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Scottish MPA Project

Assessment against the MPA Selection Guidelines

WYRE AND ROUSAY SOUNDS NATURE CONSERVATION MPA

AUGUST 2014

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www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork

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Purpose

This document provides details of the assessment of Wyre and Rousay Sounds Nature Conservation MPA against the Scottish MPA Selection Guidelines. It presents the assessment for each of the protected features.

We have used the terminology set out in the Selection Guidelines to describe the five main stages in the assessment process from the identification of MPA search locations through to the development of MPA proposals. This area has now become a Nature Conservation MPA following designation by Scottish Ministers.

The main terms used are described below.

MPA search location - this describes a location identified at stage 1 until it passes the assessment at stage 4.

Potential area for an MPA - if an MPA search location passes the assessment at stage 4 it goes on to become a potential area for an MPA for consideration at stage 5.

MPA proposal - a potential area for an MPA that has passed the assessment at stage 5 and which has been formally recommended for designation by SNH and/or JNCC to Scottish Ministers.

Possible MPA - an MPA proposal approved by Scottish Ministers for public consultation. From this time the location is given policy protection as if it were designated.

MPA search features - specified marine habitats, species and large-scale features that underpin the selection of Nature Conservation MPAs.

Geodiversity features - specified geodiversity interests of the Scottish sea bed categorised under themed 'blocks' that are analogous to the MPA search features for biodiversity.

Representative features - habitats and/or species which are not MPA search features or geodiversity features. They have been assessed to determine whether they would add to the broader representativity of the MPA network.

Protected feature - any feature (habitats, species, large-scale features [MPA search features and/or representative features] and/or geodiversity features) specified within the site Designation Order.

History of development

Wyre and Rousay Sounds Nature Conservation MPA was identified for two MPA search features (kelp and seaweed communities on sublittoral sediment; and maerl beds) and one geodiversity feature (Marine Geomorphology of the Scottish Shelf Seabed).

Details of supporting evidence are provided in the Wyre and Rousay Sounds data confidence assessment.

WYRE AND ROUSAY SOUNDS NATURE CONSERVATION MPA - APPLICATION OF THE MPA SELECTION GUIDELINES

Stage 1 - Identifying search locations that would address any significant gaps in the conservation of MPA search features[1]

Summary of assessment	Wyre and Rousay Sounds MPA encompasses beds of maerl (a coralline seaweed) intermixed with kelp and seaweed communities on sublittoral sediment. The maerl beds represent excellent examples of this habitat with a very high proportion of live maerl and diverse associated plant and animal communities. Orkney waters are considered to support the largest known discontinuous total area of maerl beds in UK waters (Hirst *et al.*, in prep.). The protected features also include Marine Geomorphology of the Scottish Shelf Seabed geodiversity interests.

Detailed assessment

Protected features	**Guideline 1a** *Presence of key features* [MPA search features and geodiversity equivalents]	**Guideline 1b** *Presence of features under threat and/or subject to rapid decline*	**Guideline 1c** *Functional significance for the overall health and diversity of Scottish seas*
Biodiversity			
Kelp and seaweed communities on sublittoral sediment	✓	✓ **T&D**[2]	
Maerl beds	✓	✓ **OSPAR T&D**[3]	
Geodiversity			
Marine Geomorphology of the Scottish Shelf Seabed	✓		

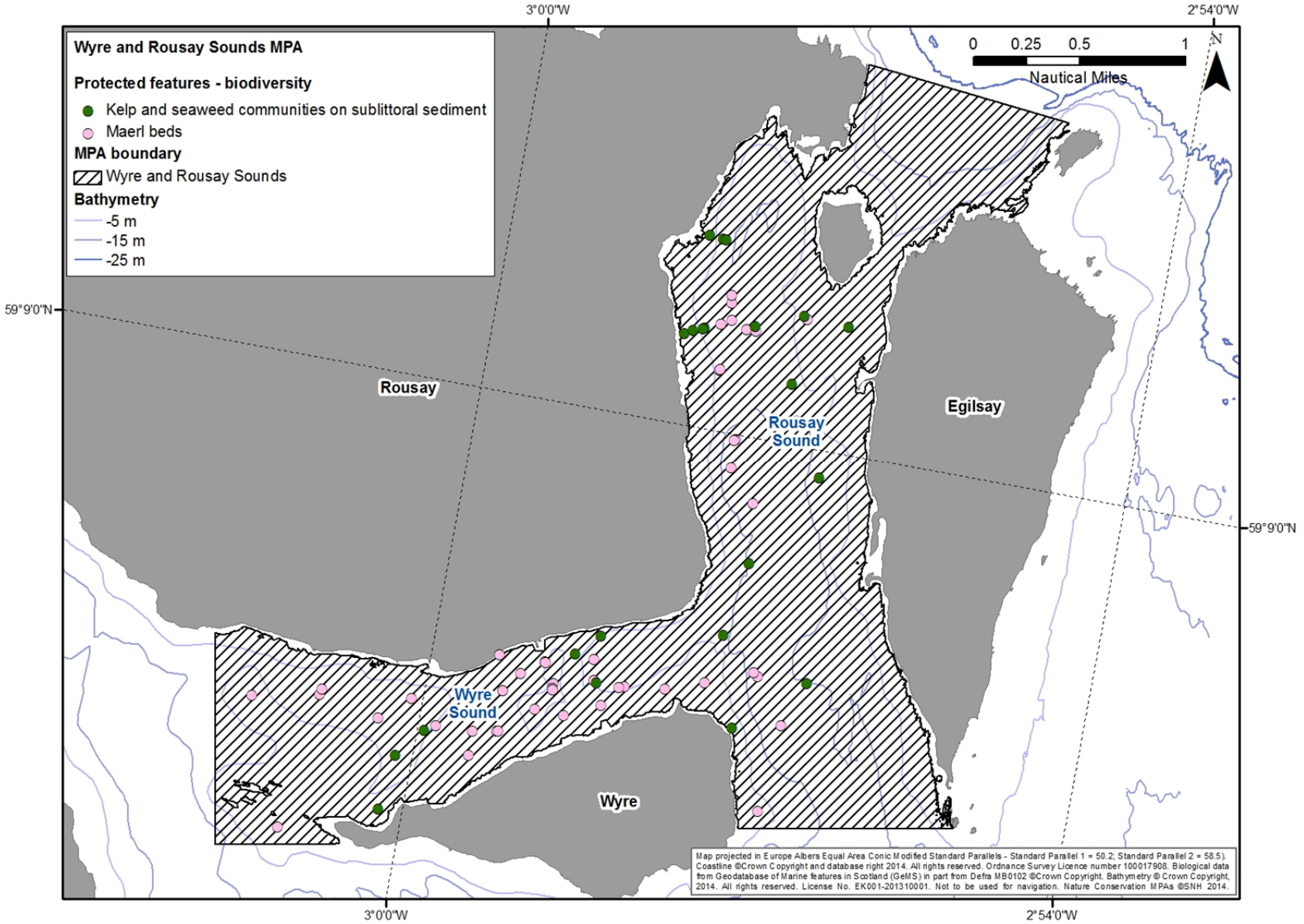
1 All protected features of the MPA (rather than just the MPA search features) are listed in the stage 1 detailed assessment table and subsequently assessed against the MPA Selection Guidelines (wherever practicable).

2 Feature considered to be under threat and/or in decline in Scottish waters (see http://www.snh.org.uk/pdfs/publications/commissioned_reports/388.pdf for further details).

3 OSPAR list of Threatened and/or Declining species and habitats (see OSPAR, 2010).

Map of Wyre and Rousay Sounds MPA showing the known distribution of protected features

The MPA lies fully within the Orkney Carbonate Production Area and the Fair Isle Strait Marine Process Bedforms Area; two overlapping key areas that represent the Marine Geomorphology of the Scottish Shelf Seabed geodiversity feature (Brooks *et al*., 2013).



Stage 2 - Prioritisation of search locations according to the qualities of the MPA search features they contain

Summary of assessment	Wyre and Rousay Sounds MPA encompasses three protected features. The maerl beds represent excellent examples of this habitat (with an exceptionally high proportion of live maerl and diverse associated biological communities) from amongst the largest known discontinuous area of maerl in UK waters (Hirst *et al*., in prep.). The maerl beds and the kelp and seaweed communities on sublittoral sediment are sensitive to a range of pressures but are currently considered to be largely unmodified by human activity and in good condition. The MPA lies within the Orkney Carbonate Production Area and the Fair Isle Strait Process Bedforms Area; both are key geodiversity areas in Scottish waters encompassing interests from the Marine Geomorphology of the Scottish Shelf Seabed feature (Brooks *et al.,* 2013). **All of the five stage 2 guidelines have been met**.

Detailed assessment	
Guideline 2a	**The search location contains combinations of features, rather than single isolated features, especially if those features are functionally linked**
Wyre and Rousay Sounds MPA has been designated for three functionally linked protected features. The maerl beds and the kelp and seaweed communities on sublittoral sediment thrive in the tide-swept channels, forming a large-scale intermixed habitat mosaic. The maerl beds are also considered an integral part of the Orkney carbonate production system, a component of the Marine Geomorphology of the Scottish Shelf Seabed geodiversity feature. **Guideline met**.	

Guideline 2b	**The search location contains example(s) of features with a high natural biological diversity**
Kelp and seaweed communities on sublittoral sediment	Different kelp and seaweed communities on sublittoral sediment have been recorded within the MPA. Dominated by conspicuous sugar kelp *Saccharina latissima* (Rare[4] to Abundant at different sampling stations), and sometimes furbellows *Saccorhiza polyschides*, three component sub-biotopes have been recognised **SS.SMp.KSwSS.LSacR.CbPb**, **SS.SMp.KSwSS.LSacR.Gv** and **SS.SMp.KSwSS.LSacR.Sa**[5], depending on whether the sediment was dominated by cobbles, pebbles and boulders, or gravel, or sand (Hirst *et al.,* in prep.; Moore, 2013). Other foliose and filamentous red algae are present with the brown bootlace weed *Chorda filum*. The seamat *Membranipora membranacea* is present on the kelp plants and a range of fish species including dragonets *Callionymus* spp. and gobies *Pomatoschistus* spp. have been recorded (Hirst *et al.,* in prep.). In the junction between Wyre and Rousay Sounds, the **SS.SMp.KSwSS.LSacR.Sa** biotope supported high numbers of *Myxicola* sp. fanworms (locally Common) in the sediment (Moore, 2013). The range of species observed on video samples collected in 2011 (Hirst *et al*., in prep.) appeared diverse and aligned well with the characterising species of the national biotope descriptions (Connor *et al.,* 2004). However, no quantitative faunal data exist with which to compare indices of biological diversity within this habitat.

[4] For details of the SACFOR scale used for reporting the abundance of marine benthic flora and fauna in biological surveys see Hiscock (1996).
[5] Further details on the UK marine habitat classification are available online at http://jncc.defra.gov.uk/page-5931

Guideline 2b	**The search location contains example(s) of features with a high natural biological diversity**
Maerl beds	Maerl is the collective term for several species of calcified red seaweed, which in their free-living form and under favourable conditions can create extensive beds. The predominant maerl species within Wyre and Rousay Sounds MPA is *Phymatolithon calcareum*, and the beds here are classified as '*P. calcareum* maerl beds in infralittoral clean gravel or coarse sand' (assigned to the **SS.SMp.Mrl.Pcal** biotope and in places to the **SS.SMp.Mrl.Pcal.R** sub-biotope which reflects the presence of a higher abundance of red algal species on the surface of the bed). The beds support a high proportion of live maerl, between 30 - 70 %, with 10 - 30 % dead maerl gravel, while poorly sorted sands and shell make up the rest of the substrate. Work undertaken in 2011 concluded that the beds within the MPA represent excellent examples of the habitat (Hirst *et al.,* in prep.). In 2011 the beds supported conspicuous patches of sugar kelp *Saccharina latissima* (Rare to Abundant at different sampling stations), a range of foliose and filamentous red algae such as *Heterosiphonia plumosa*, *Plocamium cartilagineum*, *Drachiella spectabilis* and *Bonnemaisonia hamifera* (*Trailliella* phase), and other brown seaweeds such as the bootlace weed *Chorda filum*, *Dictyota dichotoma* and landlady's wig *Desmarestia aculeata*. Hermit crabs (*Pagurus bernhardus*), velvet swimming crabs (*Necora puber*), starfish (*Asterias rubens*), sand mason worms (*Lanice conchilega*) and painted dragonets (*Callionymus reticulatus*) characterised the epifauna (Hirst *et al.,* in prep.). Large infaunal robust bivalves, large numbers of crabs, ghost shrimps (Caprellidae), brittlestars and gobies were present, and Superabundant small sabellid fan worms were recorded. Large numbers of juvenile queen scallops *Aequipecten opercularis* and harbour crabs *Liocarcinus depurator* were also recorded. The ghost shrimps, *Caprella acanthifera* and *Phtisica marina*, collectively contributed on average 23% of the individuals recorded in the samples (Hirst *et al.,* in prep.). Quantitative comparison with other Scottish maerl beds is hampered somewhat by methodological differences, but some context is provided from studies of maerl beds using similar techniques and personnel in the Sound of Arisaig (Moore *et al.*, 2004), Loch Maddy (Moore *et al*., 2006), Loch Laxford (Moore *et al.*, 2010), and the Ullapool approaches (Moore *et al.,* 2011). Infaunal taxon richness ranged from 56 to 122 species in those beds, with the Wyre and Rousay Sounds beds in the lower to mid region of this range (57 - 75) (Hirst *et al.,* in prep.). Mean infaunal abundances from the west coast beds ranged from 72 to 453 ind. / 0.01 m^2, and these were greatly exceeded by three of the Wyre Sound samples (734 - 864 ind. / 0.01 m^2) with the fourth sample towards the upper end of the range (327). Diversity indices for the four samples of the maerl beds in Wyre Sound were lower than those obtained in the Ullapool approaches, with values for Pilou's evenness J' of 0.53 - 0.85 and Shannon-Wiener diversity H' of 2.17 - 3.48 in Wyre Sound (Hirst *et al.,* in prep.), compared to Pilou's J' of 0.79 - 0.96 and H' of 4.04 - 5.43 around Ullapool (Moore *et al.,* 2011). However, when compared to maerl beds in another northern location (i.e. the Fetlar to Haroldswick MPA, Hirst *et al.,* 2013) the Wyre Sound samples have similar infaunal taxon richness (37 - 74 and 57 - 75) (all values presented for Fetlar to Haroldswick and Wyre Sound respectively), Shannon-Wiener diversity (H' of 2.9 - 3.5 and 2.17 - 3.48), Pilou's evenness (J' of 0.73 - 0.89 and 0.53 - 0.85) and a higher mean infaunal abundance (244 - 260 and 327 - 864 ind. / 0.01 m^2). The Wyre Sound maerl bed is therefore considered to be an excellent example of this feature exhibiting high natural biological diversity reflective of its geographical position within the MPA region.
2b - Result	**Guideline met**.

Guideline 2c	The search location contains coherent examples of features, rather than smaller, potentially more fragmented ones
Kelp and seaweed communities on sublittoral sediment	The kelp and seaweed communities on sublittoral sediment protected feature is naturally highly fragmented where recorded in shallow waters around Scotland's coastline. There are several distinct and separated areas of the different component biotopes that comprise the feature across the MPA (Foster-Smith and Davies*,* 1993*;* Davies, 1997; Murray *et al.,* 1999; Moore, 2013; Hirst *et al*., in prep.). The combined estimated area of the two mapped polygons of this feature within the MPA is 1.98 km^2 (Envision Mapping Ltd., 2014 - see the data confidence assessment for this MPA for further details and mapping). The characterising species of this feature such as sugar kelp *Saccharina latissima* are widespread, occurring in other sedimentary and rocky habitats, so this fragmentation is natural and unlikely to affect recruitment and population maintenance. Through the dispersive larval life history stages of the component species the discrete patches of protected feature are likely to be connected within the MPA and beyond. In the absence of disturbance or any other changes that affect the suitability of habitat, persistence of the feature is anticipated. In 2011, maerl beds were recorded at six stations within Wyre and Rousay Sounds that had previously been assigned to kelp and seaweed communities on sublittoral sediment (1996 MNCR Wyre, Eynhallow and Rousay Sounds sublittoral survey reported in Murray *et al*., 1999). This may represent an expansion of the maerl feature, small-scale spatial heterogeneity in the mosaic of these two seabed habitats or limitations in the accuracy of positional information associated with the sampling. Seasonal and annual variation in algal coverage may also have influenced biotope assignment between different surveys (Hirst *et al.,* in prep.).
Maerl beds	The maerl beds within Wyre and Rousay Sounds are extensive; covering an estimated area of 5.38 km^2 (extent figure derived from GeMS database using four polygons adapted from Envision Mapping Ltd., 2014). The level of fragmentation found within maerl beds is highly variable. Within the MPA there is small-scale spatial heterogeneity where maerl beds merge with the kelp and seaweed communities on sublittoral sediment (Foster-Smith and Davies*,* 1993*;* Davies, 1997; Murray *et al.,* 1999; Hirst *et al*., in prep.). Very little information is available to assess the area required to ensure the viability of maerl beds. Vegetative growth is the main form of propagation so the dispersal potential of maerl is limited, probably to less than 1 km, based on the dispersal of adult plants ('twiglets') by water movement. The dispersal potential of sexual propagules is unknown because these have not been observed in UK waters and there have been no studies published regarding genetic exchange between populations. As a result, Hill *et al.* (2010) concluded that an area of 1 km^2 of this habitat would incorporate the complete asexual life-cycle of maerl (all species including *Phymatolithon calcareum*). Maerl is extremely slow-growing with growth rates in Scotland in the order of tenths of millimetres to two millimetres per year. The life-span of individual plants of *P. calcareum* is estimated to be 20 to 100 years. In the absence of significant disturbance or any changes that affect the suitability of the habitat, maerl beds are therefore likely to be long-lived and stable (OSPAR, 2010).
2c - Result	**Guideline met**.

Guideline 2d	The search location contains features considered least damaged / more natural, rather than those heavily modified by human activity
Kelp and seaweed communities on sublittoral sediment	No indicators of damage were observed during the recent surveys undertaken in 2011 (Hirst *et al.,* in prep.) and 2013 (Moore, 2013). The feature is therefore considered to be in a natural state within the MPA.
Maerl beds	No indicators of change / damage were reported in the 2011 survey of the maerl beds (Hirst *et al.,* in prep.). This feature is therefore considered to be in a natural state within the MPA.

Guideline 2d	The search location contains features considered least damaged / more natural, rather than those heavily modified by human activity
Geodiversity	The maerl beds are considered an integral functional part of the carbonate production system in Orkney waters (representing the Marine Geomorphology of the Scottish Shelf Seabed geodiversity feature) and as there is no evidence to suggest influence by human activity to this biological feature (likely to be the most sensitive component); the wider geodiversity interests are considered to be in a natural state.
2d - Result	**Guideline met**.

Guideline 2e	The search location contains features considered to be at risk[6] of significant damage by human activity
Kelp and seaweed communities on sublittoral sediments	Wyre and Rousay Sounds MPA lies within the North MPA region[7]. On the basis of a risk assessment undertaken at the level of the MPA region, this feature is considered to be at **low** risk of significant damage arising from human activity (a cumulative assessment considering the range of activities known to be taking place in the MPA region). Within the region, the feature is considered at high risk from hydraulic dredging for bivalves and at medium risk from otter trawling and scallop dredging. The risk of damage from marine energy production (wave and tidal turbines and associated infrastructure) and aquaculture-related activities is considered to be low.
Maerl beds	On the basis of the cumulative regional risk assessment, there is considered to be a **high** risk of significant damage to this feature arising from human activity. The feature is considered at high risk from demersal fishing activity (hydraulic dredging, otter trawling and scallop dredging) and medium risk from other fishing techniques, seaweed harvesting, aquaculture, and tourism and leisure-related activities.
Geodiversity	**Regional risk assessments have not been completed for geodiversity features**. Information is available on the likely sensitivity of this feature to pressures arising from human activity (Brooks, 2013). Maerl beds are considered an integral functional part of the carbonate production system and form a component of the geodiversity feature with associated risks as outlined above. Other component geodiversity interests such as sand banks or sand wave fields are highly sensitive to changes in tidal current water flow and have a medium sensitivity to physical change (deposition of materials on the sea bed such as concrete mattresses, rock dumping, and moorings) and physical removal (sediment extraction). These pressures may be associated with marine energy production (wave and tidal turbines and associated infrastructure), or other coastal developments. The feature is considered to have low or no sensitivity to pressures associated with fishing activities. In the vast majority of instances, most pressures associated with marine anthropogenic activities will not be sufficient to impact geological and geomorphological seabed features (Brooks, 2013).

[6] Information on the sensitivity of the MPA search features to pressures and their associated activities was taken from Tillin *et al*. (2010). The degree to which an MPA search feature is exposed to activities / pressures to which it is sensitive in each MPA region was assessed to provide a qualitative measure of risk. Risk assessments for the various activities were examined to produce an overall qualitative risk assessment by MPA region (Chaniotis *et al.,* 2014). The conclusions may therefore not reflect the level of risk at the scale of the MPA. Site-specific activities and pressures are considered in further detail within the management options paper produced for this MPA.

[7] The seas around Scotland were split into five MPA regions (East, North, West, South-west and Far West) at the outset of the MPA Project to aid the identification of MPA search locations and the preliminary appraisal of these against the MPA Selection Guidelines (e.g. the completion of regional risk assessments). This approach provided a useful framework for the initial stages of assessment. Within SNH and JNCC's formal MPA network advice (SNH and JNCC, 2012) the MPA proposals and remaining MPA search locations were then cast within the context of broader OSPAR regions.

Guideline 2e	The search location contains features considered to be at risk[6] of significant damage by human activity
2e - Result	**Guideline met**. This is not an assessment of activities that require management within the MPA. That assessment is provided in the management options paper.

Stage 3 - Assessing the appropriate scale of the search location in relation to search features[8] it contains

Assessment
The size of the search location should be adapted where necessary to ensure it is suitable for maintaining the integrity of the features for which the MPA is being considered. Account should also be taken where relevant of the need for effective management of relevant activities
The size and shape of the MPA reflect the known extent of the biodiversity protected features within the natural boundaries set by the Wyre and Rousay Sounds. Both seabed habitats are widely distributed in the waters around Orkney. Sections of the MPA have not been surveyed and uncertainties therefore remain over the absolute extent of these features, kelp and seaweed communities on sublittoral sediment are believed to occur throughout. The MPA lies fully within two large-scale key geodiversity areas and the site boundary provides representation only of the Marine Geomorphology of the Scottish Shelf Seabed geodiversity feature. **Guideline met**.

[8] Setting the size and shape of a Nature Conservation MPA considers the distribution of both MPA search features and relevant geodiversity features. The latter, which are analogous to the biodiversity search features, were defined after the publication of the MPA Selection Guidelines (refer to Brooks *et al*., 2013).

Stage 4 - Assessing the potential effectiveness of managing features within a search location as part of a Nature Conservation MPA

Summary of assessment	**The MPA passed the assessment against the Stage 4 guideline**. This resulted in the original MPA search location progressing as a potential area for an MPA to Stage 5.

Detailed assessment
There is a high probability that management measures, and the ability to implement them, will deliver the objectives of the MPA
The conservation objective for the protected features within this MPA is to 'conserve'. The features are considered to be in good condition. A number of activities are considered capable of affecting the protected features (see 2e above) and there is therefore a need to consider whether additional management is required. Statutory mechanisms exist (e.g. Fisheries Orders or Marine Conservation Orders) to support the introduction of spatial / temporal measures to conserve the features within the MPA. For example, Fisheries Orders have already been used to underpin management of marine Special Areas of Conservation. There is therefore potential for management measures to be implemented successfully and the conservation objective of the MPA to be achieved. Further discussion is required with those involved in using the MPA to provide clarification on interactions between the protected features and known / potential activities / developments. Additional details are provided in the management options paper produced for this MPA.

Stage 5 - Assessment of the contribution of the potential area to the MPA network

Summary of assessment	**The MPA passed the assessment against the Stage 5 guideline. The MPA has now been designated and will make a significant contribution to the MPA network.**

Detailed assessment

The potential area contributes significantly to the coherence of the MPA network in the seas around Scotland

Assessment of biodiversity features

Feature	Representation	Replication	Linkages	Geographic range & variation	Resilience
Kelp and seaweed communities on sublittoral sediment	Good examples of the habitat. [a number of different biotopes under the **SS.SMp.KSwSS** biotope complex]	There is replication of this feature in the network within and between OSPAR Regions II and III (see SNH and JNCC, 2012; SNH, 2014).	Not applicable[9]	Within northern part of geographic range in Scotland. Examples of different habitat variants (**.LSacR.CbPb**; **.LSacR.Gv** and **.LSacR.Sa** biotopes).	Not required to achieve adequacy because of the protection already provided by existing measures. Examples of the feature within the MPA are of high quality and form a mosaic with the maerl beds. Recommended to add to the integrity of the MPA and complement existing protection in Region II.
Maerl beds	Excellent examples of the habitat from within the largest known discontinuous total area of maerl beds in UK waters. [**SS.SMp.Mrl.Pcal**(**.R**) biotope and sub-biotope]	There is replication of this feature in the network within and between OSPAR Regions II and III (see SNH and JNCC, 2012; SNH, 2014).	Not applicable[9]	Within northern part of geographic range in Scotland.	There is additional replication of this feature within the network because maerl beds are considered to be threatened and declining in Scottish waters. The feature is listed on the OSPAR List of Threatened and/or Declining habitats (OSPAR, 2010).

[9] The linkages part of the guideline has only been assessed in situations where there is a good understanding of the relationship between features in different areas to help build connectivity into the network. There is currently little evidence on which to base assessments of linkages for seabed habitats and low or limited mobility species in Scotland's seas. Whilst there is information available for some species on dispersion distances, this cannot be readily applied to areas with complicated hydrography. Modelling work undertaken by Marine Scotland Science looking at the connectivity of some benthic species within the Scottish MPAs is presented in Gallego *et al*. (2013).

Assessment of geodiversity features	
Geodiversity features[10]	Wyre and Rousay Sounds MPA (in conjunction with Papa Westray MPA) lies within two overlapping key geodiversity areas in Scottish waters (the Orkney Carbonate Production Area and the Fair Isle Strait Marine Process Bedforms Area) providing representation of the Marine Geomorphology of the Scottish Shelf Seabed feature (Brooks *et al*., 2013). The Orkney Carbonate Production Area is an internationally important example of a non-tropical shelf carbonate system (the biological production of marine sediments with high calcium carbonate content - derived from the shells of animals that live in on the seabed or, in more shallow tide-swept locations from banks of maerl, a coralline seaweed). These sediments supply the carbonate sands of the coastal machair around Orkney (Farrow *et al*., 1984) and are considered to be critical to the functioning of the wider marine and coastal ecosystem. The Fair Isle Strait Marine Process Bedforms Area is important for the study of the interactions between currents, seabed sediments and bedforms such as sand banner banks, sand waves and sand ribbons. Source: Brooks *et al*., 2013; Gordon *et al*., 2013 (and references therein).

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[10] For geodiversity the stage 5 assessment primarily considers the potential contribution to the principal 'networks' of marine geodiversity interests present in Scottish waters (representation).

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