



<p>Scottish MPA Project Assessment against the MPA Selection Guidelines</p>
<p>CENTRAL FLADEN NATURE CONSERVATION MPA</p>
<p><i>JULY 2014</i></p>

The following documents provide further information about the Central Fladen 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-6476

Document Distribution List and Version Control				
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Electronic	4.0	11/07/2013	Review of document to take into account MPA Sub-Group comments and release of document for public consultation.	Uploaded to JNCC website
Electronic	5.0	07/07/2014	Document update to align with designation status and text revised in response to consultation and independent review report	Delivery to Marine Scotland to support MPA designation and uploaded to JNCC website.

Background

This document provides details of JNCC's assessment of the Central Fladen 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 Central Fladen MPA are provided in the Data Confidence Assessment document.

CENTRAL FLADEN MPA - APPLICATION OF THE MPA SELECTION GUIDELINES

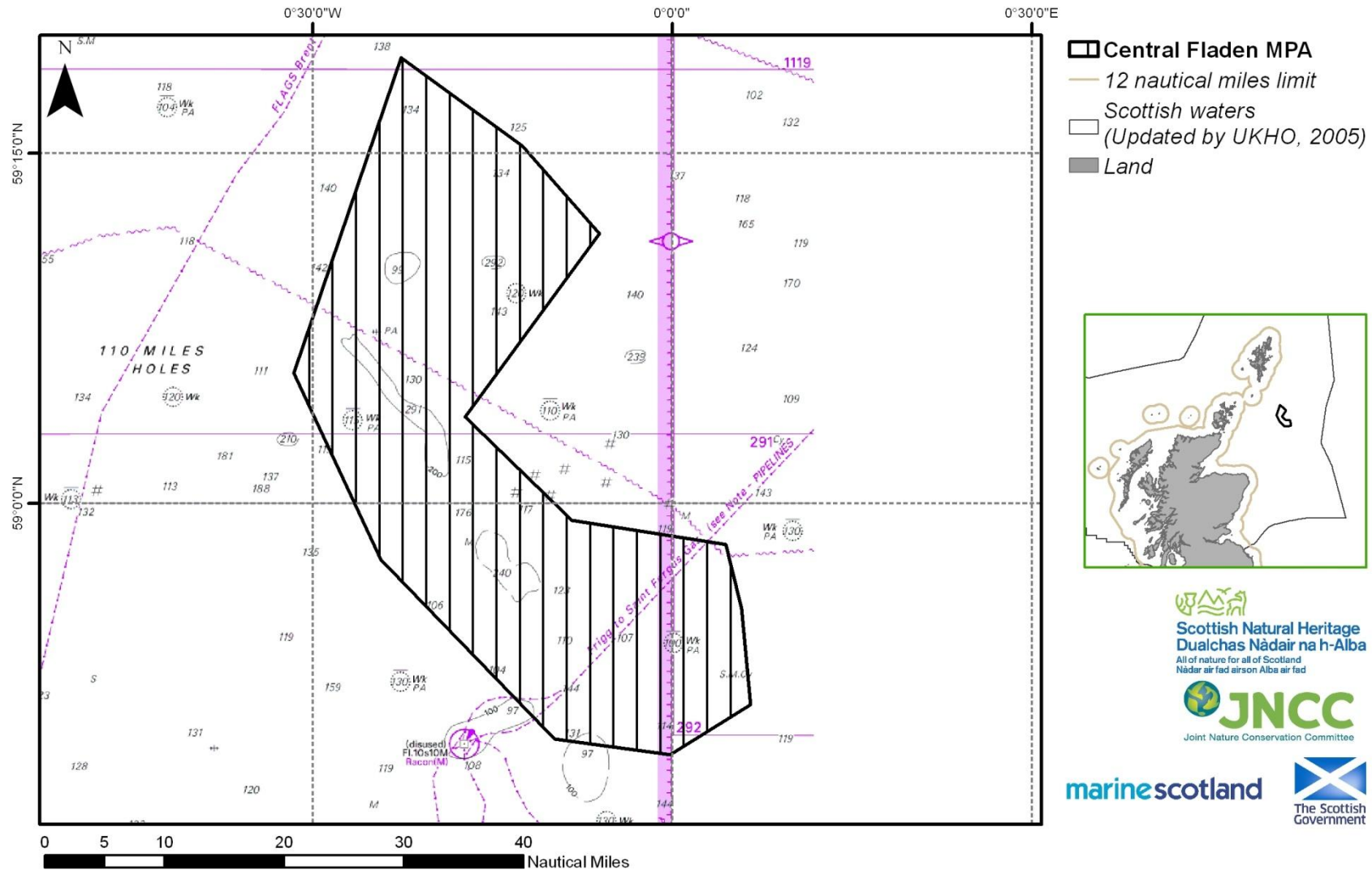
Stage 1 - Identifying search locations that would address any significant gaps in the conservation of MPA search features

Summary of assessment	The MPA includes two components of the burrowed mud protected feature – the seapens and burrowing megafauna biotope (<i>SS.SMu.CFiMu.SpnMeg</i>) and records of the tall seapen (<i>Funiculina quadrangularis</i>), which is a sub-component of the seapens and burrowing megafauna biotope (<i>SS.SMu.CFiMu.SpnMeg.Fun</i>). The MPA also includes a sub-glacial tunnel-valley geodiversity feature representative of the Fladen Deeps Key Geodiversity Area (Brooks <i>et al.</i> , 2013). The components of the burrowed mud protected feature equate to the OSPAR habitat seapens and burrowing megafauna – which is considered to be Threatened and/or Declining. The sub-glacial tunnel-valley geodiversity feature is scientifically important as it holds potentially valuable evidence about past changes in the extent and geometry of the last British-Irish Ice Sheet (Brooks <i>et al.</i> , 2013).
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Detailed assessment			
Protected features	Guideline 1a <i>Presence of key features</i> [MPA search features and geodiversity equivalents]	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	
<i>Geodiversity</i>			
Sub-glacial tunnel-valley (Quaternary of Scotland)	✓		

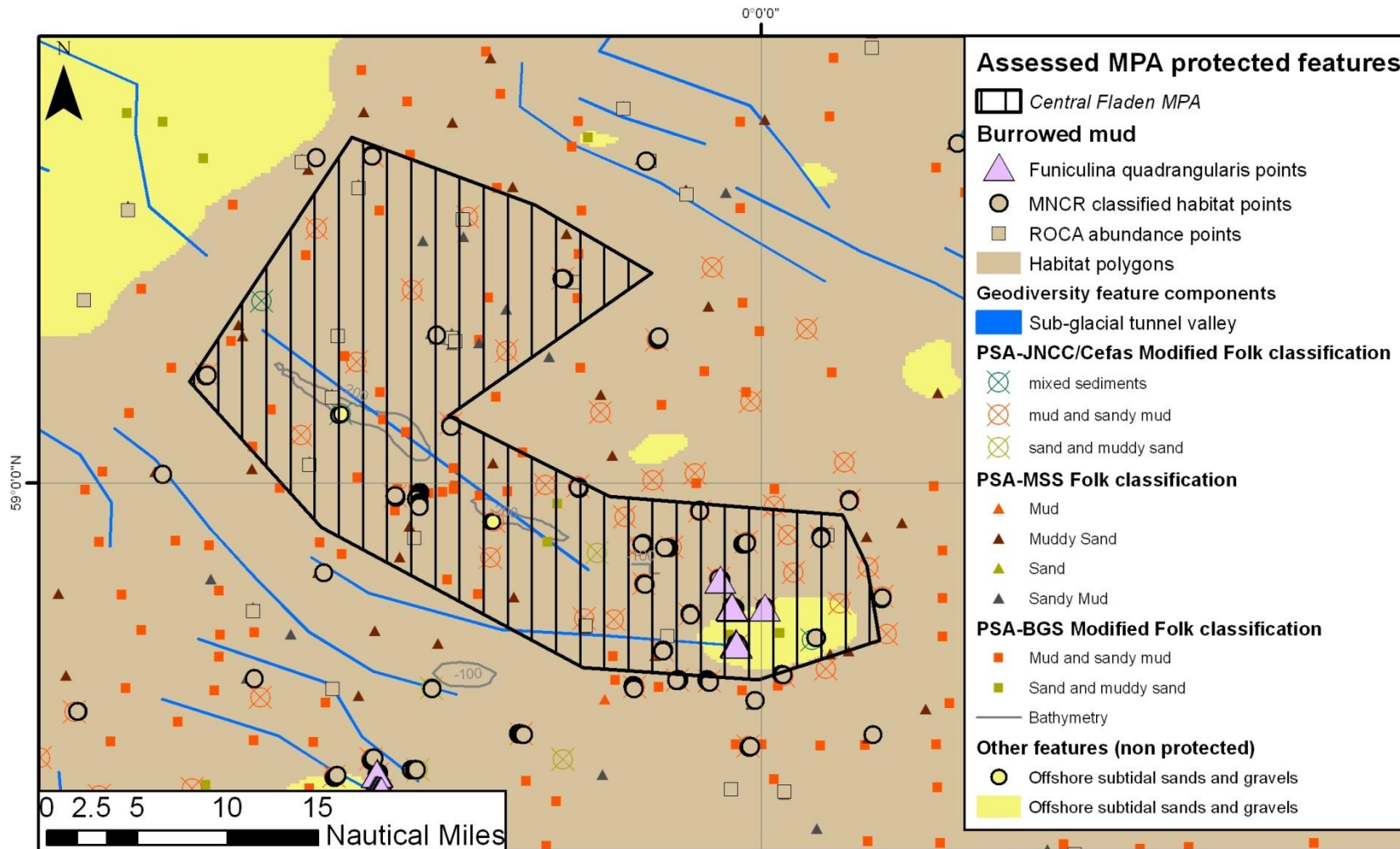
¹ OSPAR list of Threatened and/or Declining species and habitats (see OSPAR, 2008 a & b)

Map showing the location of The Central Fladen MPA



Map projected in Mercator (World) projection, geographic coordinate system WGS1984. The exact limits of the UK Continental Shelf are set out in the Continental Shelf (Designation of Areas) Order 2013, Statutory Instrument 2013/3162 (© Crown Copyright), Landmass, Ordnance Survey © Crown Copyright and database right 2011. All rights reserved. Scotland (Adjacent waters) Updated by the Law of the Sea Division, United Kingdom Hydrographic Office October 2005. MPA © JNCC and SNH, 2014. All rights reserved. Admiralty Chart © Crown Copyright, 2013. All rights reserved. License No. EK001-20130405. NOT TO BE USED FOR NAVIGATION

Map of the Central Fladen MPA showing the known distribution of the protected features



Map displayed in geographic coordinates WGS84. The exact limits of the UK Continental Shelf are set out in the 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. Bathymetry © GEBCO, 2011. Biological data from Geodatabase of Marine features in Scotland (GeMS v4) © Crown Copyright; MPA © JNCC and SNH 2014. All rights reserved; JNCC/Cefas PSA data © JNCC & Cefas. BGS PSA data © BGS. MSS PSA © MSS.

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

Summary of assessment

The MPA is designated for two protected features – burrowed mud habitat, of which there are two components present (seapens and burrowing megafauna and the tall seapen), and a sub-glacial tunnel valley representative of the Fladen Deep Key Geodiversity Area (Brooks *et al.*, 2013). We are uncertain about whether the burrowed mud in the MPA has a high natural biological diversity because of limited data on species diversity within the MPA and also the availability of data for other areas of burrowed mud in offshore waters with which to make a meaningful comparison. Survey data collected in 2013 confirms that the burrowed mud habitat is distributed across the MPA with verified records of the seapens and burrowing megafauna (**SS.SMu.CFiMu.SpMmeg**) biotope and sub-biotope (**SS.SMu.CFiMu.SpMmeg.Fun**) to the south of the MPA (Eggleton *et al.*, 2013). These data are supported by Particle Size Analysis (PSA) samples that confirm the sediment type as muddy substrate. This evidence supports JNCC’s assessment that the burrowed mud feature within the MPA is a coherent example of the habitat as opposed to fragmented patches.

There is limited information on the condition of the burrowed mud habitat or the sub-glacial tunnel-valley feature within the MPA. However, the information available on the sensitivity of the protected features to pressures associated those activities to which they are exposed suggest the burrowed mud habitat may have been modified by human activity. However, the sub-glacial tunnel-valley feature is considered robust and highly resilient to the pressures associated with those activities taking place within the MPA and so is not considered to have been modified by human activity (Brooks, 2013). Within the MPA Region², JNCC consider that there is a medium risk of damage by human activity to the burrowed mud habitat, and sub-glacial tunnel valleys are considered to be at low risk of damage by human activity across Scotland’s seas.

The stage 2a, 2c and 2e guidelines have been met. We are uncertain about whether the stage 2b guideline has been met. The stage 2d guideline has not been met for the burrowed mud protected feature.

Detailed assessment

Guideline 2a The search location contains combinations of features, rather than single isolated features, especially if those features are functionally linked

The MPA was considered for one biodiversity protected feature – burrowed mud habitat, of which there are two types present (seapens and burrowing megafauna and the tall seapen) within the MPA boundary. This guideline is not applicable to burrowed mud in this MPA since the survey data confirms the feature is widespread across the full extent of the MPA and the wider Fladen Grounds.

² East (Offshore) 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>Analysis of towed video footage since 2008, including a dedicated survey aboard the RV Cefas Endeavour in 2013, verifies the presence of the seapens and burrowing megafauna habitat (SS.SMu.CFiMu.SpnMeg) across the MPA (Greathead <i>et al.</i>, 2011; Eggleton <i>et al.</i>, 2013). This conclusion is based on the identification of megafaunal burrows, including Norway lobster (<i>Nephrops norvegicus</i>) individuals, and the occurrence of those seapen species characteristic of this habitat. There are records of the tall seapen biotope (SS.SMu.CFiMu.SpnMeg.Fun) at the southern part of the MPA; observations of the tall seapen <i>Funiculina quadrangularis</i> were often associated with records of the nationally rare brittle-star <i>Asteronyx loveni</i> that appears to be an obligate commensal of the tall seapen (Greathead <i>et al.</i>, 2011; Eggleton <i>et al.</i>, 2013). This tall seapen species is particularly rare and seldom recorded in offshore waters. The tall seapen is known to have a habitat preference for mud and muddy sand (Ager and Wilding 2009). The records present within Central Fladen are found at the edge of a patch of habitat predicted by EU SeaMap³ as offshore subtidal sand and gravel habitat, verified by PSA data (BGS, 2012) indicating these records are likely to be at the edge of their preferred habitat. Two samples analysed from the International Bottom Trawl Survey in 2011 also support the presence of the burrowed mud habitat, seapens and burrowing megafauna (SS.SMu.CFiMu.SpnMeg) in the centre of the MPA (Goudge & Morris, 2014). There are also records of polychaetes (<i>Paramphinome jeffreysii</i>) and brittle stars (<i>Amphiura chiajei</i>) in association with these survey records.</p> <p>There are limited data available with which to compare levels of natural biological diversity between burrowed mud in this MPA and in other offshore areas of similar habitat. As a proxy for identifying an area of higher diversity within the Fladen Grounds, JNCC focussed the MPA boundary to include records of seapens and burrows that met or exceeded the average density recorded from across the wider Fladen Grounds.</p> <p>The abundance of both the phosphorescent sea pen (<i>Pennatula phosphorea</i>) and the slender sea pen (<i>Virgularia mirabilis</i>) across the wider Fladen grounds from 2008 and 2009 is occasional, with the slender sea pen records being rare in 2010. These abundance scores were derived from the ROCA scale⁴ for seapen abundance adopted by Marine Scotland Science. As a proportion of the total number of tows from 2008-2010 within the Central Fladen MPA, 97% of records meet or exceed the average abundance of seapens recorded from across the wider Fladen Grounds for these respective species. Burrow density is just below the average for the wider Fladen Grounds.</p> <p>We are uncertain about whether the burrowed mud in the MPA has a high natural biological diversity because of limited data on species diversity within the MPA and also the availability of data for other areas of burrowed mud in offshore waters with which to make a meaningful comparison. However, based on the available information burrowed mud habitat in the MPA may be more biologically diverse in comparison to the mud habitat across the wider Fladen Grounds.</p>

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>

⁴ **ROCA** is a scale of relative abundance used by Marine Scotland Science to assess the density of organisms. It uses the categories Rare, Occasional, Common and Abundant

Guideline 2c The search location contains coherent examples of features, rather than smaller, potentially more fragmented ones	
Burrowed mud	Analysis of the available survey data illustrates a fairly even distribution of seapens and burrows recorded from within the MPA boundary (Greathead <i>et al.</i> , 2011; Allen <i>et al.</i> , 2012; Eggleton <i>et al.</i> , 2013; Goudge & Morris, 2014). The distribution of the burrowed mud habitat is supported by PSA samples that confirm the sediment type as muddy substrate. In addition, the survey data suggests that the majority of the burrowed mud survey points meet or exceed the average abundance of typical seapen species recorded from across the wider Fladen Grounds and that burrow density values for stations within the MPA are just under the average for the values across the wider Fladen grounds (Greathead <i>et al.</i> , 2011). Overall, JNCC consider that burrowed mud within the MPA is a coherent as opposed to fragmented example of the habitat.
Guideline 2d The search location contains features considered least damaged / more natural, rather than those heavily modified by human activity⁵	
Burrowed mud	Eggleton <i>et al.</i> , (2013) note that there was evidence of occasional trawl scars towards the south of the MPA boundary, but otherwise there is limited information on the condition of burrowed mud 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 burrowed mud may be sensitive (Marine Scotland, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which are coarse in resolution, and VMS point data from 2009-2011, indicate that the entire extent of burrowed mud habitat within the MPA is exposed to activities (otter trawling, seine netting and set netting) linked to pressures to which the feature may have medium sensitivity. Unlike the slender sea pen (<i>Virgularia mirabilis</i>) and the phosphorescent sea pen (<i>Pennatula phosphorea</i>), the tall sea pen is unable to retract into the sediment making it particularly vulnerable to human-induced disturbance on the sea-floor, particularly by mobile fishing gear (Greathead <i>et al.</i> , 2005). JNCC conclude that the burrowed mud habitat may have been modified by human activity and this guideline is not considered to be met.
Sub-glacial tunnel-valley	There is no information on the condition of the sub-glacial tunnel-valley feature 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 sub-glacial tunnel-valley features may be sensitive (Brooks, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which are coarse in resolution, and VMS point data from 2009-2011, indicate that the entirety of the sub-glacial tunnel-valley within the MPA is exposed to activities (otter trawling) linked to pressures to which the feature may have a low sensitivity. Overall, the feature is considered robust and highly resilient to pressures associated with the activities taking place within the MPA (Brooks, 2013) and so it is considered unlikely that the feature has been modified by human activity. We therefore consider this guideline to be met.

⁵ 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 2e The search location contains features considered to be at risk⁶ of significant damage by human activity	
Burrowed mud	The protected feature is considered to be at medium risk of significant damage by human activity in the MPA Region (Chaniotis <i>et al.</i> , 2014). The risk is derived from the use bottom-contact fishing-gear (primarily otter trawling) and cable and pipeline installation and their maintenance.
Sub-glacial tunnel-valley	The protected feature is considered to be at low risk of significant damage by human activity in Scotland's seas (Brooks, 2013). The risk is primarily derived from otter trawling and scallop dredging.

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 was drawn to include survey records of the seapens and burrowing megafauna (<i>SS.SMu.CFiMu.SpnMeg</i>) habitat, mostly including areas where the distribution of the seapen species meet or exceed the average density of seapens from across the wider Fladen Grounds. The southern part of the MPA boundary was drawn to include one of the only areas where tall seapen have been recorded in Scottish offshore waters. The MPA also includes the entirety of a sub-glacial tunnel-valley geodiversity feature representative of the Fladen Deeps Key Geodiversity Area (Brooks <i>et al.</i>, 2013).
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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	Burrowed-mud habitat is widely distributed across the MPA and the wider Fladen Grounds. The MPA boundary was drawn to include survey records of the seapens and burrowing megafauna (<i>SS.SMu.CFiMu.SpnMeg</i>) habitat, mostly including areas of the habitat where the distribution of the characteristic seapen species meet or exceed the average density of those seapens from across the wider Fladen Grounds (Greathead <i>et al.</i> , 2011). The southern boundary of the MPA has been drawn to include one of the only areas where tall seapen have been recorded in Scottish offshore waters; the boundary tracks the predicted distribution of the typical habitat type for this species (muddy sand) (Ager & Wilding, 2009).
Geodiversity features	The MPA includes the entirety of a sub-glacial tunnel-valley geodiversity feature that runs through the centre of the MPA, a feature representative of the Fladen Deeps Key Geodiversity Area (Brooks <i>et al.</i> , 2013).

⁶ 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 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 EC Common Fisheries Policy to introduce spatial/temporal measures to manage fishing activities to conserve the protected features within the MPA. Licensed activities could be managed 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 to be achieved.
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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 objectives of the protected features of the MPA are to 'conserve – feature condition uncertain'. This uncertainty is a consequence of the lack of direct evidence available to confirm the condition of the protected features. We consider that burrowed mud may have been modified by human activity (see 2d) but there still remains the potential for the protected features to be conserved.

Mechanisms exist through the European Commission under the Common Fisheries Policy to support the introduction of spatial/temporal measures to manage fisheries activities to conserve the protected features within the MPA. Licensed activities could be managed through the EIA process. Therefore, management action could be successfully implemented to achieve the conservation objectives of the protected features.

Further discussion concerning management of the protected features of the MPA is provided in the Central Fladen Management Options Paper.

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 for the seapens and burrowing megafauna and tall seapen components of the burrowed mud MPA search feature; the tall seapen component is seldom recorded in offshore waters around Scotland. The sub-glacial tunnel-valley geodiversity feature representative of a part of the Fladen Deep Key Geodiversity Area is regarded as scientifically important since it holds potentially valuable information regarding past changes in the extent and geometry of the last British-Irish Ice Sheet (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 the seapens and burrowing megafauna habitat type of burrowed mud and the most recent records of the tall seapen away from the coast in OSPAR Region II. For further information please see the burrowed-mud adequacy assessment (SNH and JNCC, 2014).
Assessment of geodiversity features	
Geodiversity features ⁷	The key geodiversity interest within the Central Fladen MPA is an example sub-glacial tunnel-valley representing the wider Key Geodiversity Area – the Fladen Deep. The Fladen Deep, or ‘The Holes’, represent a series of large-scale tunnel-valleys. In places, these are up to 150m in depth below the surrounding seafloor, 4km wide and 40km long and are likely to have been formed by pressurised melt-water flowing beneath the ice sheet. The Fladen Deep is regarded as scientifically important since they hold potentially valuable information regarding past changes in the extent and geometry of the last British-Irish Ice Sheet (Brooks <i>et al.</i> 2013).

⁷ 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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