented, all remaining non-licensable activities are compatible with the conservation objectives of this marine protected area.

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Annex 1 – MMO methodology

Assessment process

The non-licensable assessments have three stages:

Part A: A coarse assessment using generic sensitivity information to identify which non-licensable activities can be discounted from further assessment (Part B) as they are not taking place or not a significant concern.

Part B: An in-depth analysis to assess the effects of remaining pressures on the features of the site, and a pressure in-combination assessment.

Part C: An in-combination assessment between all activities occurring

Sources of evidence

Evidence used in the assessments falls into two broad categories:

1. Non-licensable activity information. This includes patterns, intensity and trends of non-licensable activities.

2. Ecological information, in particular the location, condition and sensitivity of designated features.

Non-licensable activity information

MPASum Inspection data

MPASum inspections are carried out by MMO Marine Officers. This involves counting the occurrence of water-based activities within the site from a set location over 4 to 5 minutes. The following activities are recorded:

- Powerboats at anchor
- Yachts at anchor
- Powerboats on mooring
- Yachts on mooring
- Non-motorised watercraft
- Motorised Personal watercraft
- Vessels underway
- Scuba divers
- Swimmers and snorkelers

Alongside activity data, environmental conditions are recorded. This includes information on:

- Date
- Time

- Weather
- Temperature
- Sea state
- Wind force and direction

Figure 11 indicates the location from which inspections took place in Studland Bay MCZ.

Figure 11: Satellite map displaying the location from which MPASum inspections were carried out (50.6427° N, 1.9440° W). Source – Google Earth.

Automatic Identification System data

It is a legal requirement for vessels of 300 gross tonnage or more and all passenger vessels irrespective of size to have AIS installed. These vessels use AIS-A. Other vessels do not legally require AIS. AIS-B is a non-mandatory form of AIS typically used by small commercial craft, fishing vessels and recreational vessels (MMO, 2014a). To prevent overloading of the available bandwidth, transmission power is restricted to 2 Watts, giving a range of up to 10 nautical miles (MMO, 2014a). Information regarding use patterns by these types of craft from AIS sources alone will therefore significantly underplay the true frequency and use patterns (MMO, 2014a).

AIS transmits information which is manually input and therefore is only as reliable as the operator. As not all vessels are required to have AIS this data is likely to be an underrepresentation of the activity within the site.

AIS trackline data is processed by ABPmer and provided to the MMO up to 2017. AIS tracks for recreational vessels only was extracted and plotted for 2015-2017. This data also indicates the number of AIS tracks recorded per month.

Marine Traffic displays live AIS data. Marine Traffic indicates whether vessels are stationary or underway depending on the vessel speed. It can be assumed that stationary vessels indicated by AIS data are anchored or moored. Live AIS data from Marine Traffic was used to count the number of vessels that were stationary over the seagrass feature at different times.

Expert opinion

Expert opinion provided by MMO coastal and IFCA officers. MMO may provide additional information and intelligence on the non-licensable activities happening within the site to support MPASum inspections. IFCA officers provide information on the fishing activities within the site which includes information on number and size of vessels fishing, target species, type and amount of fishing gear used and seasonal trends in activity.

Permanent moorings data layer

The permanent moorings data layer is a 2016 GIS dataset from The Crown Estate indicating where areas of seabed have been leased for moorings. This data was provided to Defra for use in project ME6003[25] which was completed in 2017 and studied recreational and commercial mooring and anchoring impacts in marine protected areas in Wales and England.

It must be noted that moorings may have been removed since this data layer was created.

Ecological information

The fisheries assessments use the conservation advice packages produced by Natural England and the Joint Nature Conservation Committee. These provide information on the features of the site, their area and conditions. The packages also contain an advice on operations and supplementary advice documents which allow the assessment of which pressure/gear combinations a feature may be sensitive too.

For some assessments, further ecological information has also been provided by Natural England. This information is available in the relevant assessments.

Sensitivity and vulnerability

[25] ME6003: http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=19777

The following definitions of sensitivity and vulnerability are used in MMO assessments.

Sensitivity is defined as:

a measure of tolerance (or intolerance) to changes in environmental conditions.[26]

Vulnerability is defined as:

a combination of the sensitivity of a feature to a particular pressure/activity, and its exposure to that pressure/activity.

[26] Tilin *et al.* 2010, Roberts *et al.* 2010

Annex 2 – AIS data

Table 24: Stationary AIS points recorded within Studland Bay MCZ and over seagrass feature. Source - Marine Traffic.

Date	Max. daily air temperature (°C)	Max. daily wind speed (mph)	Day	Time	Count AIS (stationary)	
					Studland MCZ	Seagrass feature
11/07/2020	23	Unknown	Saturday	06:40	24	20
14/07/2020	22	12	Tuesday	09:00	7	6
				13:00	6	5
				18:00	11	10
15/07/2020	20	11	Wednesday	09:00	9	8
				13:00	8	7
				18:00	8	6
16/07/2020	25	11	Thursday	09:00	10	8
				13:00	14	13
				18:00	11	9
17/07/20	26	13	Friday	09:00	5	3
				13:00	19	17
				18:00	26	22
18/07/20	22	13	Saturday	09:00	17	15
				13:00	17	15
				18:00	19	17
19/07/20	21	9	Sunday	09:00	15	14
				13:00	6	4
				18:00	11	10
20/07/20	23	9	Monday	09:00	7	6
				13:00	12	9
				18:00	28	22
21/07/20	22	8	Tuesday	09:00	23	20
				13:00	18	16
				18:00	20	17
22/07/20	22	12	Wednesday	09:00	15	12
				13:00	18	13
				18:00	21	18
23/07/20	23	14	Thursday	09:00	9	8
				13:00	5	5
				18:00	16	14
24/07/20	24	14	Friday	09:00	14	12
				13:00	7	7
				18:00	6	3
25/07/20	19	12	Saturday	09:00	6	7
				13:00	8	9
				18:00	10	11
26/07/20	21	17	Sunday	09:00	6	5
				13:00	1	1
				18:00	1	1

Annex 3 – MPASum Inspection data

Table 25: Results of MPASum inspections for Studland Bay MCZ showing count data for non-licensable activities.

Date	Time	Weather	Air temperature (°C)	Sea state	Wind force & direction	Anchored vessels		Moored vessels		Non-motorised watercraft	Motorised Personal watercraft	Vessels underway	Scuba divers	Swimmers and snorkellers
						Powerboats	Yachts	Powerboats	Yachts					
01/06/20 Monday	1650	Sunny	22	Calm	F2 ESE	15	5	0	0	5	1	0	0	12
06/06/20 Saturday	0900	Light cloud	12	Calm	F3 W	0	0	0	0	0	0	0	0	1
19/06/20 Friday	1045	Overcast	16	Moderate	F5 WSW	0	5	0	0	0	0	0	0	0
25/06/20 Thursday	0930	Sunny	22	Calm	F2 E	8	2	6	0	8	2	0	0	18
25/06/20 Thursday	1240	Sunny	28	Calm	F2 E	52	11	9	0	23	4	0	0	30
28/06/20 Sunday	0900-1010	Sunny intervals	16	Slight	F4 WSW	0	0	1	0	5	1	0	0	9
07/07/20 Tuesday	1600	Light cloud	18	Slight	F5 SW	16	15	1	9	4	1	1	0	6
09/07/20 Thursday	1100	Warm but overcast	16	Calm	F17 SW	14	5	0	0	2	0	2	0	2
11/07/20 Saturday	0830	Sunny	16	Calm	F2 SW	3	49	1	4	8	0	0	0	4

11/07/20 Saturday	1030	Sunny	19	Calm	F2 SW	17	52	0	3	26	3	5	4	40
12/07/20 Sunday	1200	Sunny	20	Calm	F2 SSE	65	58	2	4	57	5	7	0	100
17/07/20 Friday	1225	Overcast	20	Calm	F3 NNW	17	29	3	4	24	5	4	1 *	33
20/07/20 Monday	0945	Sunny	17	Calm	F2 SW	4	35	0	5	27	0	0	0	6
10/08/20 Monday	1215	Sun, light cloud and hot	25	Calm	F1SSW	26	18	2	3	12	4	7	0	52

* 1 flagged dive boat (no. divers unknown)

Annex 4 – Aerial imagery Studland Bay MCZ

Figure 12: Aerial imagery of a section of the seagrass feature of Studland Bay MCZ. Source – Google Earth (Date accessed: 12/08/2020).

Annex 5 - Monitoring and Control Process

Figure 13: Monitoring and control process