



Scottish MPA Project Assessment against the MPA Selection Guidelines
GEIKIE SLIDE AND HEBRIDEAN SLOPE NATURE CONSERVATION MPA
<i>JULY 2014</i>

The following documents provide further information about the Geikie Slide and Hebridean Slope Marine Protected Area (MPA):

- Site Summary Document
- Data Confidence Assessment
- Management Options Paper

The documents are all available at www.jncc.defra.gov.uk/page-6481

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Electronic	4.0	15/07/2013	Review of document to take into account MPA Sub-Group comments and release of document for public consultation.	Uploaded to JNCC website
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Background

This document provides details of JNCC's assessment of the Geikie Slide and Hebridean Slope Nature Conservation MPA (herein referred to as 'MPA') against the [Scottish MPA Selection Guidelines](#). It presents an 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 an MPA.

The main terms used are described below.

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

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

Protected feature - any feature (habitats, species, large-scale features and/or geodiversity features) which are specified in the MPA Designation Order.

MPA search location - this describes a location identified at stage 1 [of the Selection Guidelines] until it passes the assessment against stage 4.

Potential area for an MPA - if an MPA search location passes assessment against stage 4 it goes on to be considered at stage 5 as a potential area for an MPA.

Nature Conservation MPA – a location that has been approved by Ministers for designation.

Details of evidence supporting the designation of the Geikie Slide and Hebridean Slope MPA are provided in the Data Confidence Assessment document.

GEIKIE SLIDE AND HEBRIDEAN SLOPE MPA - APPLICATION OF THE MPA SELECTION GUIDELINES

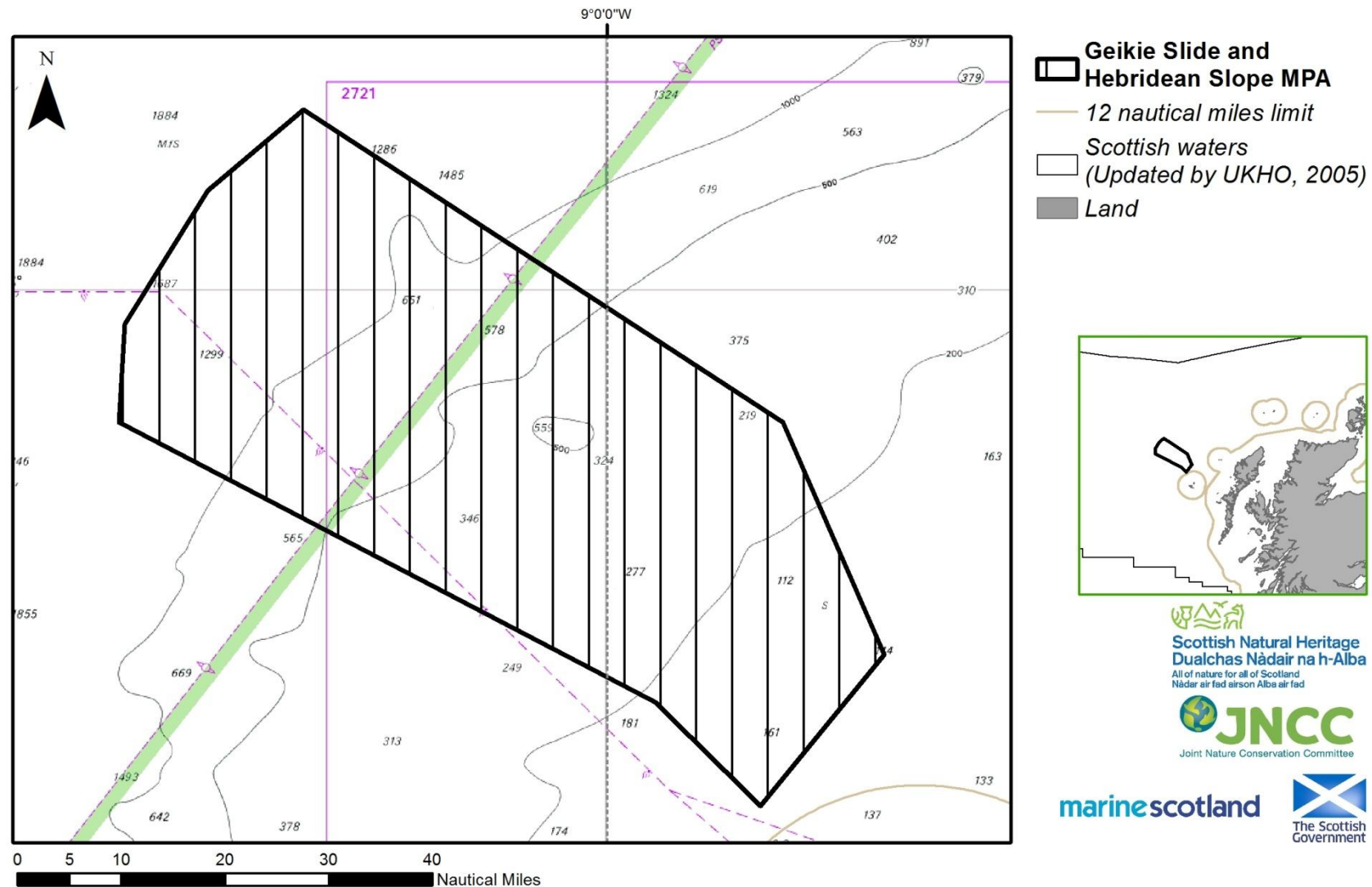
Stage 1 - Identifying search locations that would address any significant gaps in the conservation of MPA search features

Summary of assessment	<p>The MPA includes five protected features – a deep-water variant of the seapens and burrowing megafauna component of the burrowed mud habitat, Atlantic-influenced offshore deep-sea mud habitats on the continental slope, Atlantic-influenced offshore subtidal sand and gravel habitats on the continental slope and the continental shelf, an area of the Hebridean continental slope, and the slide deposit feature representative of The Geikie Slide Key Geodiversity Area (Brooks <i>et al.</i>, 2013). The seapens and burrowing megafauna component of burrowed mud habitat is considered to be Threatened and/or Declining by the OSPAR Commission. The Hebridean slope more broadly is thought to have functional significance to the health and biodiversity of Scotland's seas in the way that it serves to increase water column mixing and subsequently a rise in levels of biological productivity (e.g. Shapiro & Hill, 1997). It is also a spawning and nursery ground for species of commercially important fish; this MPA for example overlaps with a spawning ground for the commercially important fish blue ling (Large <i>et al.</i>, 2010). Large-scale slides such as the Geikie Slide are considered characteristic geodiversity features along the Scottish continental slope and the Geikie Slide is one of five examples that is broadly representative of the range of slide features identified across Scotland's seas (Brooks <i>et al.</i>, 2013).</p>
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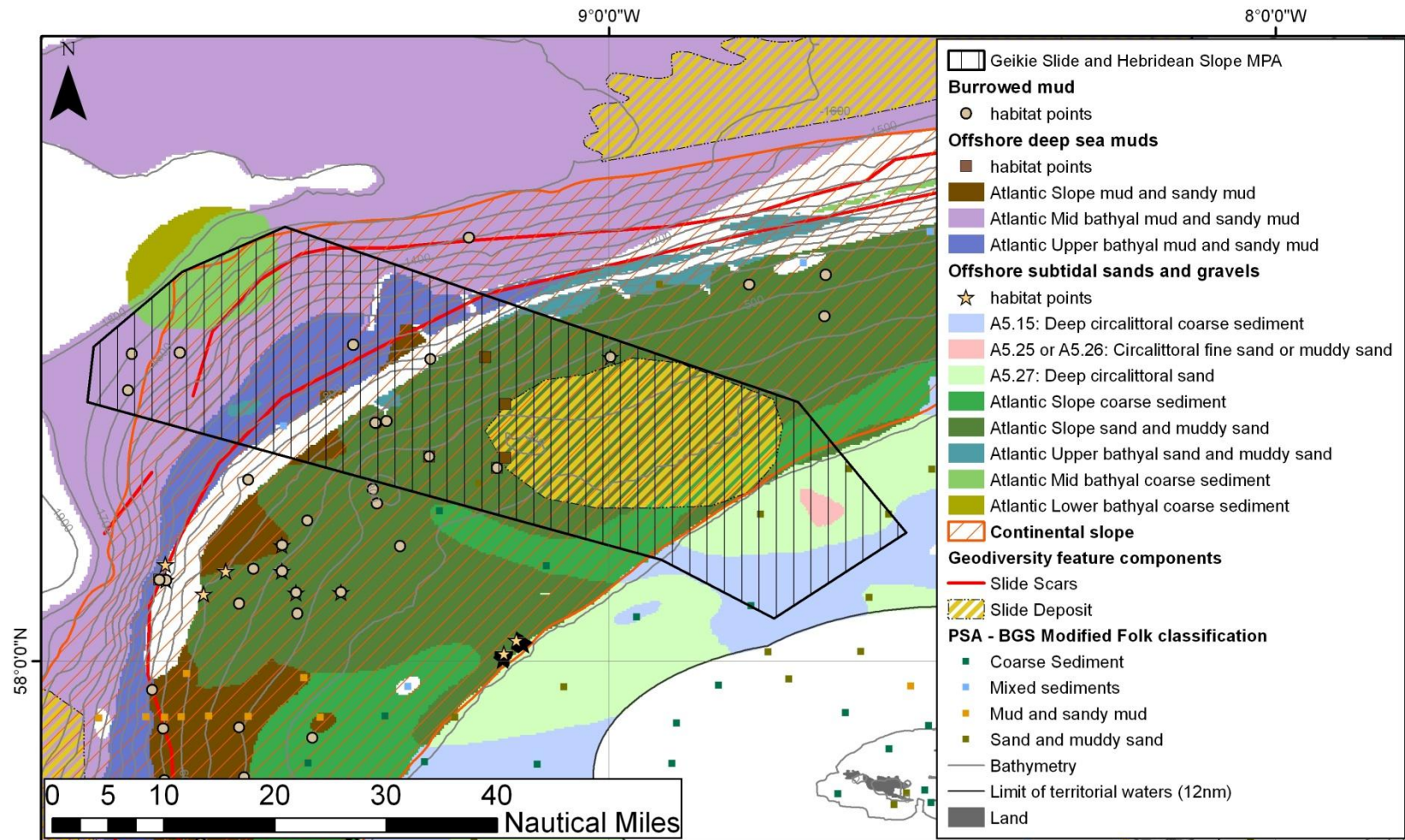
Detailed assessment			
Proposed protected features	Guideline 1a <i>Presence of key features [MPA search features and geodiversity equivalents]</i>	Guideline 1b <i>Presence of features under threat and/or subject to rapid decline</i>	Guideline 1c <i>Functional significance for the overall health and diversity of Scottish seas</i>
<i>Biodiversity</i>			
Burrowed mud	✓	✓ OSPAR T&D ¹	
Offshore deep sea muds	✓		
Offshore subtidal sands and gravels	✓		
Continental slope	✓		✓ enhanced productivity, fish spawning and nursery areas
<i>Geodiversity</i>			
Slide deposit (Submarine Mass Movement)	✓		

¹ OSPAR list of Threatened and/or Declining species and habitats (see OSPAR, 2008 a & b).

Map showing the location of the Geikie Slide and Hebridean Slope MPA



Map showing the known distribution of protected features in the Geikie Slide and Hebridean Slope MPA



Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdair air fad airson Alba air fad

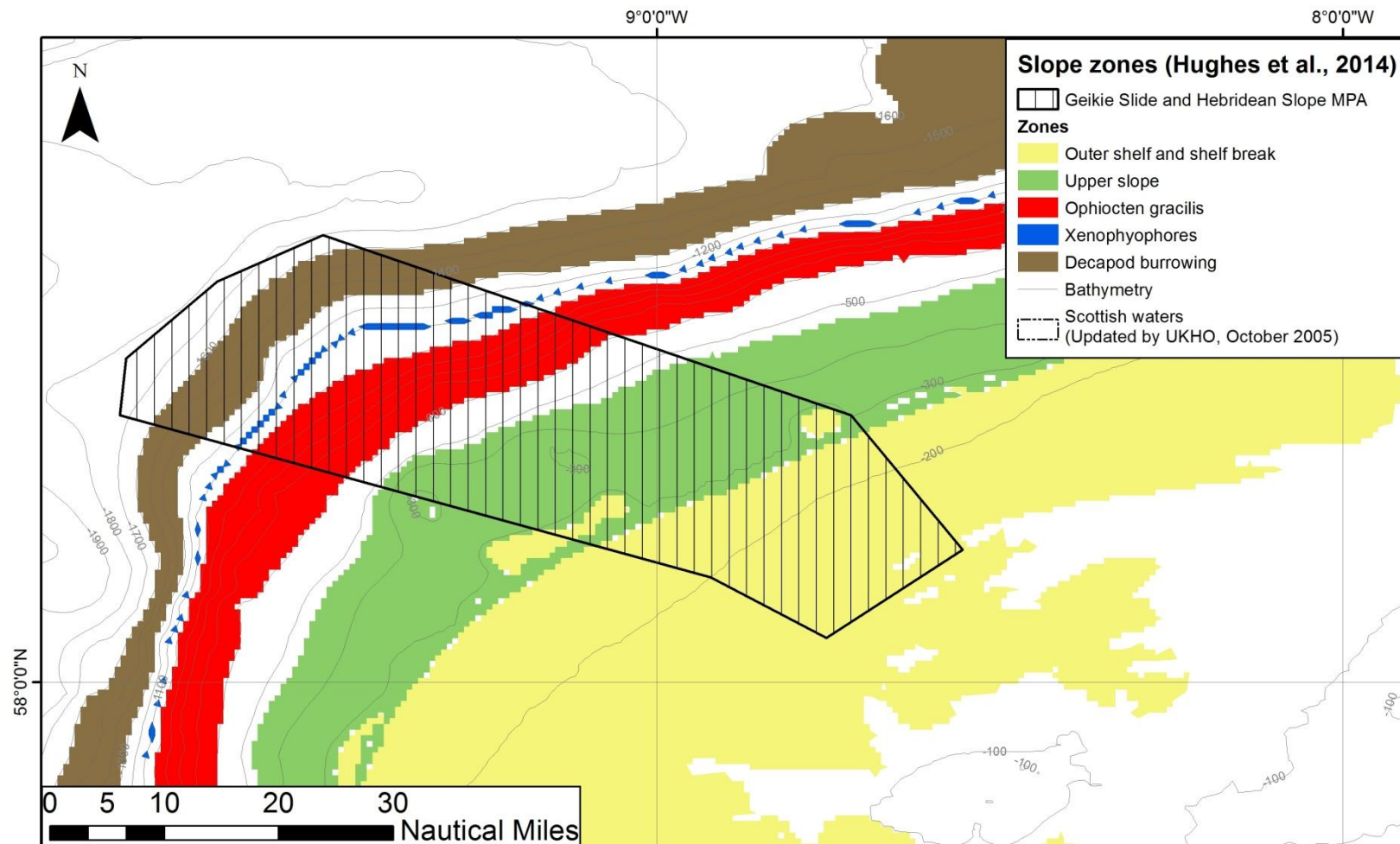
marinescotland

The Scottish
Government

JNCC
Joint Nature Conservation Committee

Map displayed in geographic coordinates WGS84. The exact limits of the UK Continental Shelf (Designation of Areas) Order 2013, Statutory Instrument 2013/3162(© Crown Copyright). Scotland (Adjacent waters) Updated by the Law of the Sea Division, United Kingdom Hydrographic Office October 2005. Landmass Ordnance Survey © Crown Copyright and database right 2011. All rights reserved. Bathymetry © GEBCO, 2011. Biological data from Geodatabase of Marine features in Scotland (GeMS_v4) © Crown Copyright. PSA data © BGS. MPA and geodiversity data © JNCC and SNH 2014. All rights reserved.

Map of Geikie Slide and Hebridean Slope MPA showing the distribution of biological community depth-zones as defined by Hughes *et al.* (2014)



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

Summary of assessment	<p>The MPA contains combinations of protected features, and there is evidence to support functional linkages between the Hebridean Slope and the habitats and species present in the MPA. For instance, there are depth-related trends in habitat type and megafaunal distribution (Hughes <i>et al.</i>, 2014). Areas of reduced hydrographic influence with depth are characterised by finer-grained sediments, and vice versa. As well as functional linkages between the protected features of the MPA, there is evidence to support the role of the Hebridean Slope more generally supporting the health and biodiversity of Scotland's seas. Topographic relief and water-current patterns enhance productivity (e.g. Shapiro & Hill, 1997). Commercially important fish species are known to spawn along the slope with evidence that this spawn occurs within the MPA (e.g. blue ling – Large <i>et al.</i>, 2010).</p> <p>There is limited information available to undertake a detailed assessment of the stage 2b guideline for burrowed mud, offshore deep-sea muds and offshore subtidal sands and gravels because of a lack of information on characterising species; but all three seabed habitats are likely to be coherent within the MPA based on the proposed biological zones along the Hebridean slope as defined by Hughes <i>et al.</i> (2014). There is limited or no information on the condition of the protected features but information on their sensitivity to pressures associated with activities to which they are exposed suggest the biodiversity protected features may have been modified by human activity.</p> <p>Within the wider MPA Region², JNCC consider there is a medium risk of damage by human activity to burrowed mud habitat. This judgement is based on the sensitivity of burrowed mud to pressures associated with activities to which the habitat is exposed. For offshore subtidal sand and gravel habitats and offshore deep-sea mud habitats the risk of damage by human activity varies, reflecting the range in sensitivity of different sub-types of these habitats to pressures associated with activities to which they are exposed. Slide deposits are considered to be at low risk of damage across Scotland's seas.</p> <p>Three of the five parts of the stage 2 guidelines (2a, 2c & 2e) are met. There is a limited evidence to support making a conclusive assessment against the stage 2b guideline for all protected features. The stage 2d guideline has not been met for the biodiversity protected features.</p>
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Detailed assessment

Guideline 2a	The search location contains combinations of features, rather than single isolated features, especially if those features are functionally linked
	<p>There are combinations of protected features present within the MPA, with evidence of functional linkage between the Hebridean slope and the habitats and species present. There are depth-related trends in habitat type and megafaunal distribution down the Hebridean slope. Areas of reduced hydrographic influence with depth are characterised by finer-grained sediments and biological features associated with the sediment type. Zones of biological variance coincide with the bathymetric extent of the slope-current flowing northwards along the Scottish continental margin, known as the 'mud-line'. Transport of organic particles in the northwards-flowing slope current may play an important role in sustaining the high benthic biomass seen in this 'mud-line' (Hughes <i>et al.</i>, 2014). Further to functional linkages between the protected features of the MPA, there is evidence to support the role of the Hebridean slope more generally supporting the health and biodiversity of Scotland's seas. Topographic relief and current patterns enhance productivity (e.g. Shapiro & Hill, 1997). Commercially important fish species are known to spawn along the slope, with evidence for blue ling present in the MPA (Large <i>et al.</i>, 2010).</p>

² Far West MPA Region as described in the [Scottish MPA Selection Guidelines](#)

Guideline 2b	The search location contains example(s) of features with a high natural biological diversity (for habitats only)
Burrowed mud	<p>Marine Scotland Science by-catch records from 2008 and 2009 identify that the species present in the MPA are indicative of deep-water burrowed mud. These data provide recent confirmation of the presence of deep-water seapens (<i>Umbellula</i> sp. and <i>Kophobelemnion</i> sp.) at every sampling location (consisting of seven records distributed across four clusters of data points). Further confirmation of the burrowed mud feature presence in this MPA comes from the analysis of underwater video footage from three MSS stock assessment survey stations (2004 and 2009) (Allen <i>et al.</i>, 2014a & b). The majority of these records intersect with the Decapod burrowing zone and the <i>Ophiocten gracialis</i> zone defined by Hughes <i>et al.</i> (2014), which are largely characterised by fine sand, muddy sand or sandy mud substrates. However, a small number of other records intersect the biological zone identified by Hughes <i>et al.</i> (2014) as the upper slope, which is more frequently characterised by coarser sediments. In addition the predictive seabed habitat mapping project EU SeaMap³ suggest the majority of records are located in the area of offshore deep-sea muds (mud and sandy mud), but others are located in an area of offshore subtidal sands and gravels (sand and muddy sand). Overall, JNCC consider that there is evidence to support the presence of deep-water burrowed mud within the MPA, but a lack of data on associated species diversity means we are not able to undertake a detailed assessment of the stage 2b guideline.</p>
Offshore deep-sea muds	<p>On the slope in OSPAR Region V, EUSeaMap predicts one type of offshore deep-sea mud to occur (Atlantic slope mud and sandy mud) and the MPA encompasses an example of this feature. Its presence is confirmed from the analysis of underwater video footage from five MSS <i>Nephrops</i> stock assessment survey stations that were assigned to the habitat offshore deep-sea mud (Allen <i>et al.</i>, 2014a & b). A further Marine Scotland Science video-tow station from 2009 also confirms the presence of offshore deep-sea mud habitats (defined in this instance as Atlantic upper slope mud) within the MPA (Axelsson <i>et al.</i>, 2014). The extent of this feature is uncertain as the survey records do not coincide with the extent of the feature predicted by EU SeaMap. Although we are certain that this feature is present within the MPA there is limited information available with which to undertake a detailed assessment of the stage 2b guideline because of a lack of information on the species present.</p>
Offshore subtidal sands and gravels	<p>Within a given depth range, the underlying substrate characteristics are likely to be a strong determinant of the types of species present (Eleftheriou & Basford, 1989). Therefore, biodiversity might be expected to be highest within a given area that contains a range of different physical types of sand and gravel habitats. With this in mind, the MPA boundary was developed to include as wide a range as possible of the offshore subtidal sand and gravel habitats thought to occur in the area.</p> <p>On the continental slope in OSPAR Region V, EU SeaMap predicts three different types of offshore subtidal sand and gravel habitats occur: Atlantic slope coarse sediment; Atlantic slope mixed sediment, and Atlantic slope sand and muddy sand. The MPA includes examples of two of these types of habitats, representing coarse to muddy sediments.</p> <p>On the continental shelf in OSPAR Region III, EU SeaMap predicts eight types of EUNIS Level 4 offshore subtidal sand and gravel habitats are likely to be present. The MPA represents examples of three of these types of EUNIS Level 4 offshore subtidal sand and gravel habitats to be present representing coarse to fine sediments:</p> <ul style="list-style-type: none"> • A5.15 deep circalittoral coarse sediment

³ This project modelled a combination of physical data describing the marine environment with information from biological sampling to refine ecologically-relevant thresholds to produce a broad-scale predictive map of seabed habitats across Europe. Further information is available online at <http://jncc.defra.gov.uk/EUSeaMap>

Guideline 2b	The search location contains example(s) of features with a high natural biological diversity (for habitats only)
	<ul style="list-style-type: none"> • A5.25 circalittoral fine sand or A5.26 circalittoral muddy sand • A5.27 deep circalittoral sand <p>The presence of offshore subtidal sand and gravel habitats on the continental slope and shelf is confirmed by British Geological Survey Particle Size Analysis (PSA) sample points. A Marine Scotland Science deep-water video tow also verifies the presence of gravelly sand on the slope, but no information on the biological communities present is available (Allen <i>et al.</i>, 2014a & b). The work undertaken by Hughes <i>et al.</i> (2014) to define biological zones on the Hebridean slope suggests there are examples of areas present that are characterised by coarser sediments – notably the outer shelf and shelf break and the upper slope biological zones.</p> <p>Overall, we consider there is limited information available with which to undertake a detailed assessment of the stage 2b guideline because of a lack of information on the range and diversity of species present within the predicted habitats.</p>

Guideline 2c The search location contains coherent examples of features, rather than smaller, potentially more fragmented ones	
Burrowed mud	<p>The EU SeaMap habitat modelling project predicts offshore deep-sea muds and offshore subtidal sands and gravels to be present on the continental slope, extending into the bathyal region of the Rockall Trough within the MPA, with the offshore subtidal sands and gravels extending onto the continental shelf break.</p> <p>Hughes <i>et al.</i> (2014) characterised the biological diversity on the Hebridean slope based on archive stills data from 1988-1998. The findings indicate five distinct biological zones with associated communities that change with depth on the slope:</p> <ul style="list-style-type: none"> • Outer shelf and shelf break zone (135-227m) – characterised by coarse sediments ranging from strongly rippled sand and gravel plains to dense fields of cobbles and small boulders. Visible fauna is sparse in this zone and predominantly comprises echinoderms such as the pencil urchin <i>Cidaris cidaris</i> and sea stars. • Upper slope zone (279-470m) – generally characterised by coarser sediments with sand and gravel patches and predominantly includes echinoderms as visible fauna. • <i>Ophiecten gracialis</i> zone (600-1020m) – a biological zone dominated by large numbers of the small brittlestar <i>Ophiecten gracialis</i> on fine sandy, muddy sand or sandy mud, with some areas of gravel or cobbles. • Xenophyophore zone (1088-1180m) – a biological zone characterised by the Xenophyophore <i>Syringammina fragilissima</i> in rippled muddy sand or sandy mud. • Decapod burrowing zone (1293-1595m) – a biological zone characterised by the burrows of large decapods such as <i>Munida tenuimanis</i> in fine muds. <p>The MPA includes examples of all five biological zones that characterise the Hebridean slope including the outer shelf and shelf break zone that predominantly occur on the continental shelf itself. As such, we consider that the three seabed habitats on the continental slope included as protected features of the MPA are coherent examples of these habitats, forming only part of a much greater extent of the biological communities that extend both northward and southward of the MPA boundary.</p>
Offshore deep-sea muds	
Offshore subtidal sands and gravels	
Continental slope	<p>In general, the Hebridean slope is regarded as a productive environment with nutrient-rich, cooler waters being drawn up the slope as a consequence of topographic relief. These buoyancy-driven cold-water cascades (Shapiro & Hill, 1997) serve to increase levels of primary biological productivity. The Hebridean slope may provide enhanced feeding conditions for a number of species occurring in the area including cetaceans and deep-water sharks, although there is no direct evidence available to support this assertion within the MPA. Large <i>et al.</i> (2010) report that blue ling are known to aggregate for spawning on the Hebridean slope and at peak depths of between 730m and 1100m within the MPA.</p>

Guideline 2d	The search location contains features considered least damaged / more natural, rather than those heavily modified by human activity ⁴
Burrowed mud	There is no information on the condition of burrowed-mud habitat within the MPA. Consequently, the possible condition of this protected feature has been inferred from information on exposure to those activities associated with pressures to which it is considered to be sensitive (Marine Scotland, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which have a coarse resolution, and VMS point data from 2009-2011, indicates that the burrowed mud feature within the MPA is exposed to activities (otter trawling) linked to the pressures to which the protected feature has a medium sensitivity. JNCC based this judgement on an assessment against the predictive distribution of offshore deep-sea muds from EU SeaMap due to few point records of burrowed mud being available. We conclude that the burrowed mud habitat may have been modified by human activity and this guideline is not considered to be met.
Offshore deep-sea muds	There is no information on the condition of offshore deep-sea mud habitats within the MPA. Consequently, the possible condition of the protected feature has been inferred from information on exposure to activities associated with pressures to which it is considered to be sensitive (Marine Scotland, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which have a coarse resolution, and VMS point data from 2009-2011, indicate that the majority of the predicted extent of offshore deep-sea mud habitats within the MPA are exposed to activities (otter trawling and line fishing) linked to pressures to which the protected feature's sensitivity may range from not sensitive to highly sensitive. This range of sensitivity is due to the biological variation between low- and higher-energy sub-types of offshore deep-sea muds that may be present within the MPA. The EU SeaMap model predicts a moderate to low level of energy at the seabed in the MPA at the depths where offshore deep-sea mud habitats are likely to occur. This prediction suggests a likely sensitivity at the upper range for the feature but given the range in sensitivity, and the uncertainty regarding the true extent of the feature, the ecological significance of such modification is uncertain. We conclude that the offshore deep-sea mud habitats may have been modified by human activity and this guideline is not considered to be met.
Offshore subtidal sands and gravels	There is no information on the condition of offshore subtidal sand and gravel habitats within the MPA. Consequently, the possible condition of the protected feature has been inferred from information on exposure to activities associated with pressures to which it is considered to be sensitive (Marine Scotland, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which have a coarse resolution, and VMS point data from 2009-2011, indicate that the majority of the predicted extent, and just over half of ground-truthed points of offshore subtidal sand and gravel habitats within the MPA are exposed to activities (otter trawling and line fishing) linked to pressures to which the protected feature sensitivity may range from not sensitive to highly sensitive. This range of sensitivity is due to biological variation between low- and high-energy sub-types of offshore subtidal sand and gravel communities. The EU SeaMap model predicts a moderate to high level of energy at the seabed in the MPA at the depths where offshore subtidal sand and gravel habitats are likely to occur. This prediction suggests a likely sensitivity at the lower range for the feature but given the range in sensitivity, and the uncertainty regarding the true extent of the components of the feature, the ecological significance of such modification is uncertain. We conclude that the offshore subtidal sand and gravel habitats may have been modified by human activity and this guideline is not considered to be met.

⁴ The Least damaged/more natural stage 2d assessment considers protected feature exposure to activities associated with pressures to which the features are sensitive. This is distinct from the work outlined in Chaniotis *et al.* (2011), which mapped available activities data at the scale of Scotland's seas to identify broad areas of low/no activity from which to identify MPA search locations in the initial phase of the MPA selection process. Unlike the stage 2d assessment Chaniotis *et al.* (2011) did not consider the location of features or their sensitivity to pressures.

Guideline 2d	The search location contains features considered least damaged / more natural, rather than those heavily modified by human activity ⁴
Slide deposit	There is no specific information on the condition of the slide deposit feature representative of the Geikie Slide Key Geodiversity Area within the MPA. Consequently, the possible condition of the protected feature has been inferred from information on exposure to activities associated with pressures to which the feature is considered to be sensitive (Brooks, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which have a coarse resolution, and VMS point data from 2009-2011, indicate that the near entire extent of the slide deposit feature is exposed to activities (otter trawling) associated with pressures to which the feature has a medium sensitivity. We consider that the degree of exposure to activities to which the feature is sensitive is not significant enough to suggest that the feature has been modified by human activity and therefore the guideline is considered to be met.

Guideline 2e	The search location contains features considered to be at risk ⁵ of significant damage by human activity
Burrowed mud	The protected feature is considered to be at medium risk of significant damage in the MPA Region (Chaniotis <i>et al.</i> , 2014). Risk to the feature is primarily associated with the use of bottom-contact mobile fishing gear.
Offshore deep-sea muds	The protected feature is considered to be subject to levels of risk that range from low to high levels in the MPA Region (Chaniotis <i>et al.</i> , 2014). The range in risk is due to the variation in sensitivity of different types of offshore deep-sea mud habitats to activities to which they are exposed. Habitats in relatively higher energy environments are generally less sensitive than habitats in lower energy environments to pressures related to physical disturbance for example. This risk to the feature within the MPA Region is primarily associated with the use of bottom-contact mobile fishing gear.
Offshore subtidal sands and gravels	The protected feature is considered to be subject to levels of risk that range from low to high levels in the MPA Regions (Chaniotis <i>et al.</i> , 2014). The range in risk is due to the variation in sensitivity of different types of offshore subtidal sand and gravel habitats to activities to which they are exposed. Habitats in higher energy, naturally disturbed, environments are generally less sensitive than habitats in lower energy environments to pressures related to physical disturbance for example. This risk to the feature within the MPA Regions is primarily associated with the use of bottom-contact mobile fishing gear.
Slide deposits	Slide deposits are considered to be at low risk of damage across Scotland's seas (Brooks, 2013), the main risk being in relation to pressures associated with otter trawling.

⁵ Information on the sensitivity of the biodiversity protected features to pressures and their associated activities was taken from Marine Scotland (2013). The degree to which a feature is exposed to activities associated with pressures to which it is sensitive in each MPA Region (as described in the Scottish MPA Selection Guidelines) 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. The conclusions do not reflect the level of risk at the scale of the MPA. The sensitivity of the geodiversity protected features to pressures and their associated activities was taken from Brooks (2013) and an assessment of risk was undertaken at the national level.

Stage 3 - Assessment of the appropriate scale of the search location in relation to the search features it contains	
Summary of assessment	The MPA boundary captures the full range of sedimentary communities as they change with depth down the continental slope in OSPAR Region V, as well as the shelf break communities present in OSPAR Region III. It also encompasses the slide deposit geodiversity feature representative of the Geikie Slide Key Geodiversity Area (Brooks <i>et al.</i> , 2013).
Detailed 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	
Burrowed mud	The MPA boundary encompasses all records of burrows in the area based on data from Marine Scotland Science deep-water towed video surveys, and sample locations of seapens recorded as by-catch from Marine Scotland Science trawl surveys.
Offshore deep-sea muds Offshore subtidal sands and gravels	The MPA boundary comprises a corridor down the slope that captures examples of the different biological zones that characterise the Hebridean slope as defined by Hughes <i>et al.</i> (2014). For offshore subtidal sand and gravel habitats, the MPA boundary was further extended onto the shelf in OSPAR Region III to capture viable areas of this habitat based on maps from the habitat modelling data from EU SeaMap and survey data. This extension was deemed necessary to meet the adequacy recommendations for the feature in that part of the Scottish network in OSPAR Region III.
Geodiversity features	The MPA boundary encompasses the full extent of the slide deposit feature representative of the Geikie Slide Key Geodiversity Area (Brooks <i>et al.</i> , 2013).

Stage 4 - Assessing the potential effectiveness of managing features within a search location as part of a Nature Conservation MPA	
Summary of assessment	Mechanisms exist through the EU Common Fisheries Policy to introduce spatial and/or temporal management measures on fishing activities to conserve the protected features within the MPA. Should licensed activities occur within the possible MPA in the future, JNCC consider any potential impacts could be addressed through the Environmental Impact Assessment (EIA) process. There is therefore potential for management measures to be implemented successfully and the conservation objectives of the protected features of the MPA to be achieved.
Detailed assessment	
There is a high probability that management measures, and the ability to implement them, will deliver the objectives of the MPA	
<p>The conservation objectives of the protected features within the MPA are to 'conserve – feature condition uncertain'. This uncertainty is a consequence of the lack of direct evidence available to confirm the features' condition within the MPA. We consider that the biodiversity protected features may have been modified by human activity (see 2d).but there is potential for these features to be conserved.</p> <p>Mechanisms exist through the EU Common Fisheries Policy to introduce spatial and/or temporal management measures on fisheries activities to conserve the protected features within the MPA. Should licensed activities occur within the MPA in the future, JNCC consider any potential impacts could be addressed through the Environmental Impact Assessment (EIA) process. JNCC conclude there is potential for management measures to be successfully implemented for the protected features to achieve their conservation objectives in the MPA.</p> <p>Further discussion concerning management of the protected features of the MPA is provided in the Geikie Slide and Hebridean Slope Management Options Paper.</p>	

Stage 5 - Assessment of the contribution of the potential area to the MPA network	
Summary of assessment	The MPA makes a contribution to the MPA network by representing deep-water burrowed-mud in OSPAR Region V, and a range of different types of offshore subtidal sand and gravel and offshore deep-sea mud habitats at the northern extent of the Hebridean slope. It also includes an area of the Hebridean Continental Slope, which evidence suggests may be of functional significance. The Geikie Slide and Hebridean Slope MPA also includes features representative of the Geikie Slide Key Geodiversity Area. Large-scale slides such as the Geikie Slide are considered characteristic geodiversity features along the Scottish continental slope and the Geikie Slide is one of five examples that are broadly representative of the range of slide features identified across Scotland's seas (Brooks <i>et al.</i> , 2013).
Detailed assessment	
The potential area contributes significantly to the coherence of the MPA network in the seas around Scotland	
Assessment of biodiversity features	
Feature	Summary
Burrowed mud	The MPA provides representation for burrowed mud in OSPAR Region V at the north-eastern extent of its geographical range. As an OSPAR Threatened and/or Declining habitat, it is considered important to have greater replication for the feature on the grounds of increased resilience. Further information is provided in the burrowed mud habitat adequacy assessment (SNH and JNCC, 2014).
Offshore deep-sea muds	The MPA provides representation for Atlantic-influenced offshore deep-sea mud habitats on the continental slope in OSPAR Region V. It represents one of two examples of slope Atlantic-influenced offshore deep-sea mud habitats recommended for protection in OSPAR Region V. Further information is provided in the offshore deep-sea muds habitat adequacy assessment (SNH and JNCC, 2014).
Offshore subtidal sands and gravels	The MPA provides representation for Atlantic-influenced offshore subtidal sand and gravel habitats predominantly on the continental slope in OSPAR Region V, but also to a small extent on the shelf in OSPAR Region III. It represents one of two examples of both shelf and slope Atlantic-influenced offshore subtidal sand and gravel habitats recommended for protection in OSPAR Regions III and V respectively. Further information is provided in the offshore subtidal sand and gravel habitats adequacy assessment (SNH and JNCC, 2014).
Continental slope	The MPA provides representation for one of two recommended areas of the Hebridean continental slope to be included within the MPA network. The Hebridean Slope is considered ecologically and hydrographically distinct to the Faroe-Shetland Channel slope and so the recommendation is for at least two examples of each area of the slope to be included. Further information is provided in the continental slope adequacy assessment (SNH and JNCC, 2014).

Assessment of geodiversity features	
Geodiversity features ⁶	The MPA includes features representative of the Geikie Slide Key Geodiversity Area. Large-scale slides are a characteristic feature along the Scottish continental slope and a number of mass-failure events have now been recognised. However, these slides vary in terms of both age and morphology: most of the older (pre-Holocene) slide deposits have been partially or completely buried within the sedimentary column whilst other (predominantly Holocene age) slides have retained clear seabed expression. Geikie slide is one of five examples of large-scale slide events that have been identified. Geikie slide is suggested to be broadly representative of the range of slides found in offshore Scottish waters (Brooks <i>et al.</i> , 2013).

⁶ For geodiversity the stage 5 assessment primarily considers the contribution of the MPAs to the principal 'networks' of marine geodiversity interests present in Scottish waters (representation). The MPA Selection Guidelines propose that there should be minimal duplication of geodiversity features at a national level.

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