Supplementary Advice on Conservation Objectives for Bassurelle Sandbank Special Area of Conservation

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Contents

Introduction

What the conservation advice package includes

The information provided in this document sets out JNCC's supplementary advice on the conservation objectives set for this site. This forms part of JNCC's formal conservation advice package for the site and must be read in conjunction with all parts of the package as listed below:

- Background Document explaining where to find the advice package, JNCC's role in the provision of conservation advice, how the advice has been prepared, when to refer to it and how to apply it;
- Conservation Objectives setting out the broad ecological aims for the site;
- Statements on:
    - the site's qualifying feature condition;
    - conservation benefits that the site can provide; and
    - conservation measures needed to support achievement of the conservation objectives set for the site.
- Supplementary Advice on Conservation Objectives (SACO) providing more detailed and site-specific information on the conservation objectives (this document); and
- Advice on Operations providing information on those human activities that, if taking place within or near the site, can impact it and present a risk to the achievement of the conservation objectives.

The most up-to-date conservation advice for this site can be downloaded from the conservation advice tab in the Site Information Centre (SIC) on JNCC's website.

The advice presented here describes the ecological characteristics or 'attributes' of the site's qualifying feature: Annex I Sandbanks which are slightly covered by seawater all the time specified in the site's conservation objectives. These attributes include extent and distribution, structure and function and supporting processes.

Figure 1 below illustrates the concept of how a feature's attributes are interlinked: with impacts on one potentially having knock-on effects on another e.g. the impairment of any of the supporting processes on which a feature relies can result in changes to its extent and distribution and structure and function.

Collectively, the attributes set out in Table 1 below, along with the objectives set for each of them, describe the desired ecological condition (favourable) for the site's feature. The condition of each feature contributes to its favourable conservation status more widely, as well as the site's integrity. All attributes listed in Table 1 must be taken into consideration when assessing impacts from an activity.

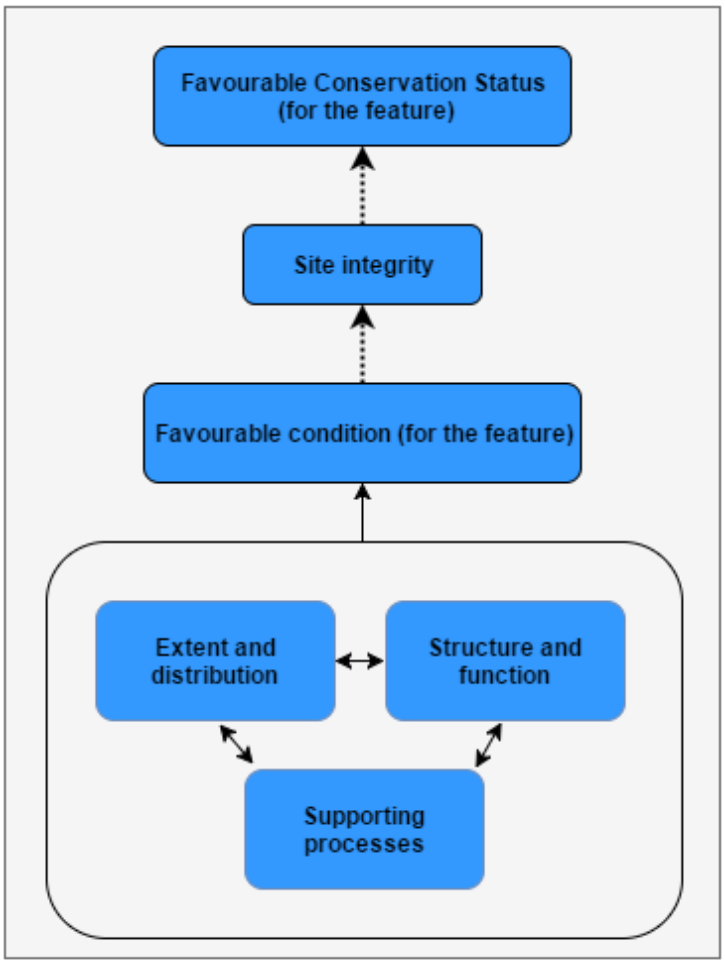

Figure 1. Conceptual diagram showing how feature attributes are interlinked, describe favourable condition and contribute to site integrity and wider favourable conservation status.

In Table 1 below, the attributes for the Annex I Sandbanks which are slightly covered by seawater all the time are listed and a description provided in explanatory notes. An objective of restore or maintain is set for each feature attribute. The objective reflects our current understanding of a feature's condition e.g. where evidence indicates some of a feature extent is lost and needs to be restored or that extent is not lost and needs to be maintained in order to ensure the feature is in overall favourable condition. The rationale for setting an objective is also provided in the explanatory notes, along with reference to supporting evidence from the site. Note that where it is not practical through human intervention to

restore a feature’s attribute, a maintain objective is set, accompanied by a statement to reflect the impracticality of restoration.

Note also that when a maintain objective is set, this does not preclude the need for management, now or in the future. Please see the conservation measures for further detail regarding managing activities.

Table 1. Supplementary advice on conservation objectives (SACO): Annex I Sandbanks slightly covered by seawater all the time

Attribute: Extent and distribution

Objective: Maintain

JNCC understands the site is not subject to activities that are considered capable of impacting the feature's extent and distribution. There is no evidence to suggest any loss of feature extent from the site. ***JNCC advise a maintain objective*** *based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities. Our confidence in this objective would be improved with longer-term monitoring information. Activities must look to minimise, as far as is practicable, changes in substrata and the biological communities associated with the feature.*

Explanatory notes

Extent refers to the total area in the site occupied by the qualifying feature and must include consideration of its distribution, i.e. how it is spread out within the site. A reduction in extent has the potential to alter the biological and physical functioning of sedimentary habitat types (Elliott *et al.,*1998). The distribution of a habitat influences the component communities present, and can contribute to the health and resilience of the feature (JNCC, 2004b). The extent within the site must be conserved to the full known distribution.

Annex I sandbanks which are slightly covered by seawater all the time are defined and delineated (Duncan, 2016) by:

- ***large-scale topography*** which is elevated, elongated, rounded or irregular, permanently submerged and predominantly surrounded by deeper water (EC, 2013);
- ***sediment composition*** that is mainly sandy sediments (sand is defined as sediment particles between 2 mm and 0.0625 mm in diameter and sandy sediment must be composed of less than 30% gravel and have more sand than mud). Other sediment types including boulders, cobbles or mud may also be present on a sandbank; and
- ***biological assemblages***. See JNCC's Marine Habitat Correlation Table for more detail about the range of biological communities (biotopes) that can occur on Annex 1 sandbanks.

Loss of large scale topography would constitute loss of the sandbank feature extent. Loss of characterising sandbank biological assemblages or sandbank sediments from an area of the feature would constitute loss of sandbank habitat and a reduction in overall feature extent.

In the UK offshore area, there are two different types of sandbank:

1. Sandy mound sandbanks: created by glacial processes which have long since stopped acting on the feature. While surface sediments may be mobilised, the extent and distribution of the sandbanks as a whole remain broadly unaffected by ongoing hydrodynamic processes. It is important to note that we would not expect large scale topography or the underlying immobile substrates to recover, should they be physically impacted. The sandbank communities, however, are capable of recovering from impacts but this will be dependent on prevailing environmental conditions, the influence of human activities i.e. the scale of any current impacts, species life history traits, environmental connectivity between populations and habitat suitability (Mazik *et al.,* 2015); and
2. Open shelf ridge sandbanks: can be relatively mobile with their extent and distribution being actively influenced by ongoing hydrodynamic processes and subsequently changing naturally over time. Recovery from physical impacts for these types of sandbanks is possible but again dependent on the range of factors mentioned in 1 above.

Extent and distribution within the site

The site map for Bassurelle Sandbank SAC is available on JNCC's Interactive MPA Mapper and shows the extent and distribution of the feature within the site. The site is a representative example of the Annex I feature *Sandbanks which are slightly covered by sea water all the time* and is an example of an open shelf ridge sandbank formed by tidal currents. The feature is considered to include the bank, flanks and troughs in the site. The site boundary delineates the feature, calculated to be 67 km^2. This site is adjacent to the Ridens et dunes hydrauliques du Detroit du Pas de Calais SAC in French waters and the south-west boundary of the site is drawn to the UK-France median line.

The complex nature of the physical topography of the bank has presented challenges in delineating the extent of the topographic feature within the site (Fróján *et al.,* 2017). At the time of designation, the Annex I feature boundary was defined using the Klein method, drawn to closely follow the 30 m contour. Since this time, JNCC has devised a methodology (Ellwood, 2014) which relies on a mixture of slope analysis, using a 0.5° cut-off to define the bottom of the bank, as well as expert judgement. However, this approach has not been feasible for Bassurelle due to the complexity of the finer scale topography of the site, and an expert driven approach has been used to delineate the topographic extent of the sandbank. Whilst our understanding of the feature extent has not changed (the site area of 67 km^2 continues to constitute the feature extent), our understanding of the feature's large-scale topography has changed due to a change in the delineation process.

There is no evidence from survey to suggest that the extent has changed as a result of human activities and there are no human activities occurring in or near the site which are considered capable of impacting the features extent and distribution.

JNCC advise a maintain objective based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities. Our confidence in this objective would be improved with longer-term monitoring information. Activities must look to minimise, as far as is practicable, changes in large scale topography, substrata and the biological communities associated with the feature. Further information on the impacts associated with human activities on Annex I Sandbanks slightly covered by seawater all the time can be found in the Advice on Operations workbook for the site.

Attribute: Structure and function

Objective: Restore

JNCC understands that the site has been subjected to activities that have resulted in a change to the structure and function of the feature within the site. Fishing activity may have a continuing effect on structure and function, specifically the characteristic communities of the site. As such, ***JNCC advise a restore objective*** *which is based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities i.e. demersal fishing. Our confidence in this objective would be improved with longer-term monitoring and access to better information on the activities taking place within the site. Activities must look to minimise, as far as is practicable, disturbance and changes to the biological communities within the site.*

Explanatory notes

Structure

Structure encompasses both the physical structure of a habitat type together with the biological structure. **Physical structure** refers to finer scale topography and sediment composition and distribution Physical structure can have a strong influence on the hydrodynamic regime at varying spatial scales in the marine environment as well as the presence and distribution of biological communities (Elliott *et al.,* 1998). This is particularly true of features like sandbanks which are large-scale topographic features. The biological structure refers to the key and influential species and characteristic communities present. Biological communities are important in not only characterising the sandbank feature but supporting the health of the feature i.e. its conservation status and the provision of ecosystem services by performing functional roles.

Physical structure: finer scale topography

Sandbank topography can be characterised by finer scale bedforms such as sand waves, mega-ripples and mounds which are driven by hydrodynamic processes. These bedforms can support different sediment types and associated communities (Elliott *et al.,* 1998; Barros *et al.,* 2004; Limpenny *et al.,* 2011). Where finer bedforms are known to be naturally present on a sandbank feature they should be conserved.

Physical structure: finer scale topography within the site

Bassurelle Sandbank is distinct from the surrounding seafloor due to the thickness of the sediment (up to 25 m thick) resulting in its elevation above the wider seabed. Topographic features have been observed on the sandbank feature within the site. Mega ripples are characteristic of the topography of the north-facing flank of the western part of the feature, whilst on the south flank, large sand waves (of up to 2.5 m in height) have been observed (Froján *et al.,* 2017). It is not clear whether these finer scale topographic features are mobile or relatively static in nature and therefore if the feature within the site could change naturally over time.

The main activity occurring in the site is demersal trawling, primarily beam trawling. This activity can cause physical abrasion; penetrating the seabed. Due to their relatively large-scale nature however, demersal trawling is not considered capable of impacting the physical structure of the feature's finer scale topography i.e. mega ripples and sand waves.

JNCC advise a maintain objective based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities. Our confidence in this objective would be improved with longer-term monitoring information and a better understanding of the natural change in sand wave and mega ripple distribution within the site.

Further information on the impacts associated with human activities on Annex I *Sandbanks slightly covered by seawater all the time* can be found in the Advice on Operations workbook for the site.

Physical structure: sediment composition and distribution

Sediment composition of sandbanks is highly dependent on the level of energy experienced by the environment. It can be varied but in the offshore tends to be limited to primarily circalittoral sand but also circalittoral coarse sediments and to a lesser extent, circalittoral mixed

sediments where finer sediment fractions (mud, silt/clay) are present. Coarser sediments tend to be located in higher energy environments that are subject to strong prevailing currents. Conversely, finer sediment types are typically associated with lower energy environments. Storm conditions however, can mobilise all sediment types including coarser fractions. Furthermore, it is important to note that the composition and spatial distribution of sediments can change naturally over time.

Many functional ecological groups have specific niche sedimentary requirements; some species occur on all types of sediment, but most are restricted to a type and therefore limited in their distribution. Particle composition (including grain size and type) is a key driver influencing the biological community composition (Cooper *et al.,* 2011; Coates *et al.,* 2015; 2016; Coblentz *et al.,* 2015) and the distribution and extent of these communities (JNCC, 2004b). The natural range of sedimentary habitats known to be present within a sandbank along with their composition and distribution, should be conserved.

Physical structure: sediment composition and distribution within the site

As previously mentioned, Bassurelle Sandbank is distinct due to the thickness of the sediment (up to 25 m thick) and the resulting elevation above the surrounding seafloor. Finer sediments (sublittoral sands) composed of over 99% sand content are prevalent in the shallower regions (towards the middle and east) of the site. Coarser sediment (sublittoral coarse sediment) predominates in the deeper areas towards the southwest of the site. Only a few patches of coarser sediment have been noted in the north-eastern corner of the survey area (Froján *et al.,* 2017). Coarse sediment within the site ranges in content between 5.5% and 38.5% gravel, 59.9% and 93.6% sand and 9.9% and 6.5% silt/clay.

Relatively high levels of demersal trawling, specifically beam trawling is reported as occurring across the entire site. This activity can cause abrasion but is not considered capable of removing sediment which comprises the feature.

Overall, JNCC consider that the activities occurring within the site are not capable of removing material which would result in a change to sediment composition and distribution within the site. **JNCC advise a maintain objective** based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities. A better understanding of the natural change in sediment composition and distribution within the site is required.

Further information on the impacts associated with human activities on Annex I *Sandbanks slightly covered by seawater all the time* can be found in the Advice on Operations workbook for the site.

Biological structure: key and influential species

Key species form a part of the habitat structure or help to define a biotope. Influential species are those that have a core role in the structure and function of the habitat. For example, species that are bioturbators which are benthic organisms that forage and burrow bottom tunnels, holes and pits in the seabed, help to cycle nutrients and oxygen between seawater and the seabed supporting organisms that live within and above the sediment. Grazers, surface borers, predators or other species with a significant functional role linked to the habitat can also be influential species. Changes to the spatial distribution of communities across the feature could indicate changes to the overall feature (JNCC, 2004b). It is therefore important to conserve the key natural structural and influential species of the sandbank within the site to avoid diminishing biodiversity and ecosystem functioning within the habitat and to support its health (JNCC, 2004a; Hughes *et al.,* 2005).

Biological structure: key and influential species within the site

There is insufficient information available to support an understanding of the significance of the role which species play in maintaining the structure and function of the habitat. Therefore, it is not possible to set an objective for this particular sub-attribute and it is not considered relevant at this current time.

Biological structure: characteristic communities

The variety of communities' present make up the habitat and reflect the habitat's overall character and conservation interest. Characteristic communities include, but are not limited to, representative communities, for example, those covering large areas, and notable communities, for example, those that are nationally or locally rare or scarce such as those listed as OSPAR threatened or declining, or known to be particularly sensitive.

The biological communities typical of sandbanks will vary greatly depending on location, sediment type and depth, as well as fine-scale physical, chemical and biological processes. Communities found on sandbank crests are predominantly those typical of mobile sediment environments and tend to have relatively low diversity. Fauna such as polychaetes (worms) and amphipods (shrimp-like crustaceans) thrive in this

environment as they are able to rapidly bury themselves. Animals like hermit crabs, flatfish and starfish also live on the surface of the sandbanks. Deeper areas more sheltered from prevailing currents or wave action can have reduced sediment movement. Such areas tend to have a higher diversity of burrowing species and often can support an abundance of attached bryozoans, hydroids and sea anemones, particularly on stones and dead shells.

Changes to the spatial distribution of communities across the feature could indicate changes to the overall feature (JNCC, 2004b). For example, non-native species may become invasive and displace native organisms by preying on them or out-competing them for resources such as food, space or both. In some cases, this has led to the elimination of indigenous species from certain areas (JNCC, 2004d). It is therefore important to conserve the natural spatial distribution, composition, diversity and abundance of the main characterising biological communities of the sandbank within the site to avoid diminishing biodiversity and ecosystem functioning within the habitat and to support its health (JNCC, 2004a; Hughes *et al.,* 2005).

Biological structure: characteristic communities within the site

A report produced by Froján *et al.* (2017) based on a scientific survey of the site in 2013 collected information on the characteristic communities found within the site. The feature itself is reported to comprise predominantly of A5.2 Sublittoral sand, with a large area of A5.1 Sublittoral coarse sediment to the south-west of the site.

Generally speaking, biological communities are reported as being more prevalent both in terms of numbers and species diversity in the deeper parts of the site (particularly towards the north-east and south-west corners and in the area associated with A5.1 Sublittoral coarse sediment). Communities that were reported to characterise A5.2 Sublittoral sand on the shallower parts of the sandbank included those typical of relatively unstable, clean sandy sediments (e.g. the polychaete *Nephtys cirrosa*, the bristle worms *Ophelia borealis* and *Spiophanes bombyx,* the hermit crab *Pagurus bernhardus*, the brittlestar *Ophiura spp*. and the hydroid *Hydrallmania falcata*). Communities that were reported to characterise A5.1 Sublittoral coarse sediment in the deeper areas of the site included more sessile and encrusting animals such as sponges, bryozoans, anemones, barnacles and keel worms.

The Lesser sandeel (*Ammodytes tobianus*) and Weever fish (*Echiichthys vipera*) are also present on the bank. The region is a nursery area for lemon sole, mackerel and sandeel and a spawning area for cod, lemon sole, sole, plaice, sand eel and sprat (Coull *et al.,* 1998; Ellis *et al.,* 2010b; Ellis *et al.,* 2012).

High levels of demersal trawling, specifically beam trawling, are occurring across the site which can impact the characteristic communities of the feature through pressures such as abrasion and the removal of non-target species.

JNCC advise a restore objective for the characteristic communities of the feature within the site based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities i.e. demersal trawling activities. Our confidence in this objective would be improved with longer-term monitoring information, access to better information on the activities taking place within the site. Activities must look to minimise, as far as is practicable, disturbance and changes to the sediment composition, finer scale topography and biological communities within the site.

Further information on the impacts associated with human activities on Annex I *Sandbanks slightly covered by seawater all the time* can be found in the Advice on Operations workbook for the site.

Function

Functions are ecological processes that include sediment processing, secondary production, habitat modification, supply of recruits, bioengineering and biodeposition. These functions rely on the supporting natural processes and the growth and reproduction of those biological communities which characterise the habitat and provide a variety of functional roles within it (Norling *et al.,* 2007) i.e. key and influential species and characteristic communities

These functions can occur at a number of temporal and spatial scales and help to maintain the provision of ecosystem services locally and to the wider marine environment (ETC, 2011). Ecosystem services typically provided by Annex 1 sandbanks include:

- Nutrition: due to the level of primary and secondary productivity on or around sandbanks, a range of fish species use these areas as feeding and nursery grounds. Some will migrate to certain parts of the habitat for feeding and breeding e.g. cod, plaice, dab, sole (Ellis *et al.,* 2012), whilst others are more resident e.g. sandeels (Scottish Natural Heritage, 2012) making the conservation of sandbanks important to the fishing industry;
- Bird and whale watching: foraging seals, cetaceans and seabirds may also be found in greater numbers in the vicinity of sandbanks due to their shallower nature that enhances the availability of their typical prey items (e.g. Daunt *et al.,* 2008; Scott *et al,* 2010; Camphuysen *et al.,* 2011; McConnell *et al.,* 1999, Jones *et al.,* 2013); and

- Climate regulation: by providing a long-term sink for carbon within sedimentary habitats.

The prevailing hydrodynamic regime and sedimentary composition have a strong influencing effect on the recovery potential of the functional components of subtidal sedimentary habitats – with higher-energy, coarser sedimentary habitats showing greater recovery potential following impact than lower-energy, finer sedimentary habitats (Dernie *et al.,* 2003). Recovery of populations of individual species or communities also depends on life history traits of species (e.g. their growth rate, longevity), and interactions with other species including predators. Furthermore, the environmental connectivity between populations or species patches, the suitability of the habitat (e.g. substrate type), depth, water and sediment quality (Mazik *et al.,* 2015) will also influence the recovery potential of features.

The natural range of sandbank communities within the site should be conserved to ensure the functions they provide support the health of the feature and the provision of ecosystem services to the wider marine environment.

Function of the feature within the site

The ecosystem services that may be provided by the *Sandbanks which are slightly covered by seawater all the time* within the site include:

- **Nutrition** – the site provides a feeding ground where prey is made available for a variety of species of commercial importance. The region is a nursery area for lemon sole, mackerel and sand eel and a spawning area for cod, lemon sole, sole, plaice, sand eel and sprat (Coull *et al.,* 1998; Ellis *et al*., 2010a; Ellis *et al.,* 2010b; Ellis *et al.,* 2012); and
- **Climate regulation** – the range of sedimentary habitats and associated communities in the site perform known ecological processes common to sandbanks such as deposition and burial of carbon in seabed sediments through bioturbation, living biomass and calcification of benthic organisms sinks (Hattam *et al*., 2015).

JNCC advise a restore objective for function within the site based on our understanding of impacts to the characterising communities from ongoing activities i.e. demersal trawling as detailed previously. Our confidence in this objective would be improved by longer-term monitoring information, access to better information about the activities occurring within the site and a clearer understanding of the role which biological communities play in the health of the feature and its provision of ecosystem services. Activities must look to minimise, as far as is practicable, disturbance and changes to the biological communities within the site to conserve the functions that it provides to the wider marine environment.

Further information on the impacts associated with human activities on Annex I *Sandbanks slightly covered by seawater all the time* can be found in the Advice on Operations workbook for the site.

Attribute: Supporting processes

Objective: Maintain

JNCC do not consider there are to be any activities taking place that are capable of impacting upon the supporting processes on which the feature is dependent. As such, a ***maintain objective*** *is advised. Our confidence in this objective would be improved with long-term monitoring, specifically of contaminant levels and a better understanding of the hydrodynamic regime within the site. Activities must look to avoid, as far as is practicable, impairing the hydrodynamic regime within the site and exceeding Environmental Quality Standards set out in the relevant section below.*

Explanatory notes

The sandbank feature relies on a range of supporting natural processes to support the functions (ecological processes) and help any recovery from adverse impacts. For the site to fully deliver the conservation benefits set out in the statement on conservation benefits, the following natural supporting processes must remain largely unimpeded:

Hydrodynamic regime
; and
Water and sediment quality.

Hydrodynamic regime

Hydrodynamic regime refers to the speed and direction of currents, seabed shear stress and wave exposure. These mechanisms circulate food resource and propagules, influence water properties by distributing dissolved oxygen, and facilitating gas exchange from the surface to the seabed (Chamberlain *et al.,* 2001; Biles *et al.,* 2003; Hiscock *et al.,* 2004; Dutertre *et al.,* 2012). Hydrodynamic regime also effects the movement, size structure and sorting of sediment particles. Shape and surface complexity within sandbank features can be influenced by coarse as well as finer-scale oceanographic processes, supporting the formation of topographic bedforms. The hydrodynamic regime plays a critical role in the natural formation and movement of mobile sandbanks.

Hydrodynamic regime within the site

Bassurelle Sandbank lies in a high energy, full salinity environment, located away from coastal influences with tidal currents roughly alternating and parallel to the coastline (Beck *et al*., 1991). The sand waves and mega ripples present on the bank indicate that the surface sediment is regularly mobilised by tidal currents. The strong tidal currents of the straights of Dover are considered the main factor responsible for sand transport (the mean regional net sand transport is 0.2 m^3/linear metre/day), while the swell plays an important but local role in maintaining particulate matter in suspension (Beck *et al*., 1991). The predominant winds are primarily from the south-west, with subsidiary winds from the north-east and the subsequent swell sometimes adding its effect to those of tidal currents.

There is no evidence to suggest that the hydrodynamic regime within the site is impacted by human activities. There are no human activities occurring in or near the site which can impact the hydrodynamic regime within the site and there is no evidence from survey of human impacts on the hydrodynamic regime.

A maintain objective is advised based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities. Our confidence in this objective would be improved with long-term monitoring information and a better understanding of the effects which human activities have on the hydrodynamic regime within the site, specifically its influence on the formation and movement of the feature.

Further information on the impacts associated with human activities on Annex I Sandbanks slightly covered by seawater all the time can be found in the Advice on Operations workbook for the site.

Water and sediment quality

Contaminants may also impact the ecology of a sandbank feature through a range of effects on different species within the habitat, depending on the nature of the contaminant (JNCC, 2004c; UKTAG, 2008; EA, 2014). It is important therefore to avoid changing the natural Water quality and Sediment quality properties of a site and as a minimum ensure compliance with existing Environmental Quality Standards (EQS) as set out below.

Environmental Quality Standards (EQS)

The targets listed below for water and sediment contaminants in the marine environment are based on existing targets within OSPAR or the Water Framework Directive (WFD) and require concentrations and effects to be kept within levels agreed in the existing legislation and international commitments. These targets are set out in The UK Marine Strategy Part 1: The UK Initial Assessment, (2012).

Aqueous contaminants must comply with water column annual average (AA) Environmental Quality Standards (EQS) according to the amended Environmental Quality Standards Directive (EQSD) (2013/39/EU), or levels equating to (High/Good) Status (according to Annex V of the Water Framework Directive (WFD) (2000/60/EC), avoiding deterioration from existing levels.

Surface sediment contaminants (<1 cm from the surface) must fall below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL) threshold. For example, mean cadmium levels must be maintained below the ERL of 1.2 mg per kg. For further information, see Chapter 5 of the OSPAR Quality Status Report (OSPAR, 2010) and associated QSR Assessments.

The following sources provide information regarding historic or existing contaminant levels in the marine environment:

- Marine Environmental and Assessment National Database (MERMAN);
- The UK Benthos database available to download from the Oil and Gas UK website;
- Cefas Green Book;
- Strategic Environmental Assessment Contaminant Technical reports available to download from the British Geological Survey website; and
- Charting Progress 1: The State of the UK Seas (2005) and Charting Progress 2: The State of the UK Seas (2014).

Water quality

The water quality properties that influence habitats include salinity, pH, temperature, suspended particulate concentration, nutrient concentrations and dissolved oxygen. They can act alone or in combination to affect habitats and their communities in different ways, depending on species-specific tolerances. In fully offshore habitats these parameters tend to be relatively more stable, particularly so for deeper waters, although there may be some natural seasonal variation. Water quality properties can influence the abundance, distribution and composition of communities at relatively local scales. Changes in any of the water quality properties can impact habitats and the communities they support (Elliott *et al.,*1998; Little, 2000; Gray and Elliott, 2009). Changes in suspended sediment in the water column may have a range of biological effects on different species within the habitat; affecting the ability to feed or breathe. A prolonged increase in suspended particulates for instance

can have a number of implications, such as affecting fish health, clogging filtering organs of suspension feeding animals and affecting seabed sedimentation rates (Elliott *et al.,*1998). Low dissolved oxygen can have sub-lethal and lethal impacts on fish and infaunal and epifaunal communities (Best *et al.,* 2007). Concentrations of contaminants in the water column must not exceed the EQS listed above.

Water quality within the site

There is no information available to indicate whether water quality within the site is falling or above below Environmental Quality Standards (EQSs). However, Charting Progress 2 reports that the open seas are little affected by pollution and levels of monitored contaminants continue to fall, albeit slowly in many cases. JNCC therefore advise that aqueous contaminants must be maintained below the annual average (AA_EQS) according to the amended Environmental Quality Standards Directive (EQSD) (2013/39/EU) or levels equating to (High / Good) Status (according to Annex V of the Water Framework Directive (WFD) (2000/60/EC). **A maintain objective is advised** for water quality based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities. Our confidence in this objective would be improved with longer-term monitoring, specifically of contaminants within the site.

Further information on the impacts associated with human activities on Annex I *Sandbanks slightly covered by seawater all the time* can be found in the Advice on Operations workbook for the site.

Sediment quality

Various contaminants are known to affect the species that live in or on the surface of sediments. These include heavy metals like Mercury, Arsenic, Zinc, Nickel, Chrome and Cadmium, polyaromatic hydrocarbons (PAHs), poly-chlorinated biphenyls (PCBs), organotins (TBT) and pesticides such as hexachlorobenzene. These metals and compounds can impact species sensitive to particular contaminants, (e.g. heavy metals) and bioaccumulate within organisms thus entering the marine food chain (e.g. PCBs) (OSPAR, 2009; 2010; 2012). This contamination can alter the structure of communities within a site e.g. lowering species diversity or abundance. It is important therefore to avoid changing the natural sediment quality of a site and as a minimum ensure compliance with existing EQS as set out above. Sediment contaminants must not exceed the EQS listed above.

Sediment quality within the site

The available evidence is very limited regarding sediment quality within the site. Charting Progress 2 reports that levels of monitored contaminants continue to fall, albeit slowly in many cases. **JNCC advice a maintain objective** for sediment quality based on expert judgment; specifically, our understanding of the feature's sensitivity to pressures which can be exerted by ongoing activities. While evidence indicates there may be elevated levels of contaminants in the site, exceeding EQLs, a maintain objective is advised as restoration of contaminants in the offshore is not currently feasible. Our confidence in this objective would be improved with longer-term monitoring, specifically of contaminants within the site.

Further information on the impacts associated with human activities on Annex I *Sandbanks slightly covered by seawater all the time* can be found in the Advice on Operations workbook for the site.

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