

Draft Fisheries Assessment – Solan Bank Reef SAC

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Executive summary

The scope of this fisheries assessment is the [Solán Bank Reef SAC](#), located approximately 50 km from the Scottish mainland, north of Cape Wrath. The vast majority of the site occurs in the offshore region (12 to 200 nautical miles, nm), with some small portions of the site lying across the 12 nautical mile (nm) territorial sea limit. The protected features of the site are the Annex I reef sub-types 'bedrock' and 'stony' reef. The conservation objective for the SAC is to, subject to natural change, maintain or restore the reef in/to favourable condition.

In Part A, fishing activities currently occurring within the site (data from 2015 – 2019) were screened and grouped into aggregated gear types. Throughout this draft fisheries assessment the data from 2015-2019 is referred to as the current levels of activity. The gear types considered relevant to the Annex I reef feature were demersal trawls, demersal seines, boat dredges, and static traps. Based on the pressures associated with these fishing activities and the sensitivity of the reef feature, the potential for likely significant effects was identified for the pressures of abrasion/disturbance of the substrate on the surface of the seabed, and removal of non-target species. These pressures were found to be exerted by all four aggregated gear types and were taken through to Part B of the assessment.

In Part B, the assessment of fishing activities with the potential for likely significant effects within the site determined that, at current fishing levels, static demersal gear (traps) alone was compatible with the conservation objectives of the site and will not result in an adverse effect on site integrity for Solán Bank Reef SAC. However, an adverse effect on site integrity could not be ruled out where mobile demersal fishing (demersal trawl, demersal seine, and boat dredge) activities occurred. Scottish Ministers concluded that management measures were required to restrict mobile demersal fishing within Solán Bank Reef SAC.

In Part C, the in-combination assessment considered the residual potential impacts of static demersal gear (traps) alongside other relevant offshore region activities happening in and near the site. There was no potential for likely significant effects from other relevant offshore region activities. Therefore, Scottish Ministers concluded that demersal static gear (traps), in-combination with other known activities, are compatible with the conservation objectives of the site and will not result in an adverse effect on site integrity of Solán Bank Reef SAC.

Considering the need for management measures for mobile demersal gear, as identified in the assessment, two management options have been identified and are under consideration by Scottish Ministers:

- Zoned management would exclude mobile demersal gear from some parts of the site for the whole year and permit demersal trawls and seines within certain parts of the site for two months of the year. Considering the limited time when demersal seines and trawls would be permitted to operate in specific areas of the site, the limited extent of total reef resource exposed to fishing during that time, and that for the remainder of the year the entire site would be protected from mobile demersal gear. Scottish Ministers consider this management option

sufficient to avoid an adverse effect on site integrity from mobile demersal fishing activity at current levels. Enhanced activity-based monitoring for the site may be considered to ensure the zoned management measures are sufficient.

- Full site exclusion of mobile demersal fishing activity would exclude mobile demersal gear from the whole site for the full year. Scottish Ministers considers that this management option would avoid an adverse effect on site integrity from fishing activities using mobile demersal gears.

The decision as to which management option is to be taken forward will be made following a statutory public consultation exercise and will be taken in the light of all relevant obligations incumbent upon the Scottish Ministers in relation to the exercise of their functions.

1 Introduction

1.1 Scope of the Solan Bank Reef SAC assessment

The geographic scope of this assessment covers the whole of the Solan Bank Reef SAC, including portions within both the offshore (12 – 200 nautical miles, nm) and inshore (0 – 12 nm) regions (Figure 1). The purpose of this assessment is to determine whether the current levels of fishing activity occurring within the site are compatible with the conservation objectives of the Solan Bank Reef SAC and to identify options for management measures.

In this assessment, Scottish Ministers use the best available evidence to review the site characteristics and current fishing activity (Part A), both taken alone and in combination with other relevant activities (Part C), to determine if there is the potential for these activities to have a likely significant effect (LSE) on the protected feature of the site (Annex I Reef). Any fishing activities with the potential for LSE, either alone or in combination with other relevant activities are considered further to assess whether they could result in an adverse effect on site integrity (Part B).

Where there is the potential for an adverse effect on site integrity, management measures are identified for the site by Scottish Ministers. These measures are considered in light of the conservation objectives, biological characteristics, current activity levels, and existing fisheries restrictions for Solan Bank Reef SAC.

A final decision on which measures, if any, are to be adopted will follow upon a statutory consultation exercise and will take into account all relevant statutory obligations incumbent upon Scottish Ministers.

A methodology document has been prepared to aid understanding of these assessments.

1.2 Site description

[Solan Bank Reef SAC](#) (Figure 1) is located approximately 50 km from the Scottish mainland, north of Cape Wrath. The reef is located on the Solan Bank High, a Precambrian geological feature of metamorphic basement rock 130 km long and 25 km wide with sections of sand and clay. The site is surrounded by the North Rona,

North Lewis, North Minch and West Orkney basins and between the East Rona High to the west and Nun Rock-Sule Skerry High to the east. The majority of the site lies in water depths of 60–80 m. However, to the south-east of the site an outcrop of bedrock reef rises to approximately 20 m below the sea surface, while the north of the site extends to more than 90 m water depth. The site lies across the 12 nm territorial sea limit. Advice on this SAC is therefore jointly delivered by the Joint Nature Conservation Committee (JNCC) and Scottish Natural Heritage (operating name of and hereinafter referred to as NatureScot).

The site represents the Annex I reef sub-types 'bedrock' and 'stony' reef (Table 1; Figure 1). Bedrock outcrops create areas of high topography, with linear features (thought to be bedrock joint planes) forming cliffs of up to 10 m in height above the surrounding seabed. Elsewhere the bedrock forms smooth and undulating features known as roches moutonnées, created by the scour effect of moving glacial ice. Stony reef comprised of boulders and cobbles with a sandy veneer occurs in ridges to the north-west and south-west of the site; these most likely represent glacial moraine ridges (the tracks of sediment carried by glacial ice). Boulders and cobbles also occur in the larger crevices in the bedrock while smaller rock fissures are filled with a mixture of coarse sand and shell/gravel veneer.

The reefs are characterised by encrusting fauna, mainly encrusting bryozoans and encrusting coralline algae in the shallower areas. Cup corals are present throughout the site, and brittlestars are common on both the bedrock and stony reef. Areas of flatter bedrock subject to sediment scour have a lower diversity of fauna than more sheltered areas. The highly scoured reef is mainly colonised by the keel worm *Spirobranchus triqueter*, while a range of sponges, bryozoans and hydroids occur on less scoured reef areas. Water movement created by tidal streams and wave action is greater in shallower areas and here there is a higher abundance of species such as the soft coral *Alcyonium digitatum*, the cup coral *Caryophyllia (Caryophyllia) smithii* and the jewel anemone *Corynactis viridis*. Foliose red algae and kelp grow in the shallowest locations where there is sufficient light penetration.

The Solan Bank Reef SAC provides geographic representation of the Annex I reef habitat in Scottish seas, and is one of eight SACs hosting this feature in Scottish seas. The Solan Bank Reef SAC is located near the border of OSPAR Region II & III, within which there are 29 protected areas for this feature ([Celtic III Seas: 24](#); [Greater North Sea II: 5](#)).

The Conservation Objectives for the Annex I Reef at Solan Bank Reef are:

Subject to natural change, maintain or restore the reef in/to favourable condition, such that:

- the natural environmental quality and processes supporting the habitat
- the extent of the habitat on site
- the physical structure, community structure, function, diversity and distribution of the habitat and typical species representative of the reef in the Northern North Sea regional sea

are maintained or restored, thereby ensuring the integrity of the site and also making an appropriate contribution to favourable conservation status of the Annex 1 habitats (see 'Conservation Objectives and Advice on Operations (2013)' in [the Solan Bank Reef MPA: Relevant Documentation & Conservation Advice 2012](#)).

The condition of the reef feature at Solan Bank Reef SAC is uncertain, resulting from a lack of detailed information on levels of exposure to human activities and their ecological impact on the feature at this site. Further information will be required to assess and monitor favourable condition of the reef feature at this offshore region SAC. There is no direct evidence to date that the feature has been damaged by human activities (as at 2012), however best available evidence indicates that demersal fishing occurs over the reef feature, exposing it to pressures to which it is sensitive and subsequently it is assessed as moderately vulnerable. Although it is likely that bottom trawlers avoid the hard substrate to prevent damage to their gear, according to the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#), the best available evidence (as at 2012) was not of sufficient spatial resolution to confirm this and so the objective was set to maintain or restore.

More information regarding the conservation objectives for the protected features of Solan Bank Reef SAC is available in the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#) for the site.

Table 1. Estimated extent of reef habitats within Solan Bank Reef SAC. The total area of Solan Bank Reef SAC is 856 km². Note: area calculations depend on the map projections used and differing map project can lead to minor discrepancies in area calculations.

Reef type	Habitat area within SAC (km²)
Deep circalittoral bedrock reef	295.1
Infralittoral bedrock reef	0.4
Shallow circalittoral bedrock reef	29.3
Stony reef	60.3
Total	385.1

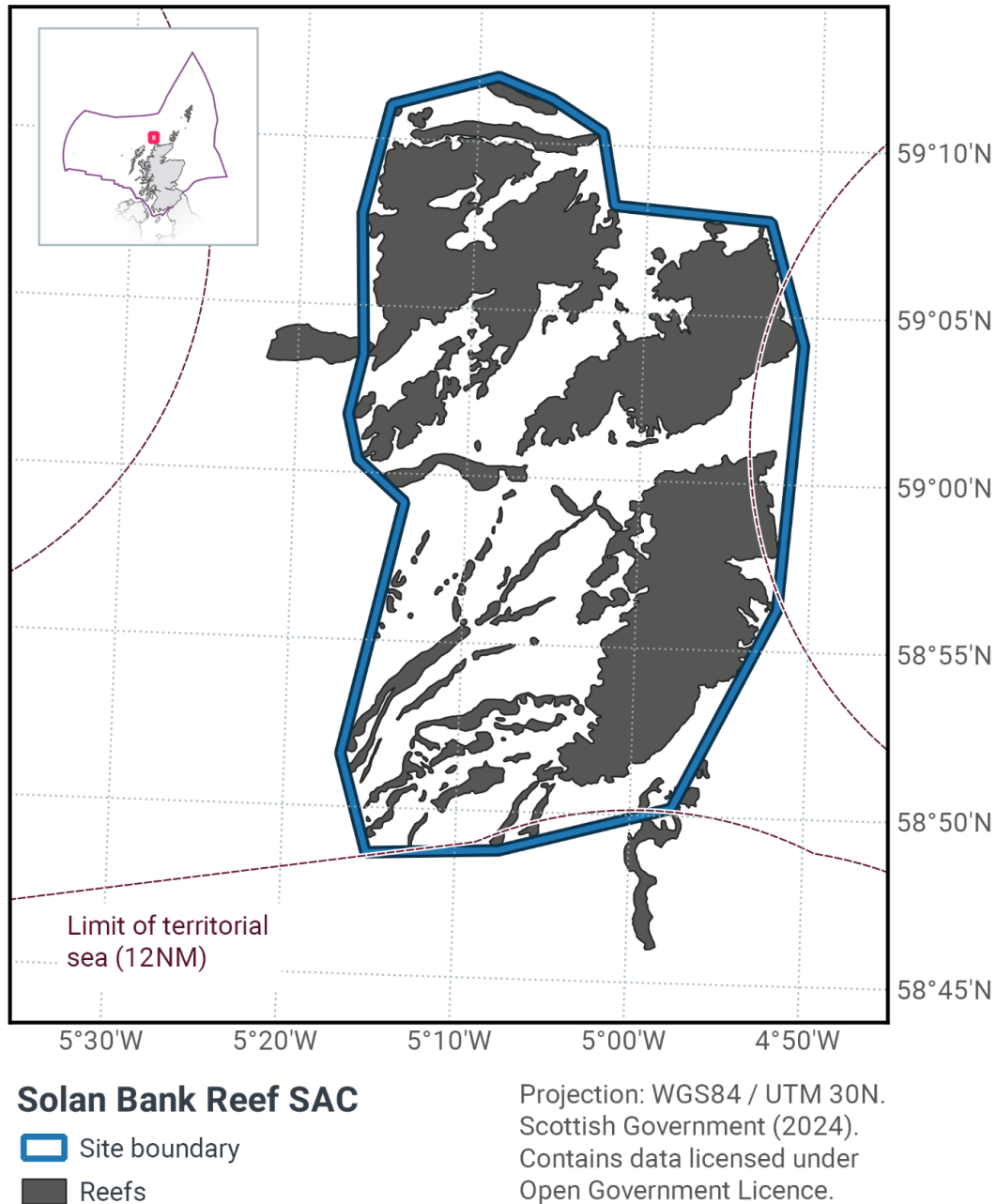


Figure 1. Solan Bank Reef SAC site map including distribution of protected features.

1.3 Activities assessed

The process followed to conduct this ‘Fisheries Assessment’ is in line with the process for a Habitats Regulation Appraisal, as required under [Article 6\(3\) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora \(the Habitats Directive\)](#); for sites within the offshore region under [Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017](#); and for sites within the inshore region under [Regulation 48\(1\) of the Conservation \(Natural Habitats, & c.\) Regulations 1994](#).

In this context, fishing activity within the SAC is considered to be the plan or project, and the implications of the fishing activity in view of the conservation objectives for the SAC are being assessed through the fisheries screening stage (Part A), the fisheries assessment (Part B), and the in combination (cumulative effect) assessment (Part C).

Fisheries assessments use the best available evidence to fully consider potential impacts of commercial fishing activity, and in-combination (cumulative) effects with other plans and projects, against the conservation objectives for the site. If the assessment concludes that use of certain fishing gear types is not compatible with the conservation objectives of the site, management measures will be considered.

Commercial sea fishing activity has the potential to vary in nature and intensity over time. This assessment considers fishing activity based on activity levels and type between 2015-2019. This date range was considered to provide the best available data on current fishing activity levels for the assessment. Using a five year date range provides an average view of fishing activity within the site; latter years (2020 – 2021) were not considered representative of regular fishing activity due to the Covid pandemic. The selected date range (2015 – 2019) was used consistently across all assessments within the consultation package. Changes in fishing activity after this time period may be considered in future reviews of this assessment (see Section 6).

2 Part A Assessment – Fisheries screening

2.1 Fisheries screening overview

Part A of this assessment meets the 'likely significant effect (LSE)' test under [Article 6\(3\) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora \(the Habitats Directive\)](#); for sites within the offshore region under [Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017](#); and for sites within the inshore region under [Regulation 48\(1\) of the Conservation \(Natural Habitats, & c.\) Regulations 1994](#). The test for likely significant effect under [Regulation 28\(2\)\(b\) of the Conservation of Offshore Marine Habitats and Species Regulations 2017](#) and [Regulation 48\(1\) of the Conservation \(Natural Habitats, & c.\) Regulations 1994](#) is not required for activities which are directly connected with or necessary to the management of the site. Fishing activities are not considered to be directly connected with or necessary to the management of the site unless otherwise indicated.

In line with the guidance within [EU Commission guidance on the Assessment of plans and projects significantly affecting Natura 2000 sites; a methodological guidance on the provisions of Article 6 \(3\) and \(4\) of the Habitats Directive 92/43/EEC](#), this assessment considers an LSE as any effect that may reasonably be predicted as a consequence of a plan or project that would negatively and significantly affect the conservation objectives established for the protected habitats and species of the protected area. If any likely significant effect of a plan or project cannot be excluded beyond reasonable doubt, then a full appropriate assessment should be undertaken.

In Part A of this assessment the pressure-feature interactions were assessed to determine the potential for LSE and risk to the conservation objectives. This section looks at the pressures exerted by the fishing activity occurring in the site (within the assessment period) in relation to the sensitivities of the protected features. The potential for an LSE was identified where there was both a medium-high risk of a pressure arising from the fishing activity and if any of the features were considered sensitive to that pressure. These pressure-features interactions were then taken forward to the appropriate assessment stage (Part B) to determine whether the plan or project would have an adverse impact on site integrity.

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 Part B:
 - a. If the feature is not exposed to the pressure, and is not likely to be in the future; or
 - b. If the effect/impact of the pressure is not likely to be significant.
2. The pressure-feature interactions were included for assessment in Part B:
 - a. If the feature is exposed to the pressure, or is it likely to be in the future; and
 - b. If the potential scale or magnitude of any effect is likely to be significant; or
 - c. If it is not possible to determine whether the magnitude of any effect is likely to be significant.

Part B of the assessment aligns with the requirements for an Appropriate Assessment under the [Conservation of Offshore Marine Habitats and Species Regulations 2017](#) (as amended) and the [Conservation \(Natural Habitats, & c.\) Regulations 1994](#) and considers the potential impact to site integrity by assessing the impact of fishing gears identified in Part A. This involves determining the potential level of interaction between the feature and the fishing activity, assessing the potential impact on the feature, and subsequently if fishing activities are liable to affect the conservation objectives of the site and thus the integrity of the site.

This involves determining the level of interaction between the feature and the fishing activity, assessing the potential impact on the feature, and subsequently if fishing activities are liable to affect the conservation objectives of the site and thus the integrity of the site.

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

The joint JNCC-NatureScot advice package '[Solán Bank Reef MPA: Relevant Documentation & Conservation Advice 2012](#)' and [JNCC Fisheries Management](#)

[Options Paper: Solan Bank Reef Special Area of Conservation](#) has been used to inform this assessment. This is the most recent assessment package and options paper available.

Where appropriate, this advice has been supplemented by information on feature sensitivity from [the Advice on Operations Package for Stanton Banks SAC](#) and pressures associated with fishing activity from the [JNCC Marine Pressures-Activities Database \(PAD\) v1.5 2022](#). As this site does not contain a published Advice on Operations Package, on the agreement with JNCC, Stanton Banks SAC Advice and Operations Package has been used as a proxy evidence package.

2.2 Activities taking place within Solan Bank Reef SAC

To screen out fishing activities that were not taking place within the site or likely to take part in the future, VMS data within Solan Bank Reef SAC from 2015 – 2019 were analysed to identify the gear types being used in the site and the aggregated gear method (Table 2). The gear types identified from 2015 – 2019 VMS data align with those included in the [JNCC Fisheries Management Options Paper: Solan Bank Reef Special Area of Conservation](#). The fishing gears screened out at this stage were not taken forward to part B of the assessment.

Solan Bank Reef SAC has two small areas of overlap with the inshore region (0-12 nm) and subsequently inshore fishing activity was also incorporated into the screening stage. Paper logbook data were checked to determine if there were inshore fishing activities occurring within this site.

The logbook data suggest that dredging for scallops takes place within the site, which is supported by the 2015 – 2019 VMS data and the [JNCC Fisheries Management Options Paper: Solan Bank Reef Special Area of Conservation](#). Although the logbook data also indicated that hand diving for scallops may take place in the site, these data were considered to be erroneous and were excluded. Paper logbook data are self-reported positions and can contain errors; given the water depth at one of the reported sites (80 m), hand diving for scallops was considered highly unlikely.

Table 2. Gear types recorded from the site based on VMS data from 2015 – 2019.

Gear type	Specific Gear Type	Gear code	Aggregated gear method
Towed	Bottom otter trawl	OTB	Demersal trawls
	Multi-rig trawls	OTT	
	Pair trawl	PTB	
	Bottom trawls (not specified)	TB	
	Scottish fly/seine	SSC	Demersal seines
Towed (pelagic)	Mid-water trawl (single)	OTM	Pelagic fishing
Dredges (towed)	Boat dredges	DRB	Boat dredges
Static- pots/traps	Pots/creels	FPO	Traps /creels

2.3 Potential pressures exerted by site fishing activities on protected features

According to the [JNCC Fisheries Management Options Paper: Solan Bank Reef Special Area of Conservation](#), the activities considered capable of affecting the reef feature are various types of demersal fishing. Pelagic fishing, in particular single mid-water trawls, whilst occurring in the site was not considered capable of affecting the reef feature as these fishing activities do not contact the bottom. Gear types considered capable of affecting the feature were retained in the assessment, gear types not considered capable of affecting the feature were screened out.

The potential pressures that could be exerted by fishing activities considered capable of affecting the Annex I reef feature (demersal trawls, boat dredges, traps, and demersal seines) were determined using information on activity-pressure relationships in the [JNCC Marine Pressures-Activities Database \(PAD\) v1.5 2022](#). The potential pressures that could be exerted by demersal trawls, demersal seines, boat dredges, and static traps are summarised in Table 3.

Within the PAD, boat dredges were considered to have a low risk of introduction of microbial pathogens however this pressure applies to native oyster populations, which are not part of the reef feature, and so this pressure was excluded from Table 3. The above water noise and collision above water pressures both had low risk profiles for all four fishing activity types, however these pressures were not considered capable of affecting the reef feature and were excluded.

Table 3. Potential pressures exerted by demersal trawls, demersal seines, boat dredges, and static traps taken from the [JNCC Marine Pressures-Activities Database \(PAD\) v1.5 2022](#). The PAD risk profiling of pressures score represents the general risk the pressures pose to the environment under normal conditions. Pressures are categorised as posing a medium/high risk (dark blue) or low risk (light blue). Pressures that are not exerted by the fishing activity are classed as not relevant (white).

PAD Pressure	Fishing activity			
	Demersal trawls	Demersal seines	Boat Dredges	Traps/Creels
Transition elements and organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC	Low			
Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	Low			

Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	Low			
Deoxygenation	Low			
Nutrient enrichment	Low	Low	Low	Not relevant
Organic enrichment	Low			
Physical change (to another seabed type)	Low	Low	Low	Not relevant
Physical change (to another sediment type)	Low	Low	Low	Not relevant
Abrasion/disturbance of the substrate on the surface of the seabed	Medium-high			
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Medium-high	Medium-high	Medium-high	Low
Changes in suspended solids (water clarity)	Medium-high	Medium-high	Medium-high	Not relevant
Smothering and siltation rate changes (light)	Medium-high	Medium-high	Medium-high	Not relevant
Litter	Low			
Underwater noise changes	Low			
Introduction of light	Low			
Barrier to species movement	Not relevant	Not relevant	Not relevant	Low
Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g. boats, machinery and structures)	Low			
Visual disturbance	Low	Low	Medium-high	Low

Introduction or spread of invasive non-indigenous species (INIS)	Low
Removal of target species	Medium-high
Removal of non-target species	Medium-high

2.4 Significance of effects/impacts to protected features

To determine whether each pressure is likely to have a significant effect on the site's features, the sensitivity assessments and risk profiling of pressures from the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#) conservation advice package and the [JNCC Marine Pressures-Activities Database \(PAD\) v1.5 2022](#) were used. A detailed JNCC Advice on Operations Spreadsheet is not available for this site.

A detailed JNCC Advice on Operations Spreadsheet is not available for Solan Bank SAC, therefore, in consultation with JNCC, the Advice on Operations Package for Stanton Banks was used as a proxy for this site due to the similarity of the features present.

Table 4 identifies the pressures from particular gears that could have a likely significant effect on each feature. Where a pressure from a particular gear is identified as not having a likely significant effect on a feature, justification is provided. To ensure the effects of fishing activities in-combination with other activities (including other fishing activities) are fully assessed, the pressures from fishing activities which were not identified as having a likely significant effect but which do interact with the feature are considered in the in-combination aspect of the assessment (Part C).

Table 4. Extract of the Advice on Operations for Stanton Banks SAC, showing the pressures from specific activities and the potential sensitivity of the protected features (Annex I Reef) of the Solan Bank SAC. Pressures are categorised as Not Relevant (white), Not Assessed (white), High sensitivity (dark blue), Sensitive (dark blue), Not Sensitive (light blue), or Insufficient Evidence (white).

Potential pressure	Protected feature sensitivity: Annex I Reef			
	Demersal trawls	Demersal seines	Dredges	Traps/Creels
Transition elements and organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC	Insufficient evidence			
Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	Insufficient evidence			
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	Insufficient evidence			
Deoxygenation	Not sensitive			
Nutrient enrichment	Insufficient evidence	Insufficient evidence	Insufficient evidence	Not relevant
Organic enrichment	Sensitive			
Physical change (to another seabed type)	Sensitive	Sensitive	Sensitive	Not relevant
Abrasion/disturbance of the substrate on the surface of the seabed	Sensitive			
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Sensitive			

Changes in suspended solids (water clarity)	Sensitive	Sensitive	Sensitive	Not relevant
Smothering and siltation rate changes (light)	Sensitive	Sensitive	Sensitive	Not assessed
Litter	Insufficient evidence			
Underwater noise changes	Not relevant			
Introduction of light	Not relevant			
Barrier to species movement	Not relevant			
Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g. boats, machinery and structures)	Not relevant			
Visual disturbance	Not relevant			
Introduction or spread of invasive non-indigenous species (INIS)	Sensitive			
Removal of target species	Not relevant	Not relevant	Not assessed	Not assessed
Removal of non-target species	Sensitive			

Considering both the information on the pressure activity association (Table 3) and the sensitivity of the reef feature (Table 4), pressures with the potential to cause likely significant effects are summarised in Table 5.

Pressures that are not relevant to demersal trawls, demersal seines, boat dredges, and traps (pressures that are not exerted by that fishing activity: 'not relevant to the activity' in Table 5) do not need to be considered further in the assessment.

According to the [PAD methods document](#) (Robson et al., 2018), pressures with low risk profiles (i.e. 'low' risk profile for the activity: Tables 3 & 5) generally do not occur at a level of concern and should not require consideration as part of an assessment, unless there are evidence-based case or site-specific factors that increase the risk, or there is uncertainty on the level of pressure on a receptor. Pressures with 'medium-high' risk profiles are commonly induced by the activity at a level that needs to be considered further as part of an assessment.

Pressures that were not relevant to the feature, do not need to be considered further in the assessment (Table 5). Pressures where the feature was 'not sensitive' (Table 4) can also be screened out. Any pressures that do not have a sensitivity assessment (either 'not assessed' or 'no evidence') should be considered as this does not mean that the feature is not sensitive, only that there is insufficient evidence to make an assessment.

Pressures with a medium-high risk profile in PAD and to which the Advice on Operations identified the feature as being sensitive would meet the definition of a likely significant effect ("any effect that may reasonably be predicted as a consequence of a plan or project that would negatively and significantly affect the conservation objectives established for the habitats and species significantly present on the site": [EU Commission, 2021](#)).

Of the pressures considered, there are six which have medium-high risk profiles for at least one of the fishing gear types and to which the feature is sensitive (Table 5). These six pressures are subsequently considered to have the potential to have likely significant effects (LSE) on the Annex I reef feature.

Of the pressures considered, there are six which have medium-high risk profiles for at least one of the fishing gear types and to which the feature is sensitive (Table 5): abrasion/disturbance of the substrate on the surface of the seabed; penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion; changes in suspended solids (water clarity); smothering and siltation rate changes (light); removal of target species and the removal of non-target species. Five of these pressures, with the exception of removal of target species, have the potential to be exerted by demersal trawls, seines and dredges. The three pressures attributed to traps/creels which are abrasion/disturbance of the substrate on the surface of the seabed, removal of non-target species and removal of target species. These six pressures are subsequently considered to have the potential to have likely significant effects (LSE) on the Annex I reef feature.

Table 5. Summary of pressures that have the potential to cause likely significant effects, based on pressure-activity associations (Table 3) and the sensitivity of the reef feature (Table 4). Pressures with the potential to cause likely significant effects (LSE) are in dark blue.

Potential pressure	Fishing Activity		
	Demersal trawls and Demersal seines	Boat Dredges	Traps/Creels
Transition elements and organo-metal (e.g. TBT) contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC	No – insufficient evidence to assess sensitivity, but low risk profile for activity.		
Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	No – insufficient evidence to assess sensitivity, but low risk profile for activity.		
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals). Includes those priority substances listed in Annex II of Directive 2008/105/EC.	No – insufficient evidence to assess sensitivity, but low risk profile for activity.		
Deoxygenation	No – low risk profile for the activity and the feature is not sensitive.		
Nutrient enrichment	No – insufficient evidence, but low risk profile for activity.	No – not relevant for the activity.	No – not relevant for the activity.
Organic enrichment	No – although the feature is sensitive, the risk profile is low.		
Physical change (to another seabed type)	No – although the feature is sensitive to this pressure, the pressure has a low	No – not relevant for the activity.	No – not relevant for the activity.

	risk profile for the activity.		
Abrasion/disturbance of the substrate on the surface of the seabed	Yes – the pressure has a medium-high risk profile AND the feature is sensitivity to this pressure.		
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	Yes –the feature is sensitive AND the pressure has a medium-high risk profile.	Yes –the feature is sensitive AND the pressure has a medium-high risk profile.	No – although the feature is sensitive, the pressure has a low risk profile
Changes in suspended solids (water clarity)	Yes - the feature is sensitive to the pressure AND has a medium-high risk profile.	Yes –the feature is sensitive AND the pressure has a medium-high risk profile.	No – not relevant for the activity.
Smothering and siltation rate changes (light)	Yes – the feature is sensitive AND the pressure has a medium-high risk profile.	Yes –the feature is sensitive AND the pressure has a medium-high risk profile.	No – not relevant for the activity
Litter	No – insufficient evidence to assess sensitivity, but low risk profile for activity.		
Underwater noise changes	No – low risk profile for activity AND the pressure is not relevant to this feature.		
Introduction of light	No – low risk profile for activity AND the pressure is not relevant to this feature.		
Barrier to species movement	No – the pressure is not relevant to the feature.		
Collision BELOW water with static or moving objects not naturally found in the marine environment (e.g. boats, machinery and structures)	No – the pressure is not relevant to the feature.		
Visual disturbance	No – the pressure is not relevant to the feature.		
Introduction or spread of invasive	No – although the feature is sensitive, the pressure has a low risk profile.		

non-indigenous species (INIS)			
Removal of target species	No – although the pressure has a medium-high risk profile, and high sensitivity, the pressure is not relevant to the feature. The benthic community associated with the feature is not being targeted by the activity.	Yes – the pressure has a medium-high risk profile and has not been assessed for dredges	Yes – the pressure has a medium-high risk profile and has not been assessed for traps
Removal of non-target species	Yes – the pressure has a medium-high risk profile AND the feature is sensitive to this pressure.		

2.5 Part A Conclusion

Considering the information on pressures and sensitivity above, and guidance within the [EU Commission guidance on the Assessment of plans and projects significantly affecting Natura 2000 sites; a methodological guidance on the provisions of Article 6 \(3\) and \(4\) of the Habitats Directive 92/43/EEC](#) in relation to European sites, mobile demersal fishing (including trawls, seines, and boat dredges) and static demersal fishing (traps) have the potential to have a likely significant effect (LSE) on the reef feature within Solan Bank Reef SAC, through abrasion/disturbance of the substrate on the surface of the seabed; penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion; changes in suspended solids (water clarity); smothering and siltation rate changes (light); removal of target species and the removal of non-target species. These six pressures are taken through to Part B of the assessment.

3 Part B Assessment – Fisheries Assessment

3.1 Fisheries assessment overview

Part B of this assessment meets the requirements for an appropriate assessment under [Article 6\(3\) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora \(the Habitats Directive\)](#) and [Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017](#), and [Regulation 48\(1\) of the Conservation \(Natural Habitats, & c.\) Regulations 1994](#) for sites wholly or partially inshore.

The fishing activities and pressures identified in Part A, at the levels identified in the relevant date range, which have been included for assessment in Part B are mobile demersal fishing (trawls, seines, and boat dredges) and static demersal fishing (traps). The only pressures associated with these fishing activities that have been included in Part B are:

- penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion;
- changes in suspended solids (water clarity) (except for creels/traps);
- smothering and siltation rate changes (light) (except for creels/traps);
- removal of target species (for creels/traps and dredges only) and
- removal of non-target species.

3.2 Fishing activity descriptions

3.2.1 Existing management within Solan Bank Reef SAC

No existing fisheries management measures or other fisheries restrictions were identified within the site.

3.2.2 Fishing activity within Solan Bank Reef SAC

The Solan Bank Reef SAC overlaps ICES rectangles 46E4 46E5, 47E4 and 47E5 in the West of Scotland (ICES Division 6a), in the North Scotland Coast region. The aggregated gear methods used in Solan Bank Reef SAC by UK vessels are demersal trawls, demersal seines, boat dredges, traps, and pelagic fishing (Table 2, in Section 2 - Part A). Pelagic fishing (mid-water trawls) was not considered capable of affecting the reef feature of Solan Bank Reef SAC as there is no contact with the seabed, and so is not considered further (see [JNCC Fisheries Management Options Paper: Solan Bank Reef Special Area of Conservation](#)). Demersal trawls, demersal seines, boat dredges, and traps are considered in more detail in the following sections.

In addition to UK activity, vessels from France (12 vessels), Ireland (8 vessels), Spain (6 vessels), Norway, Faroes, Germany, Netherlands and Lithuania (number of vessels cannot be disclosed) may also operate in the site, based on VMS data from 2015-2019. However, it is not possible to accurately determine the gear types associated with the VMS data for these non-UK vessels, or whether they were actively fishing at the time.

3.2.3 Demersal trawls

The aggregated gear method of demersal trawls includes multiple gears that operated within the Solan Bank Reef SAC between 2015 and 2019. These include bottom otter trawls, multi-rig trawls, pair trawls, and other not specified bottom trawl types. Similar pressures are exerted by the different gears used for demersal trawling, subsequently the aggregated gear type of 'demersal trawl' was used to map activity across the site.

According to the VMS intensity averaged over 2015 to 2019 demersal trawling occurs throughout the site (Figure 2). Demersal trawling is concentrated in the northeast part of the site (48 – 168 fishing hours per year per grid cell), with additional areas of high concentration in the central-eastern part of the site (24 – 48 fishing hours per year per grid cell), and a band from the western part of the site into the southeast (12 – 24 hours per year per grid cell). The remainder of the site, particularly the southwest, has lower fishing intensity (less than 12 fishing hours per year per grid cell). These activity levels are comparable to fishing activity information within the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#) for the site, where VMS data indicated that the region was fished at very low levels by UK demersal otter trawls (individual fishing effort grids of up to 50 hrs cumulatively over 2006 – 2009) with the effort distributed unevenly throughout the site.

Swept-Area Ratio (SAR) information averaged over the same time period shows similar patterns of fishing intensity as the VMS data (Figure 2). The highest SAR values are in the northeast (cells swept 2 – 5 or 1 – 2 times per year per grid cell) and in the central east and southeast of the site (cells swept 1 – 2 times per year per grid cell). The rest of the site had low SAR values (cells swept less than once per year per grid cell).

The locations identified as having higher fishing intensity through VMS and SAR; particularly in the northeast, central-east, and southeast; have the potential to overlap with the reef feature.

3.2.4 Demersal seines

The only gear within the aggregated demersal seine gear type operating within the Solan Bank Reef SAC between 2015 and 2019 was Scottish fly/seine gear. Fishing with this gear is referred to as the aggregated gear type of ‘demersal seines’ in the following sections to align with the approach taken for the rest of the assessment.

According to the VMS intensity averaged over 2015 to 2019, the distribution of demersal seines is restricted to the northern part of the site (Figure 3). The highest fishing activity is in the northwest (12 – 24 fishing hours per year per grid cell), with lower intensity fishing (less than 12 fishing hours per year per grid cell) across the north and northeast of the site.

Swept-Area Ratio (SAR) information averaged over the same time period shows similar patterns of fishing intensity as the VMS data (Figure 3). The highest SAR values are in the northwest (cells swept 2 – 5 or 1 – 2 times per year per grid cell), with lower fishing intensity across the north and northeast of the site (cells swept less than once per year per grid cell).

Overlap with the reef feature is possible across the parts of the site where fishing activity occurs.

3.2.5 Boat dredges

According to the VMS intensity averaged over 2015 to 2019, boat dredging happens at low levels (less than 12 fishing hours per year per grid cell) and is generally

located along the eastern side of the site, spanning from the northeast to the southeast and across the southern part of the site, with some activity scattered in the central parts of the site (Figure 4).

Swept-Area Ratio (SAR) information averaged over the same time period shows similar patterns of fishing intensity as the VMS data (Figure 4), with the same spatial distribution of fished areas, all with low levels of fishing intensity (cells swept less than once).

There appears to be minimal overlap with the reef feature in areas of fishing activity, with boat dredges seeming to occur between the patches of reef feature.

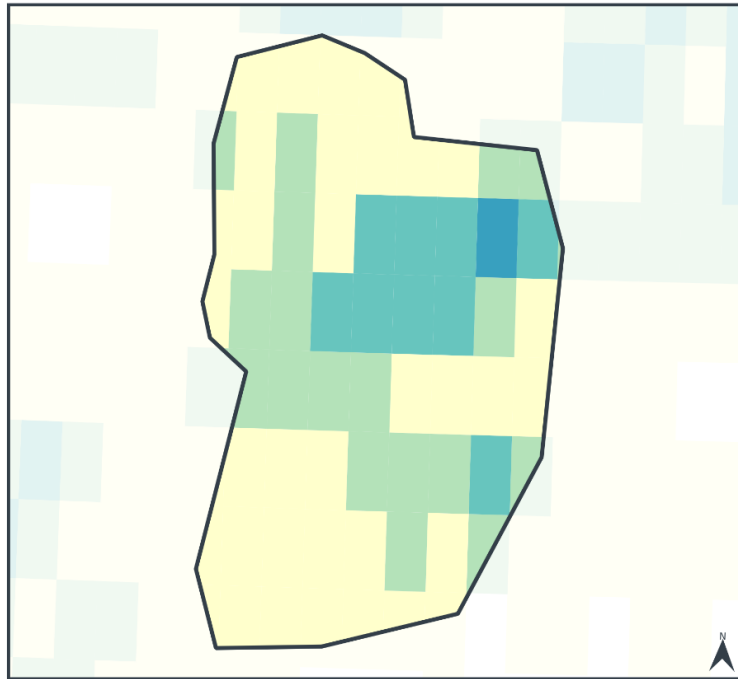
3.2.6 Traps

The only gear within the aggregated traps gear type operating within the Solan Bank Reef SAC between 2015 and 2019 was pots/creels. Fishing with this gear is referred to as the aggregated gear type of 'traps' in the following sections to align with approach taken for the rest of the assessment.

According to the VMS intensity averaged over 2015 to 2019, traps occurred throughout the site (Figure 5). The highest concentration of traps were in a band along the eastern side of the site from the east to the southeast (ranging from 48 – 168 fishing hours per year per grid cell through to 12 – 24 fishing hours per year per grid cell). Additional areas of higher fishing intensity are in the northeast (ranging from 24 – 48 fishing hours to 12 – 24 fishing hours per year per grid cell) and the northwest of the site (12 – 24 fishing hours per year per grid cell). The remainder of the site is fished at lower levels (less than 12 fishing hours per year per grid cell).

Swept-Area Ratio information is not available for static fishing, such as traps. Based on VMS data, traps have the potential to overlap with the reef feature, including in the areas of higher fishing activity.

Solan Bank Reef



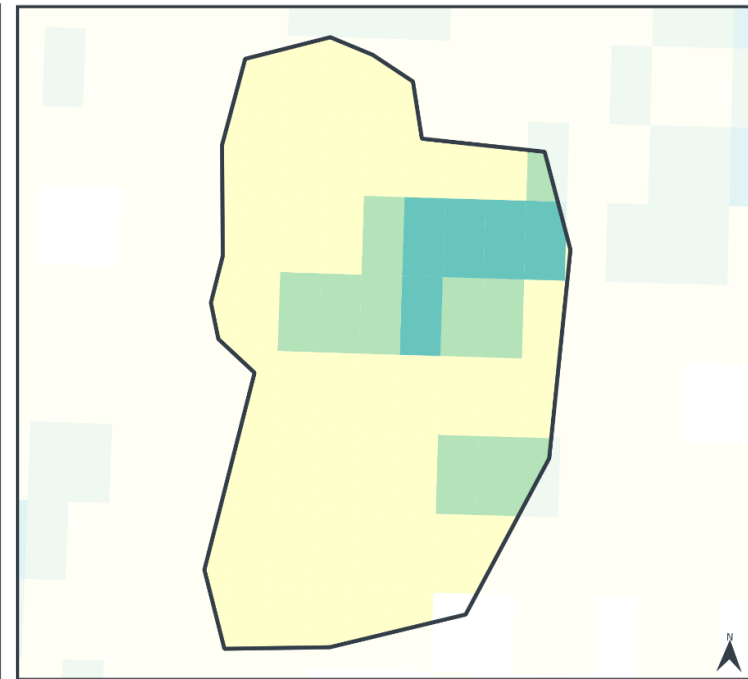
**Average VMS intensity (2015 to 2019)
for demersal trawls**

- Less than 12 hours
- 12 to 24 hours
- 24 to 48 hours (1 to 2 days)
- 48 to 168 hours (2 days to 1 week)
- 168 to 336 hours (1 to 2 weeks)
- Greater than 336 hours (Greater than 2 weeks)



Projection: WGS84 UTM 30N. Scottish Government (2024). Contains data licensed under the Open Government Licence and data from ICES Advice 2021, sr.2021.12. <https://doi.org/10.17895/ices.advice.8297>

Solan Bank Reef



**Average Swept Area Ratio (2015 to 2019)
for demersal trawls**

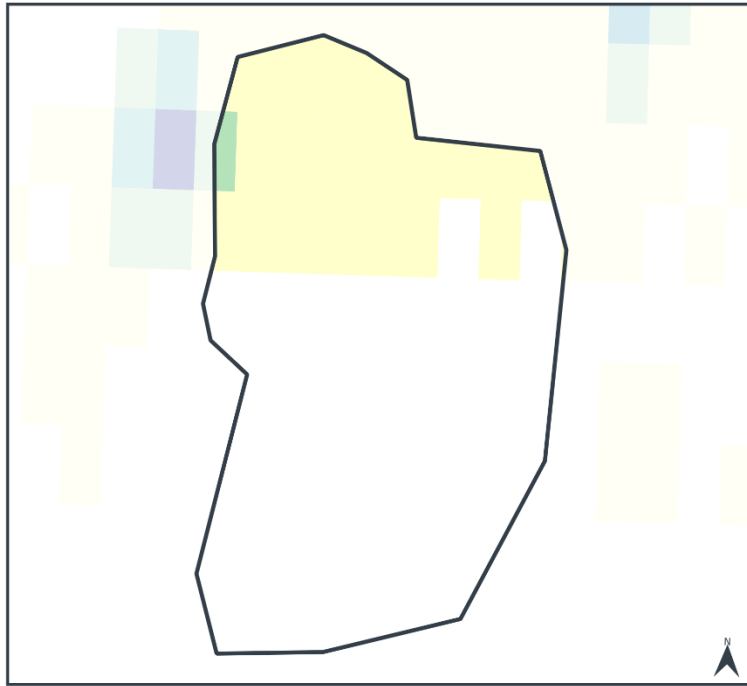
- Cell swept less than once
- Cell swept 1 to 2 times
- Cell swept 2 to 5 times
- Cell swept 5 to 10 times
- Cell swept 10 to 20 times
- Cell swept more than 20 times



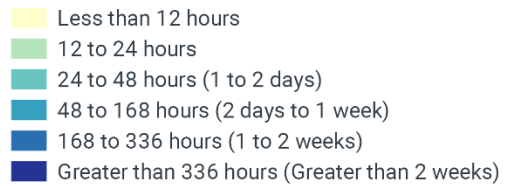
Projection: WGS84 UTM 30N. Scottish Government (2024). Contains data licensed under the Open Government Licence and data from ICES Advice 2021, sr.2021.12. <https://doi.org/10.17895/ices.advice.8297>

Figure 2. Annual fishing intensity averaged over 2015 to 2019 for demersal trawls based on VMS data (left) and Swept Area Ratio (right).

Solan Bank Reef



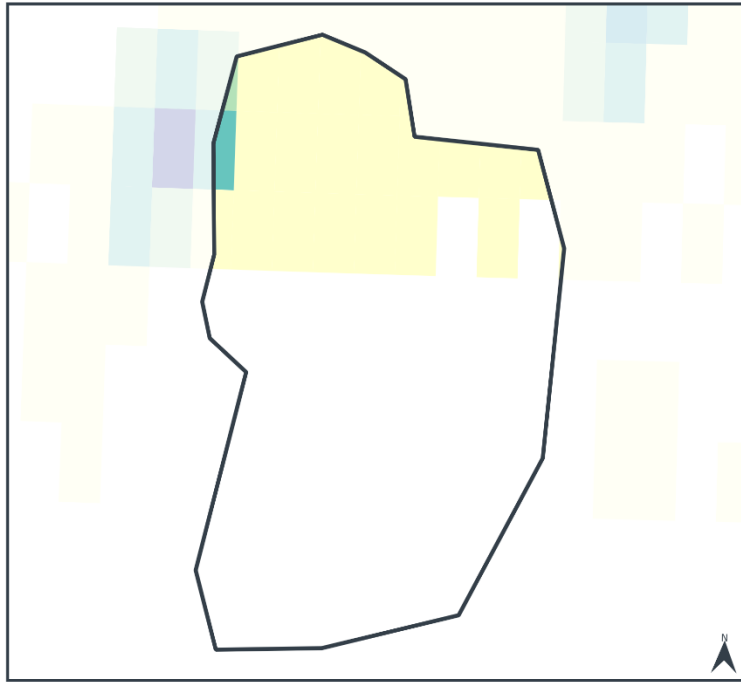
Average VMS intensity (2015 to 2019) for demersal seines



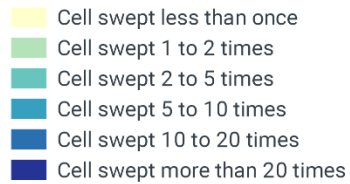
0 10 km

Projection: WGS84 UTM 30N. Scottish Government (2024). Contains data licensed under the Open Government Licence and data from ICES Advice 2021, sr.2021.12. <https://doi.org/10.17895/ices.advice.8297>

Solan Bank Reef



Average Swept Area Ratio (2015 to 2019) for demersal seines

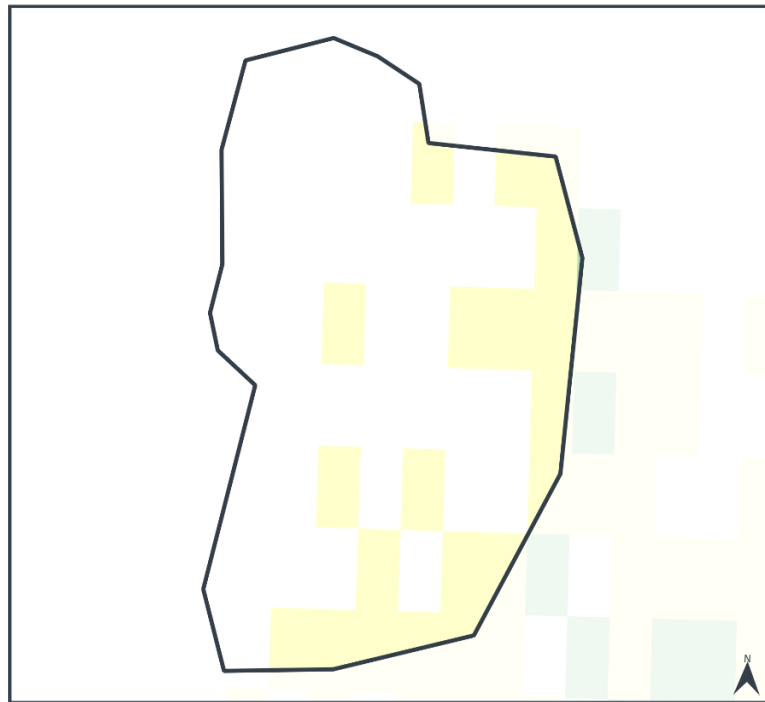


0 10 km

Projection: WGS84 UTM 30N. Scottish Government (2024). Contains data licensed under the Open Government Licence and data from ICES Advice 2021, sr.2021.12. <https://doi.org/10.17895/ices.advice.8297>

Figure 3. Annual fishing intensity averaged over 2015 to 2019 for demersal seines based on VMS data (left) and Swept Area Ratio (right).

Solan Bank Reef



**Average VMS intensity (2015 to 2019)
for boat dredges**

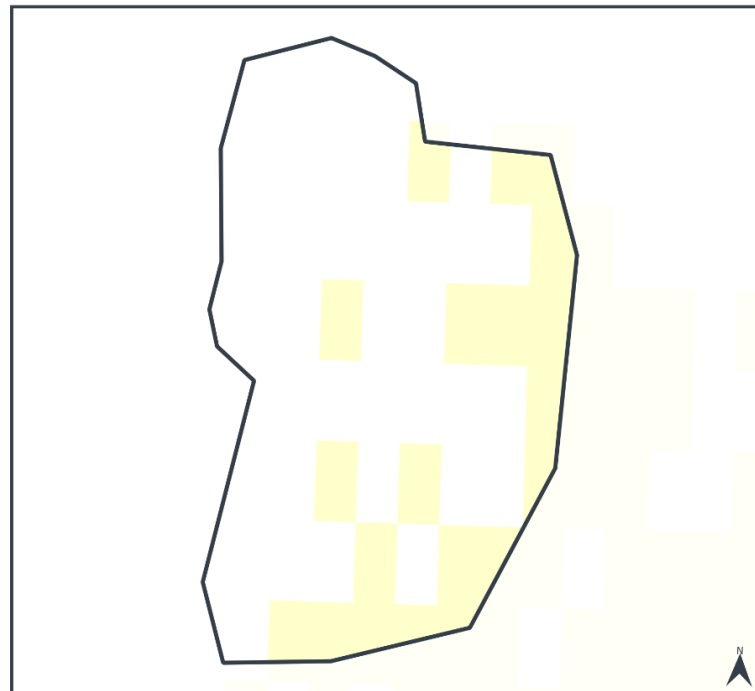
- Less than 12 hours
- 12 to 24 hours
- 24 to 48 hours (1 to 2 days)
- 48 to 168 hours (2 days to 1 week)
- 168 to 336 hours (1 to 2 weeks)
- Greater than 336 hours (Greater than 2 weeks)



0 10 km

Projection: WGS84 UTM 30N. Scottish Government (2024). Contains data licensed under the Open Government Licence and data from ICES Advice 2021, sr.2021.12.
<https://doi.org/10.17895/ices.advice.8297>

Solan Bank Reef



**Average Swept Area Ratio (2015 to 2019)
for boat dredges**

- Cell swept less than once
- Cell swept 1 to 2 times
- Cell swept 2 to 5 times
- Cell swept 5 to 10 times
- Cell swept 10 to 20 times
- Cell swept more than 20 times

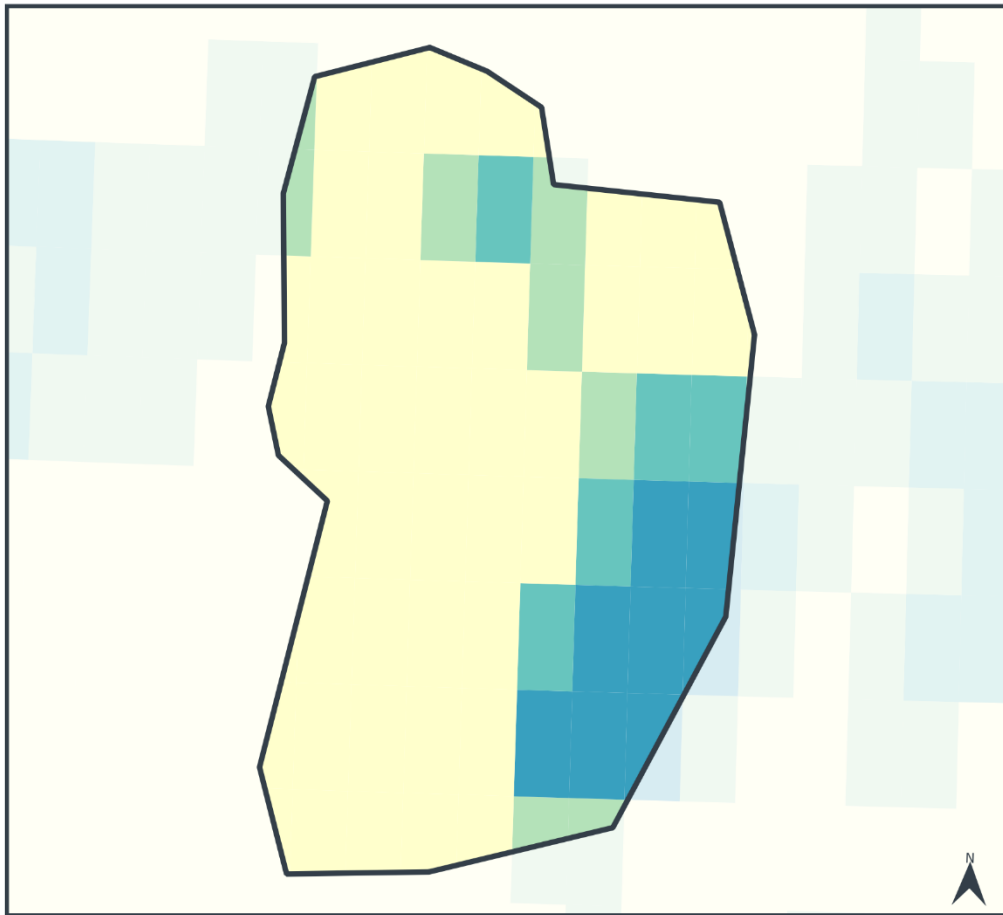


0 10 km

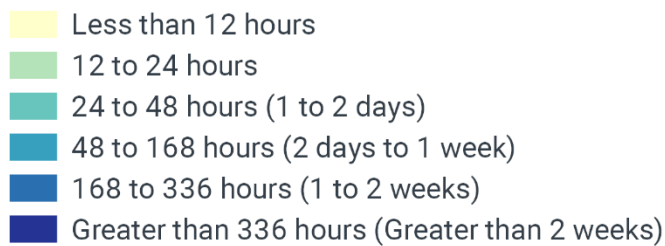
Projection: WGS84 UTM 30N. Scottish Government (2024). Contains data licensed under the Open Government Licence and data from ICES Advice 2021, sr.2021.12.
<https://doi.org/10.17895/ices.advice.8297>

Figure 4. Annual fishing intensity averaged over 2015 to 2019 for boat dredges based on VMS data (left) and Swept Area Ratio (right).

Solan Bank Reef



Average VMS intensity (2015 to 2019) for creels/traps (UK vessels only)



0 10 km

Projection: WGS84 UTM 30N. Scottish Government (2024). Contains data licensed under the Open Government Licence

Figure 5. Annual fishing intensity averaged over 2015 to 2019 for creels/traps based on VMS data.

3.2.7 Fishing activity summary

Fishing activities using demersal trawls, demersal seines, boat dredges, and traps/creels all occur within the Solan Bank Reef SAC. Demersal trawling activity occurs at higher intensity in the northeast, central-east, and in a band from the west into the southeast of the site. Demersal seines and boat dredges are more restricted in their distributions; demersal seines have the potential to overlap with the reef feature, whilst boat dredges appear to occur between patches of the feature. Traps

are used throughout the site, with higher intensity along the eastern side of the site, broadly following the distribution of the reef feature.

3.3 Fishing activity effects overview

The following sections explore the pressures associated with fishing activity (demersal trawls, demersal seines, boat dredges, traps) within the Solan Bank Reef SAC that were identified as potentially having likely significant effects on the reef feature. The pressures considered in the following sections are:

- Abrasion/disturbance of the substrate on the surface of the seabed;
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion;
- Changes in suspended solids (water clarity) (except for traps/creels)
- Smothering and siltation rate changes (light) (except for traps/creels);
- Removal of target species (for traps/creels and dredges only) and
- Removal of non-target species.

These six pressures were associated with both or either mobile demersal fishing activity (trawls, seines, boat dredges) and static demersal fishing (traps) and are discussed under the aggregated fishing gear types of 'mobile demersal gears' and 'static demersal gear'.

Given the absence of a detailed JNCC Advice on Operations spreadsheet for this site, the detailed pressure information for this section is based on information from JNCC PAD and the Advice on Operations spreadsheet for Stanton Banks which is also protected for Annex I Reefs.

3.3.1 Impacts of mobile demersal gears (trawls, seines, boat dredges) on Annex I Reef

As detailed in the [JNCC Marine Pressures-Activities Database \(PAD\) v1.5 2022](#), abrasion/disturbance of the substrate on the surface of the seabed occurs where gear makes contact with the seafloor. The area affected is determined by the footprint of the gear and the amount of movement across the seabed. The different gear components will make variable contributions to the total physical disturbance of the seabed and its associated biota, and hence the pressure will vary according to factors such as gear type, design/modifications, size and weight, method of operation (including towing speed) and habitat characteristics (e.g. topography) (Lart, 2012; Polet & Depestele, 2010; Suuronen et al., 2012). Towed bottom fishing gears are used to catch species that live in, on or in association with the seabed and therefore are designed to remain in close contact with the seabed. That interaction with the seabed can lead to disturbance of the upper layers of the seabed, direct removal, damage, displacement or death of the benthic flora and fauna; short-term attraction of scavengers; and the alteration of habitat structure (Kaiser et al., 2003; Gubbay & Knapman, 1999; Sewell & Hiscock, 2005; Collie et al., 2000; Kaiser et al., 2002).

Benthic seines are generally of lighter construction as there are no trawl doors or warps, resulting in less disturbance of the seabed than trawling (Polet & Depestele,

2010; Donaldson et al., 2010; Suuronen et al., 2012). As a relative comparison of gear types, otter trawls tend to have less physical impact on the seafloor than beam trawls (and dredges) with their heavy tickler chains, although the doors of an otter trawl do create recognisable scour of the seabed (Hinz et al., 2012; Polet & Depestele, 2010; Lart, 2012; Paschen et al. 2000). Due to their penetrative nature and close contact with the seabed, scallop dredges cause substantial physical disruption to the seafloor by ploughing sediments and damaging organisms. The Newhaven dredges used by the UK king scallop fishery are likely to be one of the most damaging types of scallop dredge due to the effect of their long teeth, which can penetrate 3 – 10 cm into the seabed (Howarth & Stewart, 2014; Hinz et al., 2012).

The magnitude of the immediate response to fishing disturbance, cumulative effects and recovery times varies significantly according to factors such as the type of fishing gear and fishing intensity, the habitat and sediment type, and levels of natural disturbance and among different taxa (Collie et al., 2000; Boulcott et al., 2014; Kaiser et al., 2006; Hinz et al., 2009; Kaiser et al., 2001).

Changes in suspended solids and siltation rates may result from physical disturbance to the seabed, along with hydrodynamic action caused by the passage of towed gear, leading to entrainment and suspension of the substrate behind and around the gear components and subsequent siltation (Sewell et al., 2007; Gubbay & Knapman, 1999; Lart, 2012; Kaiser et al. 2002; Riemann & Hoffmann, 1991; O'Neill et al., 2008; Dale et al., 2011; O'Neil & Summerbell, 2011). The quantity of suspended material and its spatial and temporal persistence will depend on factors associated with the gear (e.g. weight, towing speed), sediment (e.g. particle size composition), the intensity of the activity and the background hydrographic conditions (Sewell et al., 2007; Kaiser et al., 2002).

Turbid plumes can reduce light levels while sediment remobilisation and deposition can affect the settlement, feeding and survival of biota through smothering of feeding and respiratory organs. Prolonged exposure of an area to these pressures may result in changes in sediment composition (Sewell et al., 2007; Gubbay & Knapman, 1999; Kaiser et al., 2002; O'Neil & Summerbell, 2011).

Bycatch (i.e. discarded catch) is associated with almost all fishing activities and is related to factors such as gear type and its design (i.e. its selectivity), the target species and effort. There are significant concerns over the impacts of discards on marine ecosystems including changes in population abundance and demographics of affected species and altered species assemblages and food web structures (Alverson et al., 1994; Kaiser et al., 2001). As with other benthic towed gears, discarding of fish species from demersal seine net fisheries can be significant (Polet & Depestele, 2010; ICES, 2011). These are relatively few studies of the non-fish bycatch composition for demersal seines, however, it is probably similar to that of demersal trawls e.g. crustaceans and other invertebrates, etc., although quantities of such bycatch are likely to be lower than that of other gear types such as beam trawls (Suuronen et al., 2012; ICES, 2011; Donaldson et al., 2010; Walsh & Winger, 2011). Mixed-species and shrimp/prawn demersal trawl fisheries are associated with the

highest rates of discarding and pose the most complex problems to resolve (Alverson et al., 1994; Feekings et al., 2012; Catchpole et al., 2005). Benthic trawls most frequently result in bycatch of fish crustaceans and other invertebrates and less frequently turtles and birds (Gubbay & Knapman, 1999; Sewell & Hiscock, 2005; ICES, 2013; Pierpoint, 2000; Bergmann & Moore, 2001; Catchpole et al., 2005; Tulp et al., 2005). Dredging can result in bycatch of fish, crustaceans and other invertebrates, turtles and even marine mammals (Gubbay & Knapman, 1999; Sewell & Hiscock 2005; NOAA Fisheries, 2012; Hinz et al., 2012; Craven et al., 2013). Of all the fishing gears, scallop dredges are considered to be the most damaging to non-target benthic communities (MESL & NE, 2013).

Demersal seines, trawling and dredging may also affect the reef feature through removal of target species. Dredges are used to collect a variety of shellfish (e.g. scallops) which may themselves be part of the feature or may be species forming part of the biotope or associated with the wider community and ecosystem function (Gubbay & Knapman, 1999; Sewell & K. Hiscock, 2005; JNCC & Natural England, 2011).

As detailed in the [JNCC Fisheries Management Options Paper: Solan Bank Reef Special Area of Conservation](#), whilst it is unlikely that mobile bottom contact gear can affect the long-term natural distribution of bedrock and stony reef features, there is evidence to indicate that the use of bottom contacting mobile gears can impact the structure and function of the habitat and the long term survival of its associated species. The use of towed fishing gears is likely to cause damage or death of fragile, erect species, such as sponges and corals (Løkkeborg 2005; Freese et al., 1999). Other species such as hydroids, anemones, bryozoans, tunicates, and echinoderms may also be vulnerable (McConnaughey et al., 2000; Sewell & Hiscock, 2005). Where fragile, slow growing species occur, even low levels of fishing have the potential to change the structure and function of the habitats and may result in the loss of some characteristic species.

According to the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#) for the site, the reef at Solan Bank is exposed to physical disturbance and abrasion at low levels due to otter trawling and creeling. Although it is likely that bottom trawlers avoid the hard substrate to prevent damage to their gear, according to the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#), the best available evidence (as at 2012) was not of sufficient spatial resolution to confirm this.

The most recent [NatureScot and JNCC Conservation Objectives and Advice on Operations](#) indicated that mobile demersal fishing (including demersal trawling, demersal seining and boat dredges) poses a moderate risk of damage to Solan Bank Reef habitat. The Solan Bank reefs and associated biological communities were assessed as moderately vulnerable to 1) physical damage through physical disturbance or abrasion; and 2) biological disturbance through selective extraction of species, resulting from demersal fishing.

Considering the current levels of mobile demersal trawl and seine fishing activity within the site, and information on the impacts of abrasion/disturbance of the

substrate on the surface of the seabed and removal of non-target species, demersal trawling and demersal seining are causes for concern for the reef feature of Solan Bank Reef SAC. This aligns with the 2023 [JNCC Fisheries Management Options Paper: Solan Bank Reef Special Area of Conservation](#), which advises that the option of 'no additional management' for mobile demersal fishing would pose significant risk of not achieving the conservation objectives for the reef feature.

There is a risk that abrasion/disturbance of the substrate on the surface of the seabed caused by mobile demersal gear (trawls, seines, and boat dredges) may not help the achievement of favourable condition. Even if the impacts across gear types vary, mobile demersal fishing gears are likely to have negative impacts on biological communities across the Solan Bank Reef SAC and these gears are not considered compatible with maintaining the Annex I reef feature in, or restoring it to, favourable condition.

Through physical impacts from gear interacting with the seabed, mobile demersal gear has the potential to affect maintaining or restoring reef in/to favourable condition, such that the natural environmental quality and processes supporting the habitat, the extent of the habitat on site, and the physical structure, community structure, function, diversity and distribution of the habitat and typical species representative of the reef in the Northern North Sea regional sea are maintained or restored. Accordingly, Scottish Ministers conclude that demersal trawls, seines, and dredges alone are not compatible with the conservation objectives of the site and may result in an adverse effect on site integrity.

3.3.2 Impacts of static demersal gears (traps) on Annex I Reef

As detailed in the [JNCC Marine Pressures-Activities Database \(PAD\) v1.5 2022](#), abrasion/disturbance of the substrate on the surface of the seabed can result from surface disturbance caused by contact between the pots/traps and any associated ground ropes and anchors. This occurs during setting of the pots/traps and/or by movement of the gear over the seabed, for example during rough weather or during retrieval. Such physical disturbance can result in epifauna, especially emergent species such as erect sponges and coral, being dislodged (including snagged on the pot) or damaged, although there are limited studies of such effects (Lart, 2012; Polet & Depestele, 2010; Walmsley et al., 2015; Gubbay & Knapman, 1999; Sewell & Hiscock, 2005; Coleman et al., 2013). The individual impact of a single fishing operation may be slight but cumulative damage may be significant (Eno et al., 2001; Foden et al., 2010). It was recently suggested that pot fishing at lower pot densities did not have negative impacts on seafloor communities, although negative effects did occur at higher pot densities (e.g. where pot densities exceeded 15 – 25 pots per 0.25 km²: Rees et al. (2021).

Bycatch (i.e. discarded catch) is associated with almost all fishing activities and is related to factors such as the gear type and its design (i.e. its selectivity), the targeted species and effort. There are significant concerns over the impacts of discards on marine ecosystems, including changes in population abundance and demographics of affected species and altered species assemblages and food web structures (Alverson et al., 1994; Kaiser et al., 2001). Whilst generally considered

one of the most selective gear types, pots/traps are associated with bycatch, including of non-target crustaceans (berried females of target species are also considered bycatch in some fisheries, for example), fish, mammals (e.g. seals in cod pots) and potentially some bird species (ICES, 2013; Sewell & Hiscock, 2005; Königson et al., 2015). Bycatch survival rates are generally higher for pots than other fishing gear types (Suuronen et al., 2012; Seafish, 2014). However, the associated ropes can also result in entanglement of turtles and mammals (Sewell and Hiscock, 2005; Pierpoint, 2000). Salmon nets and fyke nets have been associated with bycatch of birds and mammals (Murray et al., 1994; Cullen & McCarthy, 2002; ICES, 2013; Lunneryd et al., 2005), as well as non-target fish species.

As detailed in the [JNCC Fisheries Management Options Paper: Solan Bank Reef Special Area of Conservation](#), mechanical impacts of static gear (e.g., weights and anchors hitting the seabed, hauling gear over seabed, rubbing/entangling effects of ropes) can damage some species (Eno et al., 1996). Other species appear to be resilient to individual fishing operations, but the effects of high fishing intensity are unknown (Eno et al. 2001). Recovery will be slow (Foden et al., 2010) resulting in significant reduction or even loss of characteristic species. The individual impact of a single fishing operation may be slight but cumulative damage may be significant (Eno et al., 2001; Foden et al., 2010). It was recently suggested that pot fishing at lower pot densities did not have negative impacts on seafloor communities, although negative effects did occur at higher pot densities (e.g. where pot densities exceeded 15 – 25 pots per 0.25 km²: Rees et al. (2021).

Considering the current levels of static demersal trap fishing within the site, and information on the impacts of abrasion/disturbance of the substrate on the surface of the seabed and removal on non-target species, trap fishing is not currently a cause of concern for the reef feature of Solan Bank Reef SAC. This aligns with the 2023 [JNCC Fisheries Management Options Paper: Solan Bank Reef Special Area of Conservation](#), which advises that the option of 'no additional management' is considered sufficient for bottom contacting static gear (including the aggregated trap gear type) to achieve the conservation objectives for the reef feature. However, if monitoring showed evidence of detrimental effects as a result of static gear activity in the future, additional management may be required.

Given the evidence above, the impacts of abrasion/disturbance of the substrate on the surface of the seabed and removal of non-target species from demersal static gear (traps) alone within Solan Bank Reef SAC at current activity levels would not affect maintaining or restoring the reef feature in/to favourable condition, such that the natural environmental quality and processes supporting the habitat, the extent of the habitat on site, and the physical structure, community structure, function, diversity and distribution of the habitat and typical species representative of the reef in the Northern North Sea regional sea are maintained or restored. Accordingly, Scottish Ministers conclude that demersal static gear (traps) alone are compatible with the conservation objectives of the site at current activity levels and will not result in an adverse effect on site integrity.

3.4 Part B Conclusion

The assessment of fishing pressures at current activity levels on reef features of the Solan Bank Reef SAC has indicated that an adverse effect on site integrity cannot be ruled out where mobile demersal fishing (demersal trawl, demersal seine, and boat dredge) activities occur. As such Scottish Ministers conclude that management measures to restrict mobile demersal gears would be required within Solan Bank Reef SAC to ensure the integrity of the site. Section 5 contains further details on potential measures.

Scottish Ministers conclude that the remaining static demersal fishing activities (traps), when considered in isolation and at current levels, are compatible with the conservation objectives of the site and will not result in an adverse effect on site integrity for Solan Bank Reef SAC.

4 Part C Assessment – In-combination Assessment

4.1 In-combination assessment overview

This section assesses the in-combination provision within under [Article 6\(3\) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora \(the Habitats Directive\)](#) to take account of the cumulative impacts, which may occur over space and time, in relation to plans or projects which are completed, approved but uncompleted, or proposed. Activities assessed in this section include the following:

- Fishing activity/pressure combinations which were excluded in Part A of this assessment as having no likely significant impact;
- Fishing interactions assessed in Part B but not resulting in adverse effects; and
- Plans and projects occurring within Solan Bank Reef SAC that are not related to fishing.

Fishing activities including demersal trawls, demersal seines, and boat dredges have been identified in Part B as requiring management to avoid adverse effects to site integrity and will therefore not be considered in Part C. Static fishing using traps was not considered to have an adverse effect on site integrity on its own and is assessed in combination with other plans or projects occurring at the site in Part C. Although pelagic fishing was shown to occur in the site, as in Part A, pelagic mid-water trawl fishing has been classified as not relevant to the protected features within the site as the activity and feature do not interact. Therefore, there is no potential for in-combination effects.

4.2 Other offshore region activities screening

To determine plans and projects not related to fishing activities to be included within this part of the assessment, a distance of 5 km was selected as suitable to capture any potential source receptor pathways that could impact the site in combination with effects of the fishing activities assessed. A 5 km buffer was therefore applied to the site boundary to identify relevant plans and projects.

Plans and projects not related to fishing activities were identified using the [Scottish Government's marine mapping tool](#). The [NatureScot and JNCC Conservation Objectives and Advice on Operations](#), and other resources on the [JNCC Site Information Centre](#) for Solan Bank Reef SAC, were also screened for activities occurring in the site that should be considered in the in-combination assessment.

The map to display offshore region activities (see Fig. 6) was derived from [OceanWise's Marine Themes Vector data](#) (July 2023 version), [Crown Estate Scotland leases](#) (September 2023 version), Kingfisher Information Services Offshore Renewable Cable Awareness (KIS-ORCA, as of December 2023 held under licence) and North Sea Transition Authority (NSTA, as of December 2023, data held under Oil and Gas Authority open licence). The Marine Themes "Industrial" was filtered to show offshore region platforms, wellheads, piles, turbines, cables, and pipelines. Features marked as "not in use", "not present", "decommissioned", or "removed" were excluded. The "Administrative" data were filtered to only show military exercise areas which included danger areas.

4.3 Other offshore region activities occurring with Solan Bank Reef SAC

The screening exercise using the [Scottish Government's marine mapping tool](#) did not identify any current cables, pipelines, turbines or piles, wellheads, or offshore region platforms within the site (see Fig. 6). There is an offshore region wind lease approximately 5 km southwest of the site but this does not intersect with the site and no offshore region wind infrastructure is currently located within the proximal part of the lease area. A military danger area overlaps with the southeast corner of the site.

The [Solan Bank Reef SAC Selection Assessment Document \(2012\)](#) confirmed that oil and gas exploration is not operating in the region of Solan Bank Reef, and no cables or pipelines run in the vicinity of the site. According to the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#) for the site, there is a wreck of an unknown craft within the site boundary. The [JNCC Site Information Centre for Solan Bank Reef SAC](#) indicates there is low density of commercial shipping in the area; however due to its offshore region location, high-energy and occasionally shallow environment, vessel anchorage is unlikely within the site.

Solan Bank Reef

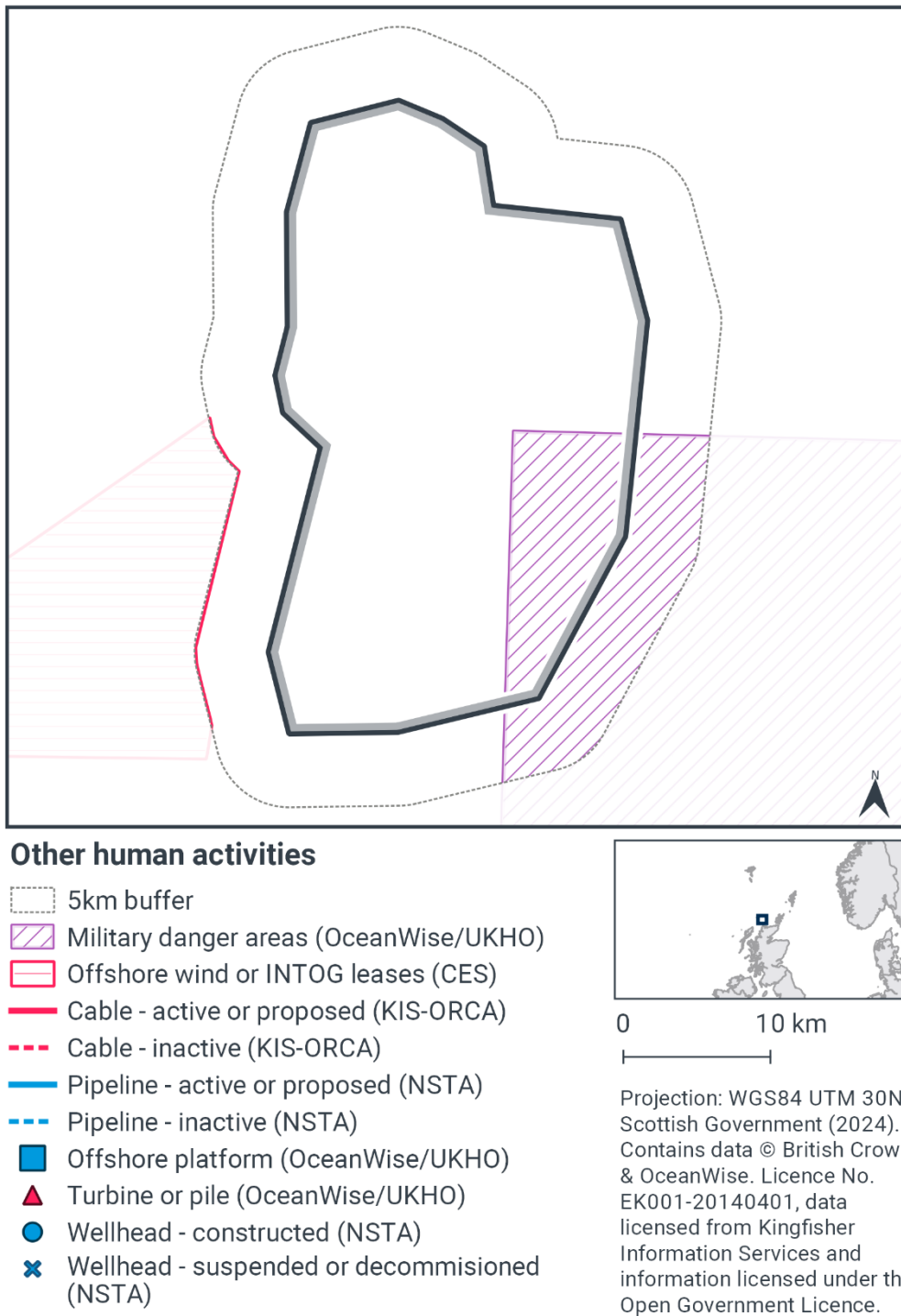


Figure 6. Other offshore region activities occurring within or near to the Solan Bank Reef SAC.

4.4 Potential pressures exerted by fishing and other plans or projects

The offshore region wind lease approximately 5 km southwest of the site does not intersect with the site and no offshore region wind infrastructure is currently located within the proximal part of the lease area. Subsequently there is no spatial overlap

with or proximity to the reef feature within the site, and offshore region wind activities are not considered capable of impacting the reef feature within the site.

According to the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#) for the site, the Solan Bank Reef SAC was assessed as exposed to a low level of physical loss (obstruction) from historic wrecks. Although there is a wreck of an unknown craft within the site boundary, which is considered to provide very low levels of obstruction, the same pressure is not associated with the fishing activities occurring in the site. Thus the obstruction provided by the wreck is not considered further as part of the in-combination assessment.

Although the [JNCC Site Information Centre for Solan Bank Reef SAC](#) indicates there is low density of commercial shipping in the area, vessel anchorage is unlikely; thus the pressures associated with shipping activity within Solan Bank Reef SAC are not considered likely to impact the reef feature within the site.

The military danger area that overlaps with the southeast corner of the site is a surface danger area / firing danger area and was not considered able to impact the seafloor reef feature.

4.5 Significance of effects/impacts to protected features

None of the other offshore region activities occurring within the Solan Bank Reef SAC exerted pressures on the reef feature that would overlap with the pressures exerted by static demersal fishing (traps). Accordingly, there were no likely significant effects identified within the in-combination assessment. Considering the absence of likely significant effects, the assessment did not identify any in-combination activities that could adversely affect the site integrity of Solan Bank Reef SAC.

4.6 Part C Conclusion

Scottish Ministers conclude that the remaining fishing activities (demersal static gear: traps) in-combination with other relevant activities are compatible with the conservation objectives of the site and will not adversely affect the site integrity of Solan Bank Reef SAC, at current levels of activity.

5 Management options

5.1 Overview of management options

Management measures are being considered by Scottish Ministers and any decision as to which measures out to be taken forward will follow upon a statutory public consultation exercise. Any such decision will also be taken in line with the Scottish Ministers obligations in relation to the exercise of their functions.

The socioeconomic impacts and costs of each management option (no additional management, zoned management, and full site exclusion) have been assessed within the Socio-Economic Impact Assessment (SEIA) and Sustainability Appraisal (SA), and are not discussed within this fisheries assessment. Nor are other considerations, statutory and non-statutory, which the Scottish Ministers may be

required to take into account when assessing whether the imposition of a particular measure is appropriate.

This section assesses the suitability of management options solely in light of the conservation objectives, biological characteristics of protected features, and current activity levels for Solan Bank Reef SAC.

5.2 Assessment of management options

5.2.1 No additional management

The assessment identified that management measures would be required to avoid adverse effects on site integrity from mobile demersal gear (demersal trawls, demersal seines, and boat dredges). Thus, the option of no management is not considered further.

5.2.2 Zoned management

Zoned fisheries management measures would be introduced to reduce/limit pressures. This would involve:

- Temporal and spatial measures apply to the site with the full site closed to all demersal mobile gears except in September and October where demersal trawls and seines will be permitted to fish a designated zone as shown in Figure 7.

There would be no zoned management measures for demersal static gear (including traps/creels), as the need for additional management for this fishing type was not identified during the assessment.

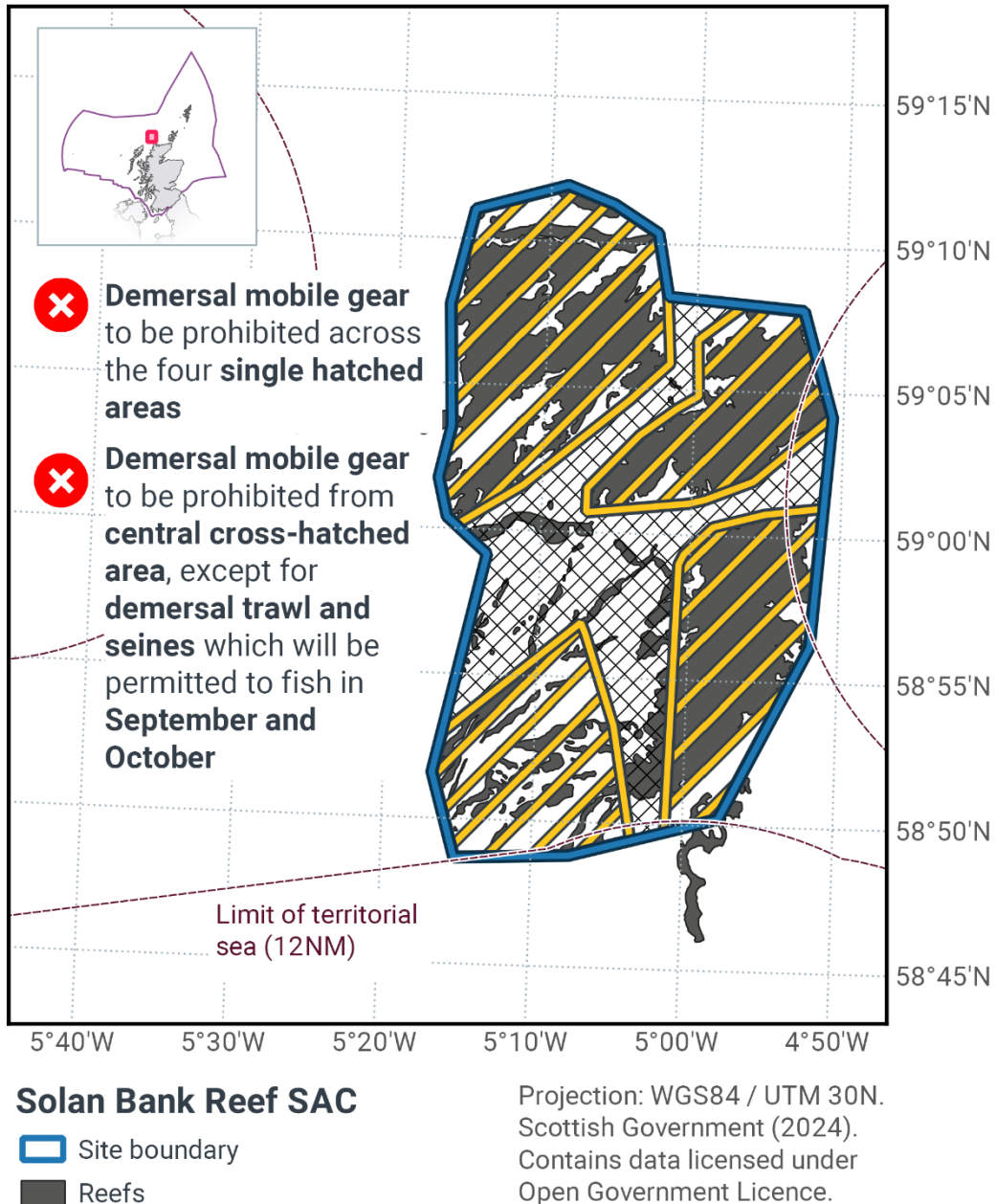


Figure 7. Solan Bank Reef SAC map of zoned management measures where the full site would be closed to demersal mobile gears, except in September and October where demersal trawls and seines would be permitted to fish in the double hatched area.

Table 6 provides details of the reef subtypes present within the Solan Bank Reef SAC and the proportion of each that would be protected by the zoned management measures. In this case, 100% of reef habitat will be protected from mobile demersal fishing for ten months of the year. In the other two months (September and October) 65.8% of bedrock reef and 26.5% of stony reef will be potentially exposed to fishing pressure from demersal trawls and seines. This exposure equates to 8.1% of the total reef resource.

Table 6. Extent of reef in Solan Bank Reef SAC protected by management measures.

Reef type	Habitat area within SAC (km²)	% protected demersal mobile gears November – August inclusive	Habitat within demersal mobile gear management zone (km²) applied September and October	% protected demersal mobile gears September and October
Deep circalittoral bedrock reef	295.1	100	280.2	95.0
Infralittoral bedrock reef	0.4	100	0.4	100
Shallow circalittoral bedrock reef	29.3	100	29.0	99.1
Stony reef	60.5	100	44.3	73.2
Total	385.1	100	353.9	91.9

This zoned management option would therefore remove/avoid pressures from some demersal mobile gear (boat dredges) across the whole site, and reduce/limit pressures from other demersal gear (demersal trawls and seines), which would only be permitted to operate in specified areas of the site in September and October. This approach would exclude demersal mobile gear from the main areas of bedrock and stony reef sub-types, whilst allowing fishing to continue in fishable areas between the features for some of the year.

It is possible that these fishable areas may include some areas where the distribution of reef is unknown or uncertain, and some very small areas of known reef. There would therefore be a very low risk of small-scale localised impact to the structure and function of reef communities in these areas. It is likely that bottom trawlers avoid the hard substrate to prevent damage to their gear, however according to the [NatureScot and JNCC Conservation Objectives and Advice on Operations](#) the best available evidence (as at 2012) was not of sufficient spatial resolution to confirm this.

Considering the small spatial extent of potential fishing activities with demersal seines and trawls, and the limited time over which these may occur, these activities were not assessed as affecting the maintenance or restoration of the reef feature, such that the natural environmental quality and processes supporting the habitat, the extent of the habitat on site, and the physical structure, community structure, function, diversity and distribution of the habitat and typical species representative of the reef in the Northern North Sea regional sea are maintained or restored, thereby ensuring the integrity of the site. This aligns with JNCC advice that this zoned option would not pose a risk to the maintenance of the long term extent and distribution of the Annex I Reef features (JNCC, 2023).

The zoned management approach would contribute to avoiding the broader decline of reef features and retaining the ecological coherence of both the Scottish MPA Network and the broader OSPAR MPA Network.

Having considered the conservation and fisheries management advice from the statutory nature conservation bodies, and the wider evidence contained within this assessment, Scottish Ministers consider the zoned management measures will not affect the maintenance or restoration of the reef feature in/to favourable condition within Solan Bank Reef SAC, and the zoned management measures are sufficient to avoid an adverse effect on site integrity.

Considering the patchy distribution of the Annex I reef feature and the relatively coarse resolution of the available fishing activity data, under the zoned management approach Scottish Ministers may consider an enhanced activities monitoring plan for this site.

5.2.3 Full site exclusion

Full site exclusion would remove/avoid all pressures associated with fishing activities using mobile demersal gear through prohibiting the use of demersal mobile gears (including trawls, seines, and dredges) across the whole site throughout the year (Figure 8). No prohibitions would be considered for any static demersal gear (including traps), as the need for additional management for this fishing type was not identified during the assessment.

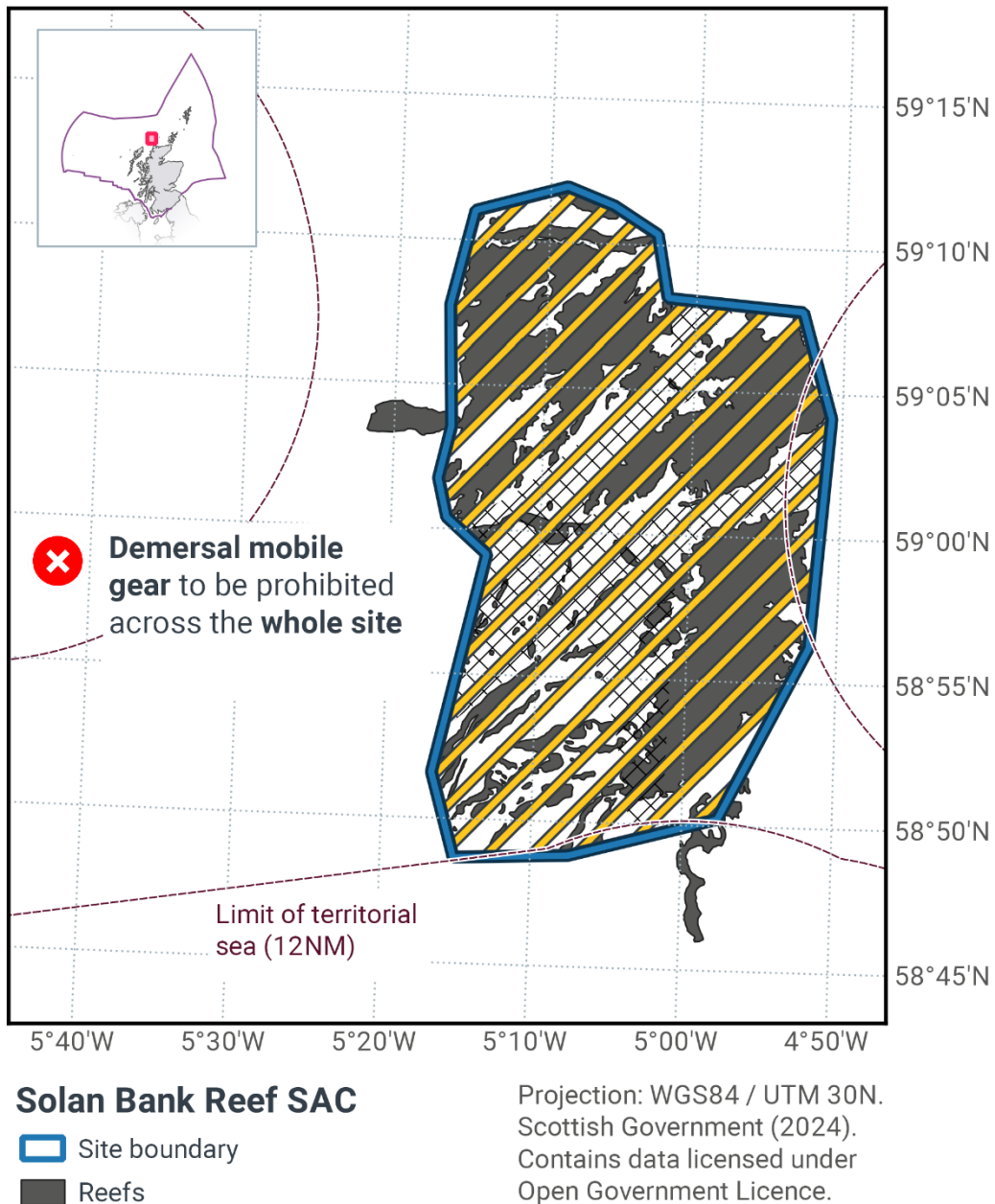


Figure 8. Solan Bank Reef SAC map of full site management measures where the full site would be closed to demersal mobile gears throughout the year.

Removing all pressures associated with demersal mobile gears would support the maintenance or restoration of the reef feature in/to favourable condition, such that the natural environmental quality and processes supporting the habitat, the extent of the habitat on site, and the physical structure, community structure, function, diversity and distribution of the habitat and typical species representative of the reef in the Northern North Sea regional sea are maintained or restored, thereby ensuring the integrity of the site.

Full site year-round exclusion of mobile demersal gear would contribute to avoiding the broader decline of reef features and retaining the ecological coherence of both the Scottish MPA Network and the broader OSPAR MPA Network.

Given the available evidence, Scottish Ministers consider that full site exclusion would support the maintenance or restoration of the reef feature in/to favourable condition and this management measure would be considered sufficient to avoid an adverse effect on the site integrity of Solan Bank Reef SAC.

5.3 Management options conclusions

Scottish Ministers consider that adopting no additional management measures for mobile demersal fishing would pose the risk of adversely affecting the site integrity of Solan Bank Reef SAC. Scottish Ministers consider that both the zoned management measures and the full site exclusion option for mobile demersal fishing would be sufficient to avoid an adverse effect on site integrity. At current activity levels, fishing using static demersal gear (traps/creels) is not considered to pose a risk to the site integrity of Solan Bank Reef SAC, and no additional management is currently required for this activity.

The decision on which management option is to be taken forward will be taken in light of all relevant duties incumbent upon the Scottish Ministers in relation to the exercise of their functions and following upon a statutory public consultation exercise in which views on the options under consideration are invited.

6 Monitoring and review

Scottish Ministers will review this assessment as required. A review of this assessment may be in response to updated conservation advice; updated advice on the condition of the feature; new information on the sensitivity of the feature to pressures arising from activities within the site; or information on changes in fishing activity within the site.

To coordinate the collection and analysis of information regarding activity levels a monitoring and control plan may be developed for this site. Although management measures for static gear are not currently considered for this site, should activity levels increase, or monitoring showed evidence of detrimental effects, management measures may need to be reassessed.

7 Conclusion

Scottish Ministers have had regard to best available evidence and conclude that, provided appropriate management measures for fishing activities as identified above are implemented, any remaining fishing activities are compatible with the conservation objectives of this Special Area of Conservation.

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