Supplementary Advice on Conservation Objectives for Pisces Reef Complex 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);
- 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 Reefs 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 the following table describe the desired ecological condition (favourable) for the site's feature. The condition of the 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.

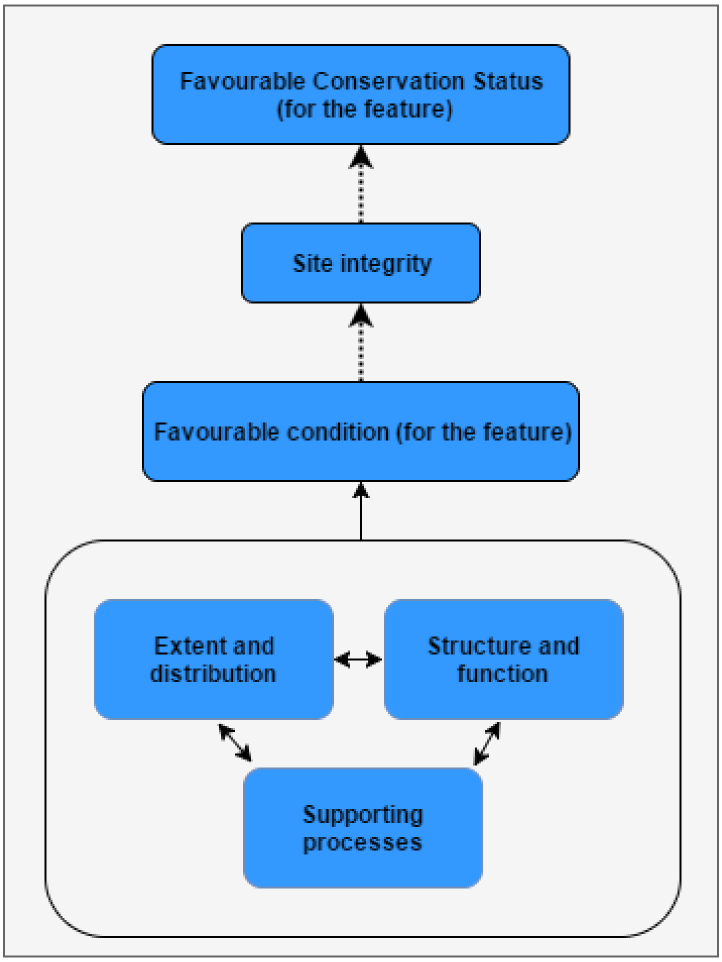

Figure 1. Conceptual diagram showing how feature attributes are interlinked, describe favourable

In Table 1 below, the attributes for the Annex I Reefs (stony and bedrock reef) are listed and a description provided in explanatory notes condition and contribute to site integrity and wider favourable conservation status.

Please note our current understanding of whether the available evidence indicates that each attribute needs to be restored or maintained is not provided. Links to available evidence for the site are provided in the Table below. If you require further site-specific information on the attributes listed for the site's feature please contact JNCC at OffshoreMPAs@jncc.gov.uk.

Table 1: Supplementary advice on the conservation objectives for Annex I Reefs- stony and bedrock reef in Pisces Reef Complex SAC

Attribute: Extent and distribution
Objective: An objective has not been set for this attribute. Links to available evidence are provided below. Please contact JNCC at OffshoreMPAs@jncc.gov.uk for further site-specific information on this attribute.
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 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, 2004a). The extent within the site must be conserved to the full known distribution. Rock habitats are defined by: • ***composition*** (particle size); • ***energy level;*** and • ***biological assemblages*** - see JNCC's Marine Habitats Correlation Table for more detail about the range of biological communities (biotopes) that characterise rock habitats in the UK marine environment. A significant change in either of these criteria within an MPA could indicate a change in the distribution and extent of rock habitats within a site. The extent of rock is unlikely to change over time, unless as a result of human activity, though habitat boundaries may become indistinct if rock is covered by a thin layer of sediment (JNCC, 2004a). Reduction in extent has the potential to affect the functional roles of the biological communities associated with the habitat (Elliott *et al.,* 1998; Tillin and Tyler-Walters, 2014). Maintaining or restoring extent is therefore critical to maintaining or restoring the conservation status of rock habitats. There is no recovery potential if the physical structure of the rock feature is diminished or removed. Hard compact substrata refers to rocks (including soft rock, e.g. chalk), boulders and cobbles. Such hard substrata that are covered by a thin and mobile veneer of sediment are classed as rock habitat if the associated biota is dependent on the hard substratum rather than the overlying

sediment. A variety of subtidal topographic features are included in this habitat such as: vertical rock walls, horizontal ledges, overhangs, pinnacles, gullies, ridges, sloping or flat bed rock, broken rock and boulder and cobble fields (EC Instruction Manual, 2013).

The biological community composition found on rock habitats vary enormously and are influenced by factors such as wave action, strength of the tidal stream, water clarity, the degree of scouring/erosion, and the shape of the rock formations themselves (Sebens, 1991; Barry and Dayton, 2001).

A general description of the different types of rock habitats found in the UK offshore marine environment of relevance to this MPA designation type is provided below:

- *Bedrock reef* - occurs where the bedrock which underlies surface sediments on the seafloor arises from the surrounding seabed, creating a habitat that is colonised by many different marine animals and plants. Bedrock is consolidated rock, and can be composed of most rock types (granite, limestone, sandstone etc.).

- *Stony reef* - 10% or more of the seabed substratum should be composed of particles greater than 64 mm across, i.e. cobbles and boulders. The remaining supporting 'matrix' could be of smaller sized material. The reef may be consistent in its coverage or it may form patches with intervening areas of finer sediment. Epifaunal species dominate biological cover. Stony reef should be topographically distinct from the surrounding sea floor with a minimum area of 25 m^2 (this also applies to the total area of a patchy reef) (Irving, 2009). Areas of Iceberg plough-marks which meet the 'reefiness criteria' (Irving, 2009) can be considered as stony reef, accepting that whilst the cobble areas within the feature may be patchy, the entire plough-mark itself is regarded feature.

There is a strong relationship between Annex I Reefs and the broad-scale habitats, which is shown in JNCC's Marine Habitats Correlation Table. Both bedrock and stony reef can comprise of High, Moderate and Low energy circalittoral rock. Therefore, these features have been grouped together in this supplementary advice as they exert similar characteristics and sensitivities to certain pressures. Collectively these will subsequently be referred to as 'rock' features.

Extent and distribution of the Annex I Reefs- stony and bedrock reef within the site

The extent and distribution of the Annex I Reefs subtypes stony and bedrock reef within the site is shown in the site map. For further site-specific information please see the Site Information Centre.

For information on activities capable of affecting the protected features of the site, please see the Advice on Operations workbook for the site (hyperlink is provided in the box at the top of this document).

Attribute: Structure and function

Objective:

An objective has not been set for this attribute. Links to available evidence are provided below. Please contact JNCC at OffshoreMPAs@jncc.gov.uk for further site-specific information on this attribute.

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** such as the natural shape and surface complexity of the feature within the site. 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 (Elliot *et al.,* 1998). This is particularly true of rock features which can be 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 rock 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

Rock topography can be characterised by elevation from the surrounding seabed. Sessile species such as sponges, bryozoans and algae communities can thrive in shallower sites as the physical rock habitat arising from the seafloor provides a suitable substratum for attachment. Mobile species such as crustaceans, echinoderms and fish use the complexity of the physical structure of the rock habitat for shelter and hunting. Surface complexity can be highly variable depending on factors such as rock type (i.e. hard or soft rock and the varying rugosity of substrate) and energy regime (i.e. erosion, stability of cobbles and boulders). Large immobile surfaces can develop very different communities to smaller rocks that maybe frequently overturned (i.e. during storms) (Sebens, 1991). Structural complexity can be provided by topographic features such as pavements, overhangs, cliffs, fissures, cracks, and crevices. Both provide heterogeneity, and the complexity of habitat is known to strongly influence megafaunal diversity and community composition (Lacharité and Metaxas, 2017; Loke *et al.,* 2015; Loke and Todd, 2016), allowing for niche specialisation (Sebens, 1991). Substratum space is an essential resource for sedentary organisms, and its availability is one of the most important population controlling factors amongst sedentary organisms (Barnes and Hughes, 1982) found on rock habitats.

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 help to cycle nutrients and oxygen between seawater and the seabed supporting organisms that live within benthic and pelagic communities. Other key and influential species may include those which provide additional and elevated hard substrates for other species, known as 'secondary substratum' these may affect water flow and thus the transport of resources and propagules within the community (Sebens, 1991). 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, 2004a). It is therefore important to conserve the key natural structural and influential species of the rock feature within the site to avoid diminishing biodiversity and ecosystem functioning within the habitat and to support its health (JNCC, 2004a; Hughes *et al.,* 2005).

The key and influential species typical of rock features will vary greatly depending on location, energy regime and depth, as well as fine-scale physical, chemical and biological processes such as competition, grazing, predation (Barry and Dayton, 1991). Rock habitats can be highly variable in terms of the communities that they support and often support a zonation of benthic species and communities. Biological cover is expected to be dominated by epifaunal species. Habitat structural composition and the local energy regime are those most likely to have the biggest influence on the expected biological structure. For example, energy levels have been found to influence the morphology and size of species such as the cup coral *Caryophyllia smithii* (Bell, 2002). Areas more sheltered from prevailing currents or wave action can support an abundance of attached bryozoans, hydroids and sea anemones.

Recovery of the communities associated with rock habitats also depends on the life history traits of the species themselves (e.g. their growth rate, longevity) and interactions with other species including predators. The scale of the disturbance and action of remaining key and influential species will also influence recovery. Furthermore, the environmental connectivity between populations or species patches, the suitability of the habitat (e.g. substrate type), depth, and water quality (Mazik *et al.,* 2015) will also influence the habitat recovery potential.

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; i) representative communities, for example, those covering large areas, and ii) 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 to anthropogenic activities.

The physical structure of substratum will influence the marine life that's likely to be present within a site. Structural and surface complexity, spaces between rocks, fissures and crevices are all examples of aspects that should be considered (Hiscock *et al*., 2006). The characteristic communities can be strongly influenced by the prevailing energy levels, with the strength of the tidal stream, turbidity of the waters and degree of scouring from sediments can all influence the communities present. Depending upon the energy regime present (high, moderate, low), a variety of encrusting species and those which attach to the rock can be expected, such as sponges, soft corals, crustose communities, polychaete, ascidians, hydroids and anemones. Other species present may include starfish, brittlestars, sea urchins, crabs, squat lobster, molluscs (such as Piddocks in cases of soft rock) and brachiopods.

Changes to the spatial distribution of communities across the feature could indicate changes to the overall feature (JNCC, 2004a). 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, 2004b). It is therefore important to conserve the natural spatial distribution, composition, diversity and abundance of the main characterising biological communities of the rock within the site to avoid diminishing biodiversity and ecosystem functioning within the habitat and to support its health (JNCC, 2004a; Hughes *et al.,* 2005).

Similar to the biological structure of key and influential species, the recovery of characterising species is dependent on the influence of prevailing environmental conditions, life-history traits and interactions between species, with environmental connectivity between populations or species patches, the suitability of the habitat (e.g. substrate type), depth and water quality further influencing the recovery potential of habitats (Mazik *et al.,* 2015).

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 rock features include:

- Nutrition: due to the level of primary and secondary productivity on or around rock habitat, a range of fish species use these areas as feeding and nursery grounds (Ellis, 2012), depending upon the biogeographic region.

There is no recovery potential if the physical structure of the rock feature is diminished or removed. The recovery of associated populations of individual species or communities 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, and water quality (Mazik *et al.,* 2015) will also influence the recovery potential of features.

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

Structure and function of the feature within the site
For further site-specific information on the structure and function of the feature within the site, please see the Site Information Centre.

For information on activities capable of affecting the protected features of the site, please see the Advice on Operations workbook for the site (hyperlink is provided in the box at the top of this document).

Attribute: Supporting processes

Objective:
An objective has not been set for this attribute. Links to available evidence are provided below. Please contact JNCC at OffshoreMPAs@jncc.gov.uk for further site-specific information on this attribute.

Explanatory notes

Rocky habitats rely 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

Water 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). Shape and surface complexity of rock 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, size structure and erosion of rock feature.

The hydrodynamic regime can also influence the rate at which sediment is deposited, and this is known to influence the status of reef habitats and/or their associated communities. Sedimentation on reef habitats, though smothering, can influence community composition, alter species growth rates and potentially affect reproductive success, reducing larval recruitment.

Water quality

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

Environmental Quality Standard (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 (EQSs) 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 (Elliot *et al.,*1998; Little, 2000; Gray and Elliot, 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 (Elliot *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.

Supporting processes for the feature within the site
For further site-specific information on the natural processes which support the feature within the site, please see the Site Information Centre.

For information on activities capable of affecting the protected features of the site, please see Advice on Operations workbook for the site (hyperlink is provided in the box at the top of this document).

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