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Scottish MPA Programme

Assessment against the MPA Selection Guidelines

SHIANT EAST BANK POSSIBLE MPA

JUNE 2019

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Purpose

This document provides details of the assessment of Shiant East Bank possible MPA against the Scottish MPA Selection Guidelines. It presents the assessment for each of the proposed 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 possible MPA because, following advice from SNH, Scottish Ministers have decided to consult on whether it should be formally designated.

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 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 key geodiversity features. They have been assessed to determine whether they would add to the broader representativity of the network.

Proposed protected feature - any feature (habitats, species, large-scale features [MPA search features and/or representative features] and/or geodiversity features) which has been proposed by SNH and/or JNCC for designation.

History of development

Shiant East Bank possible MPA was identified for two MPA search features (northern sea fan and sponge communities; shelf banks and mounds) and one geodiversity feature (Quaternary of Scotland). Circalittoral sand and mixed sediment communities is not an MPA search feature but has been recommended as a proposed protected feature because we consider that it would add to the broader representativity of the Scottish MPA network (i.e. a representative feature).

Details of supporting evidence are provided in the Shiant East Bank possible MPA data confidence assessment.

SHIANT EAST BANK POSSIBLE 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	The possible MPA is recommended for four proposed protected features; comprising two MPA search features, multiple interests under the Quaternary of Scotland geodiversity feature and a representative seabed habitat feature. The northern sea fan and sponge communities feature is believed to be under threat and/or in decline in Scottish waters. The shelf banks and mounds large-scale MPA search feature is considered to be of functional significance, providing the necessary substrates to support an assemblage of finer resolution habitats and species (Tyler-Walter *et al.,* 2012). Additionally, the bank structure itself may be shaping local water movement, thereby influencing primary and secondary productivity in the immediate area. The biodiversity features are associated with an outstanding range of glacial bedforms representing the Quaternary of Scotland geodiversity feature. Although formed by successive glaciations over the last 500,000 years, the exceptional detail of the record makes this region of international geological importance.

Detailed assessment

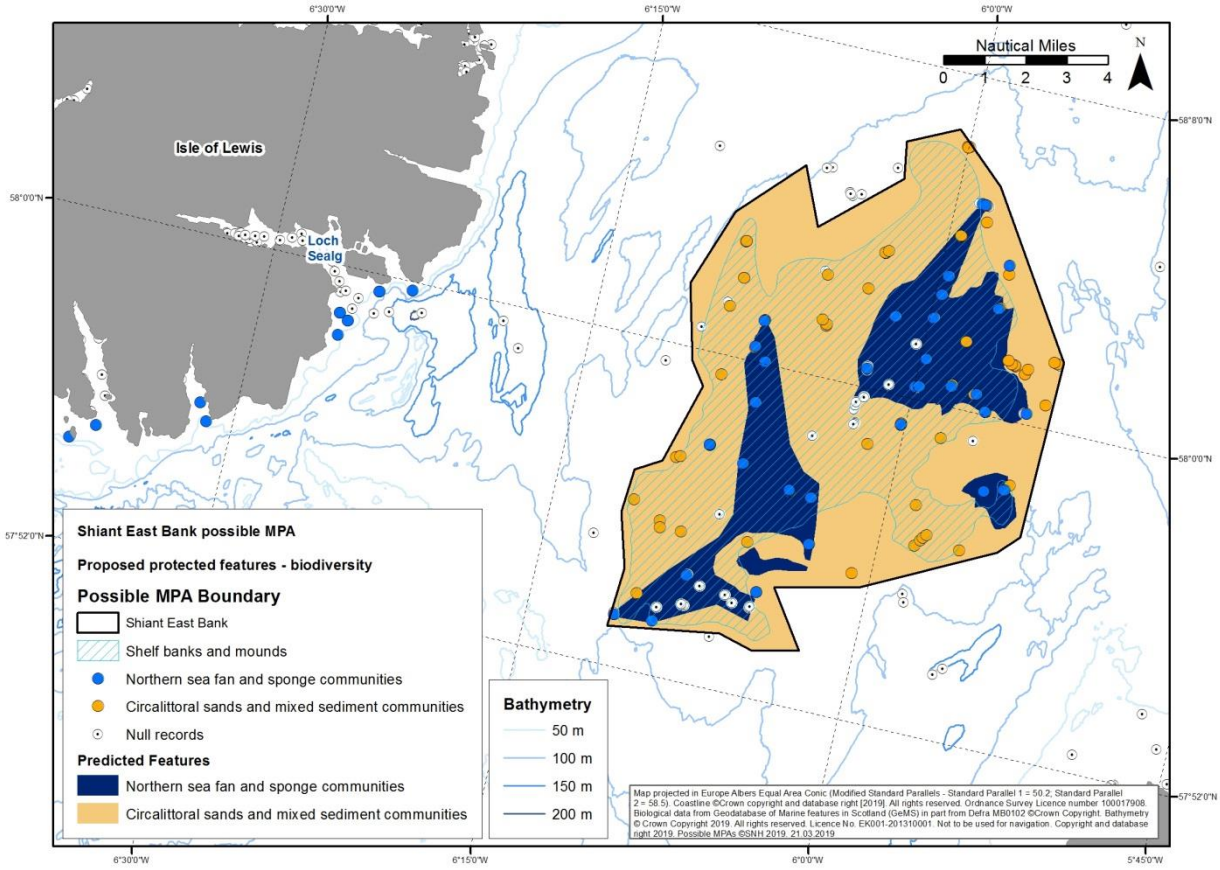
Proposed protected features	**Guideline 1a** *Presence of key features* [MPA search features and geodiversity equivalents]	**Guideline 1b** *Presence of features under threat and/or subject to rapid decline*	**Guideline 1c** *Functional significance for the overall health and diversity of Scottish seas*
Biodiversity			
Circalittoral sands and mixed sediment communities[2]	*Representative feature*		
Northern sea fan and sponge communities	✓	✓ **T&D**[3]	
Shelf banks and mounds	✓		✓
Geodiversity			
Quaternary of Scotland (drumlinoid forms, glacial lineations, iceberg ploughmarks, streamlined bedrock)	✓		

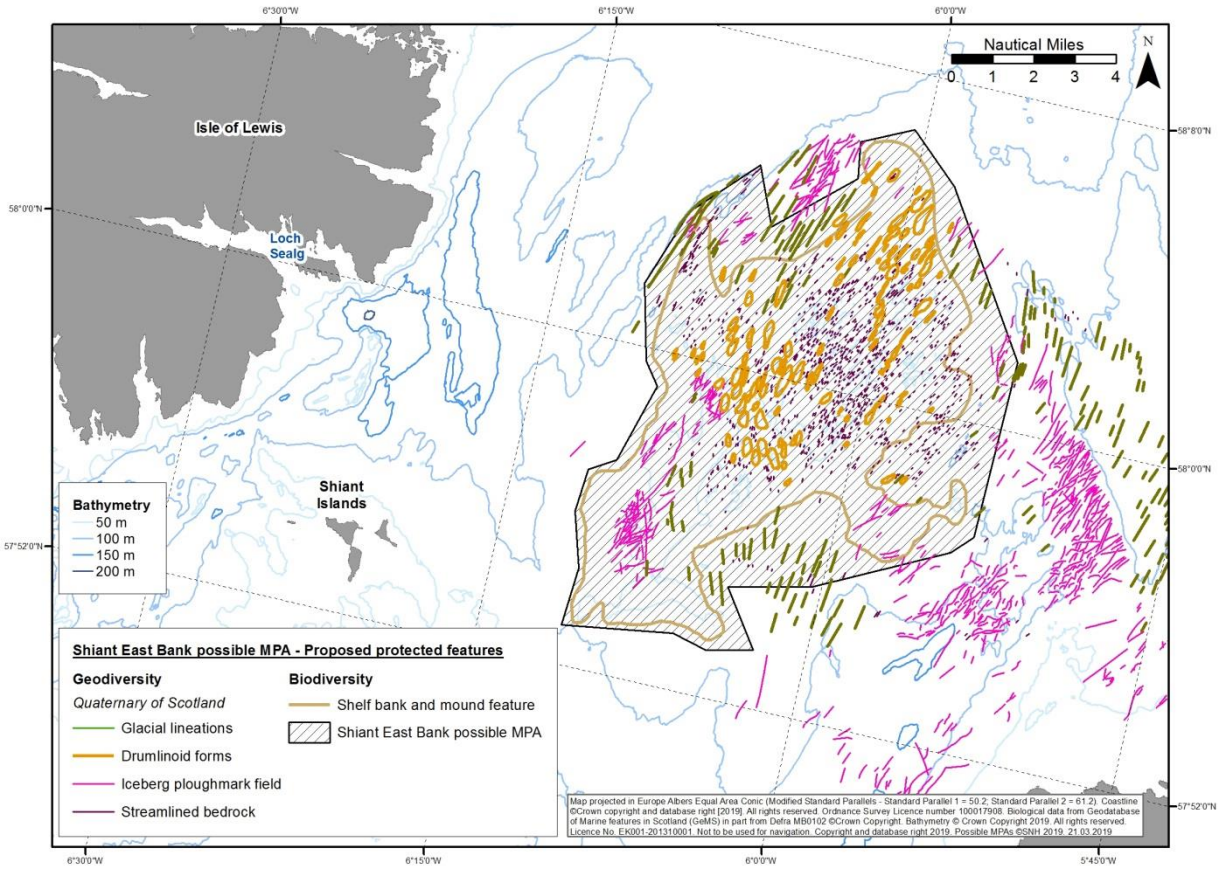
1 All proposed protected features of the possible MPA are listed in the stage 1 detailed assessment table and subsequently assessed against the MPA Selection Guidelines (wherever practicable) to facilitate read across to SNH and JNCC's 2012 MPA network advice (SNH and JNCC, 2012) and SNH's subsequent 2014 advice (SNH, 2014).

2 Comprising 'Offshore circalittoral sand' (**SS.SSa.OSa** - A5.27), 'Circalittoral mixed sediment' (**SS.SMx.CMx** - A5.44) and 'Offshore circalittoral mixed sediment' (**SS.SMx.OMx** - A5.45).

3 Feature considered to be under threat and/or in decline in Scottish waters (see https://www.nature.scot/snh-commissioned-report-388-identification-priority-marine-features-scottish-territorial-waters for further details).

Maps of the Shiant East Bank possible MPA showing the known/modelled distribution of proposed protected features





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

Summary of assessment	Shiant East Bank possible MPA encompasses a number of proposed protected features distributed within a complex and varied geological setting. The proposed protected features are integrally linked and the seabed habitats exhibit moderate levels of natural biological diversity. The seabed habitats and species are considered sensitive to a range of pressures and at a regional level are considered to be at medium risk of significant damage by human activity. On the basis of current evidence, the features present within the possible MPA are thought to be in a natural state and largely undisturbed. **<u>All</u> of the five Stage 2 guidelines have been met (2a - 2e)**.

Detailed assessment	
Guideline 2a	**The search location contains combinations of features, rather than single isolated features, especially if those features are functionally linked**
The possible MPA supports four proposed protected features. The diversity of features reflects the complex geological composition of the site. Extensive glacial lineations and iceberg ploughmarks formed during repeated glaciations over at least the last 500,000 years are accompanied by rock and drumlinoid land forms. Isolated upstanding masses of resistant basement or Tertiary volcanic rock, some up to 40 m high, separate the upper area of submarine glacial landforms from a deeper, smoother sea bed with a thin (<20 m), discontinuous cover of Quaternary sediments. This assemblage of geodiversity interests around the Shiant East Bank formed beneath a relatively fast flowing ice-sheet corridor, providing comprehensive information regarding palaeo ice-flow dynamics. The diversity of bedforms is reflected in the distribution of intrinsically and functionally linked[4] seabed habitats with northern sea fan and sponge communities occurring on the bedrock outcrops and frequent cobbles and boulders, interspersed amongst coarse mixed sandy substrates which are distributed across the large-scale shelf banks and mounds feature. **Guideline met**.	

Guideline 2b	**The search location contains example(s) of features with a high natural biological diversity (applies to seabed habitats only)**
Circalittoral sands and mixed sediment communities	This proposed protected feature comprises deep circalittoral sand (assigned to the **SS.SSa.OSa** biotope complex[5]), circalittoral mixed sediments (**SS.SMx.CMx** biotope) and offshore circalittoral mixed sediments (**SS.SMx.OMx** biotope). Records of this feature within the possible MPA have been derived primarily from quantitative infaunal grab samples (Axelsson *et al*., 2012; Allen, 2015) and semi-quantitative remote video sampling (Moore, 2012, 2014; Moore and Atkinson, 2012) undertaken in 2011 and 2013. Ten of the stations sampled in 2011 and 2013 were assigned to the finer resolution **SS.SSa.OSa.OfusAfil** component biotope (*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand), albeit with a reduced *Amphiura* component. The samples had a moderately rich fauna with 33 - 71 taxa recorded in each grab sample and calculated diversity indices ranging from 1.99 to 4.89 with a mean of 2.7 (Shannon Wiener H'). Four deeper infaunal stations (85 - 105 m depth) sampled in 2011 were characterised by the broader **SS.SSa.OSa** biotope complex with high numbers of *Chaetozone gibber* and low numbers of the bivalve *Nucula sulcata*. These stations also supported moderately diverse infaunal communities (H' = 2.73) (Axelsson *et al.,* 2012).
Circalittoral sands and mixed sediment	Three stations sampled in 2013 at around 65 m depth had more mixed sediments (muddy sandy-gravels) and were assigned to the **SS.SMx.CMx** biotope. The diversity indices calculated ranged from 4.41 to 4.86 with a mean of 4.7 (Shannon Wiener H') (Allen,

[4] This term refers to linkages between features and also the wider marine ecosystem in Scottish waters and is not the same as functional significance used in relation to Guideline 1c.

[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 (applies to seabed habitats only)
communities *cont.*	2015). At two slightly shallower sites in 2011 (54 m and 64 m depth) the presence of polychaete species such as *Laonice bahusiensis* and *Aonides paucibranchiata* suggested a better alignment with the **SS.SMx.OMx** biotope complex (Axelsson *et al.,* 2012) and these stations also supported more diverse infaunal communities than adjacent fine sands with 45 and 51 taxa recorded and H' = 3.63 and 3.61 respectively. These sedimentary habitats were also observed using drop-down video camera systems in 2011 and 2013. Silty sands occurred widely below 50 m to the maximum recorded depth of 91 m (**SS.SSa.OSa**) with motile forms such as *Porania pulvillus* and *Pagurus prideaux* apparent on the sediment surface and numerous *Munida rugosa* on scattered gravel and larger stones (Moore, 2012, 2014). At many locations the sand was accompanied by significant proportions of gravel, pebbles, cobbles and sometimes boulders supporting an impoverished version of deep sponge communities (see the next feature description below). These communities were ascribed to the **SS.SMx.OMx** biotope with a number of shallower sites (34 - 43 m) classified as **SS.SMx.CMx** (Moore, 2012, 2014).
Northern sea fan and sponge communities	Three component habitats and species of the 'northern sea fan and sponge communities' MPA search feature have been recorded within Shiant East Bank possible MPA. Northern sea fan and sponge communities have been widely recorded in deeper water from 44 - 91 m on substrates of bedrock, cobbles and boulders in dense fields or scattered over sandy sediments. The fauna has been recorded as dominated by sponges, principally *Axinella infundibuliformis* / *Phakellia ventilabrum*, which was Frequent[6] - Common, and accompanied by *Iophon nigricans*, *Polymastia boletiformis*, *Tetilla zetlandica* and *Hymedesmia paupertas*; non-sponge components included high densities of *Porella compressa,* hydroid / bryozoan clumps and sparse serpulid worms (**CR.HCR.DpSp.PhaAxi**). The fauna was augmented by Frequent - Common northern sea fans *Swiftia pallida* at many sites (**CR.MCR.EcCr.CarSwi.LgAs**) widely distributed over the surveyed area (Moore and Atkinson, 2012; Moore 2012, 2014). Deep sponge communities recorded from the eastern side of the bank down to a depth of 94 m were generally not well developed examples of **CR.HCR.DpSp.PhaAxi** on cobbles and boulders on silty sediments with silted bedrock outcrops (Moore, 2012). Some impoverished versions of this community, at depths between 46 - 84 m, were ascribed to the related **SS.SMx.CMx** and **SS.SMx.OMx** biotopes of the 'circalittoral sands and mixed sediment communities' representative feature (see above) (Moore, 2012; 2014).
2b - Result	**Guideline met**.

[6] For details of the SACFOR scale used for reporting the abundance of marine benthic flora and fauna in biological surveys see Hiscock (1996).

Guideline 2c	**The search location contains coherent examples of features, rather than smaller, potentially more fragmented ones**
Circalittoral sands and mixed sediment communities	The circalittoral sands and mixed sediment communities feature has a widespread distribution across the possible MPA. The precise area of this feature has not been calculated but is likely to exceed 40 km^2. The majority of records contained a somewhat variable infaunal community; however, they aligned well with the descriptions provided for the relevant biotopes within the national classification (Connor *et al*., 2004). The majority of records were of deep sandy sediments, assigned to the **SS.SSa.OSa** biotope complex and where appropriate, to the finer resolution **SS.SSa.OSa.OfusAfil** component biotope (*Owenia fusiformis* and *Amphiura filiformis* in offshore circalittoral sand or muddy sand). The infauna was characterised by oweniid polychaetes such as *Chaetozone gibber* and *Owenia fusiformis,* along with bivalves such as *Yoldiella philippiana* and *Abra* spp., and brittlestars including *Amphiura* spp. **SS.SMx.CMx** and **SS.SMx.OMx** biotope complexes were assigned to areas of more mixed sediments (Axelsson *et al*., 2012; Allen, 2015). The majority of species identified as being faithful and frequent residents of the feature have a larval phase in their development and so are capable of potentially dispersing over large distances. In the absence of significant disturbance, the feature is considered stable and expected to persist.
Northern sea fan and sponge communities	The northern sea fan and sponge communities present within the possible MPA are considered typical. As well as supporting the characterising northern sea fan *Swiftia pallida*, areas of sea fan habitat (assigned to the **CR.MCR.EcCr.CarSwi.LgAs** biotope) were dominated by the expected range of sponge and non-sponge species at typical abundance (although the sponge fauna was poorly developed in the more mixed, stony areas). In accordance with the national classification (Connor *et al*., 2004) bryozoan crusts were present on rock surfaces and echinoderms were present including *Echinus esculentus*, *Luidia ciliaris* and *Henricia* sp. With an increase in depth the abundance of sea fans declined and axinellid sponges *Axinella infundibuliformis* and / or *Phakellia ventilabrum* dominated the community (characterising species of the **CR.HCR.DpSp.PhaAxi** biotope). It is not possible to define a minimum viable population of northern sea fans. Thought to be self-sustaining, they have short-lived larvae and limited potential for larval dispersal (Hill *et al*., 2010). The life-span of *S. pallida* is estimated to be between 11 and 20 years (Wilding and Wilson, 2009). No information is available on the typical level of fragmentation for northern sea fan and sponge communities. There are scattered records of the feature across the possible MPA. The area covered by the feature is currently unknown but is likely to exceed 30 km^2.
Shelf banks and mounds	The boundary of the possible MPA encompasses the whole of the known extent of the Shiant East Bank. This example of the shelf banks and mounds feature covers an estimated 205 km^2 and is one of the largest in Scottish waters. Shiant East Bank may play a wider functional role (SNH and JNCC, 2014). The passing of tidal currents across the surface of the bank creates turbulence leading to the formation of internal waves. This allows relatively cooler, nutrient-rich deeper waters to mix with warmer, nutrient-depleted waters serving to increase primary productivity and also to aggregate smaller prey items. This can have profound effects on food availability for other species including top predators.
2c - Result	**Guideline met**.

Guideline 2d	**The search location contains features considered least damaged / more natural, rather than those heavily modified by human activity**
Circalittoral sands and mixed sediment communities	No indicators of change / damage to this feature were reported during the 2011 and 2013 surveys (Axelsson *et al*., 2012; Moore, 2012, 2014; Moore and Atkinson, 2012; Allen, 2015). The feature is therefore considered to be in a natural state.
Northern sea fan and sponge communities	The northern sea fan and sponge communities appeared to be in a natural state in the most recent surveys (Moore 2012, 2014; Moore and Atkinson, 2012). The northern sea fan and a number of other species in these communities, such as the branching sponges, are fragile, slow growing and long-lived. It is therefore unlikely that the feature has been heavily modified by human activity.
Shelf banks and mounds	The Shiant East Bank structure is robust and in light of the conclusions reached in relation to the associated seabed habitats and geodiversity interests is considered to be in a natural state.
Geodiversity features	The components of the geodiversity feature were formed during repeated glaciations over at least the last 500,000 years (Brooks *et al.,* 2013). They are entirely natural in origin and are not considered to have been modified by human activity.
2d - Result	**Guideline met**.

Guideline 2e	**The search location contains features considered to be at risk[7] of significant damage by human activity**
Circalittoral sands and mixed sediment communities	**Regional risk assessments have not been completed for representative features**. However, preliminary results are available on the likely sensitivity of this feature to pressures arising from human activity. The feature is considered to have a medium sensitivity to physical abrasion, substratum loss and modification, local changes in temperature and large increases in siltation. It is considered to have a low sensitivity to organic enrichment and to water flow and wave exposure changes.
Northern sea fan and sponge communities	On the basis of a cumulative regional risk assessment, there is considered to be a **medium** risk of significant damage to this feature arising from human activity. This is largely a result of exposure to pressures associated with demersal fishing activity.
Shelf banks and mounds	**Regional risk assessments have not been completed for this feature**. Its physical structure was shaped by glacial activity is unlikely to be at risk of significant damage by human activity. Risk assessments for the finer resolution component biodiversity and geodiversity features distributed across the Shiant East Bank are described separately.
Geodiversity features	**Regional risk assessments have not been completed for geodiversity features**. However, information is available on the likely sensitivity of some of the component interests (see Brooks, 2013). Glacial lineations and iceberg ploughmarks are considered highly sensitive to the physical removal of substrates, have a medium sensitivity to surface and sub-surface abrasion and a low - medium sensitivity to changes in tidal water flow and wave exposure (Brooks, 2013). The drumlinoid landforms are similarly 'relict' features (defined as having no resilience) and might therefore be expected to exhibit a comparable range of sensitivities to anthropogenic activities. Streamlined bedrock on the other hand is likely to be highly resistant (having been formed originally by glacial scouring) and is either considered not sensitive, or to have a low sensitivity, to most pressures associated with human activities.
2e - Result	**Guideline met**. This is not an assessment of activities that require management within the possible MPA. That assessment is provided in the *conservation objectives and advice to support management* paper.

[7] Information on the sensitivity of the MPA search features to pressures and their associated activities was taken from FEAST (FEature, Activity, Sensitivity Tool - http://www.marine.scotland.gov.uk/FEAST/). The degree to which an MPA search feature is exposed to activities / pressures to which it is sensitive at a regional scale 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 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 within the *conservation objectives and advice to support management* paper produced for this MPA.

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 possible MPA reflect the distribution and extent of the range of proposed biodiversity and geodiversity protected features. The boundary encompasses the full extent of the shelf banks and mounds large-scale feature as well as adjacent records of the finer resolution component features on three sides. The boundary provides good representation of the Quaternary of Scotland geodiversity feature which also extends outwith the possible MPA (marking the passage of the ice stream from the Wester Ross MPA across the continental shelf to the Sula Sgeir Fan on the shelf slope). The boundary to the north has been shaped to exclude as much of the adjacent burrowed mud habitat in the North Minch as practicable. The exclusion of two records of the circalittoral sands and mixed sediment communities here is not considered to affect the suitability of the possible MPA for maintaining the integrity of this and the other proposed protected features. **Guideline met**.

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

Summary of assessment	**The possible 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 proposed protected features within this possible MPA is to 'conserve'. A number of activities are considered capable of affecting the proposed 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 possible MPA. For example, Fisheries Orders have already been used to underpin management of marine Special Areas of Conservation and Marine Conservation Orders for MPAs. There is therefore potential for management measures to be implemented successfully and the conservation objectives of the MPA to be achieved. Further discussion is required with those involved in using the possible MPA to provide clarification on interactions between the protected features and known / potential activities / developments. Additional details are provided in the *conservation objectives and advice to support management* paper produced for this possible MPA.

[8] Setting the size and shape of a possible 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 5 - Assessment of the contribution of the potential area to the MPA network

Summary of assessment	**Guideline met - if designated the possible MPA would 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
Circalittoral sands and mixed sediment communities	Examples of deep sand and mixed sediment communities. [**SS.SSa.OSa**, **SS.SMx.OMx** and **SS.SMx.CMx** biotope complexes]	There is replication of some feature components in the network within and between OSPAR Regions II and III (**SS.SSa.OSa** and **SS.SMx.CMx**). Proposal would provide **SS.SMx.OMx** replication across the network.	Not applicable[9]	Middle of geographic range in Scotland. **SS.SMx.OMx** in OSPAR Region III / west coast shelf setting. Good correlation / spatial overlap with component geodiversity interests.	A representative feature. Not considered to be threatened and/or declining. Recommended to ensure representation of the range of broad-scale habitats within the Scottish MPA network.
Northern sea fan and sponge communities	Sediment influenced examples of the feature. [**CR.MCR.EcCr.CarSwi.LgAs**, and **CR.HCR.DpSp.PhaAxi** biotopes] Northern sea fan *Swiftia pallida*.	There is replication of this feature in the network within OSPAR Region III and between OSPAR Regions II and III (see SNH and JNCC, 2012; SNH, 2014). Feature considered well represented within the existing protected area network (Carruthers *et al*., 2011).	Not applicable[10]	Middle of the geographic range for the feature in Scotland.	Not required to achieve adequacy because of the protection already provided by existing measures. Examples of the feature within Shiant East Bank possible MPA are recommended to complement existing protection in OSPAR Region III.

[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 insufficient evidence on which to base detailed assessments of linkages for seabed habitats and low or limited mobility species in Scotland's seas but initial conclusions are presented in Gallego *et al*. (2013).

Assessment of biodiversity features					
Feature	**Representation**	**Replication**	**Linkages**	**Geographic range & variation**	**Resilience**
Shelf banks and mounds	A high quality example of the feature.	Replication of this feature in the network is proposed between OSPAR Regions II and III (see SNH and JNCC, 2012; SNH, 2014). Shelf banks and mounds are a protected feature of the existing Firth of Forth Banks Complex MPA (OSPAR Region II).	Not applicable[10]	Extends the geographic range of the feature within the MPA network to the west / into OSPAR Region III (reflecting known geographic range).	Shelf banks and mounds are not considered to be threatened and/or declining. The Shiant East Bank possible MPA would complement existing protection of this feature in OSPAR Region II (Firth of Forth Banks Complex MPA).

Assessment of geodiversity features	
Geodiversity features[10]	The possible MPA incorporates geodiversity interests from the Quaternary of Scotland feature, lying within the Summer Isles to Sula Sgeir Fan key geodiversity area (Brooks *et al.,* 2013; Gordon *et al*., 2013). This area is characterised by a classical assemblage of submarine glacial landforms produced by the presence of a high-velocity palaeo-ice stream during Quaternary glacial periods which stretched from the north-west Scottish Highlands to the Sula Sgeir trough-mouth fan on the continental slope. Within the possible MPA extensive glacial lineations and iceberg ploughmarks formed during repeated glaciations over at least the last 500,000 years are accompanied by rock and drumlinoid land forms. Isolated upstanding masses of resistant basement or Tertiary volcanic rock, some up to 40 m high, separate the upper area of submarine glacial landforms from a deeper, smoother sea bed covered by a thin (<20 m), discontinuous layer of Quaternary sediments. Due to the outstanding range of glacial interests present and the exceptional quality within which they are preserved, this region is of international geological importance. As such, the possible MPA constitutes a scientifically important region for developing the current understanding of Quaternary ice sheet dynamics, deglaciation of the last British-Irish Ice Sheet, late glacial climate change and the style and rates of fjord sedimentation. **Sources**: Brooks *et al*., 2013; Gordon *et al*., 2013; Bradwell and Stoker, 2015

[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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