Scottish MPA Project **Data Confidence Assessments**
NORTH-WEST ORKNEY NATURE CONSERVATION MPA
JULY 2014

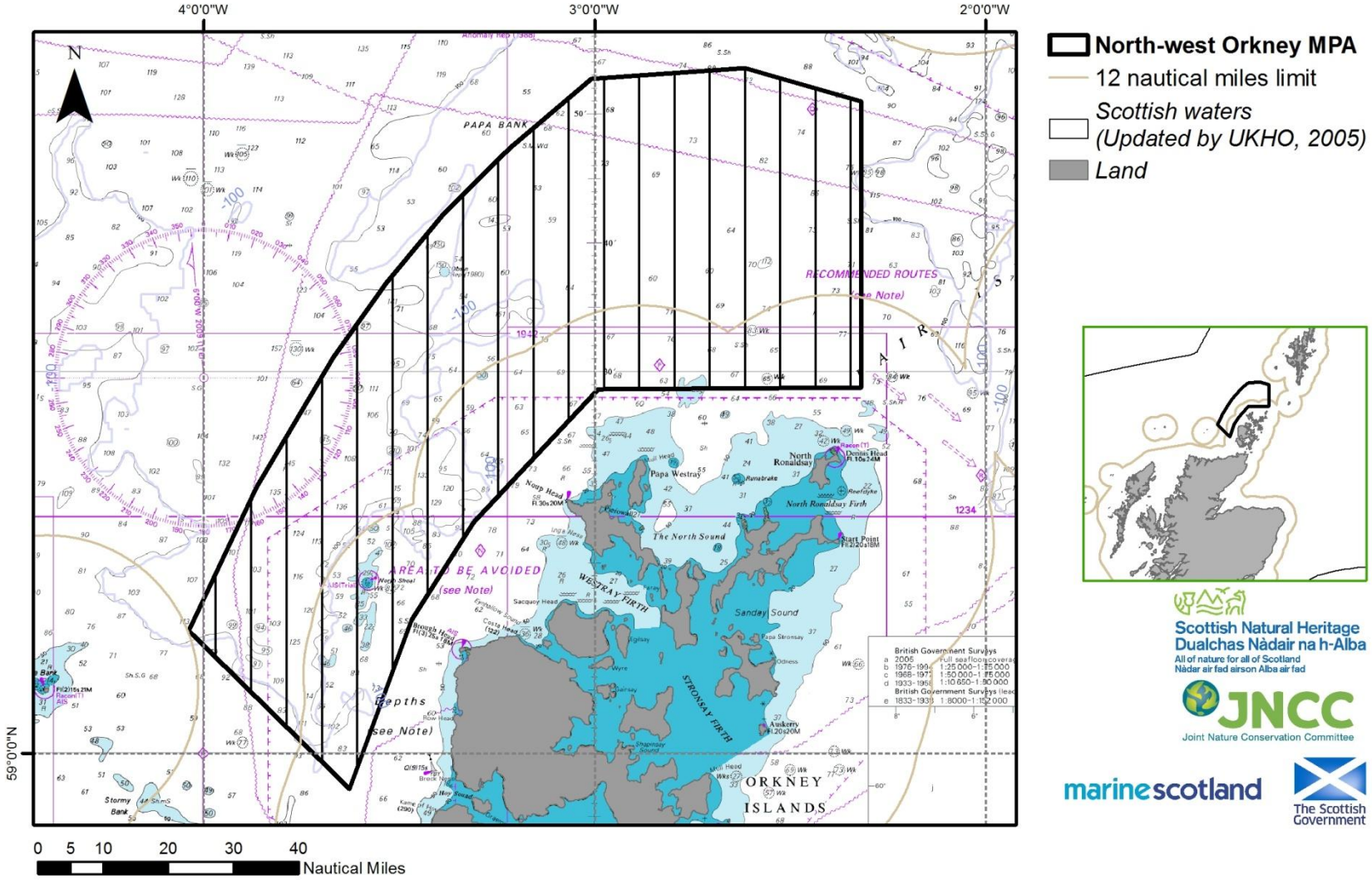
The following documents provide further information about the North-west Orkney Marine Protected Area (MPA):

- Site Summary Document
- Detailed Assessment against the MPA Selection Guidelines
- Management Options Paper

The documents are all available at www.jncc.defra.gov.uk/page-6484

Document Distribution List and Version Control				
Format	**Version**	**Issue date**	**Version development and review**	**Issued to**
Electronic	2.0	11/04/2013	Internal drafting and review of pre-version 2.0 drafts by JNCC SMPA team and Grade 7 staff and editorial review prior to release to MPA Sub Group	MPA Sub Group
Electronic	3.0	10/06/2013	Review of document to take into account MPA Sub-Group comments by JNCC SMPA team prior to release to MPA Sub Group for sign-off	MPA Sub Group
Electronic	4.0	12/07/2013	Review of document to take into account MPA Sub-Group comments by JNCC SMPA team and editorial review before release of document for public consultation.	Uploaded to JNCC website
Electronic	5.0	17/07/2014	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 upload to JNCC website

Figure 1 Map of the North-west Orkney 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

MPA name	North-west Orkney	**Date of initial assessment**	11th July 2012	**Assessors**	ALR, NC, PC, ML, OCA
The North-west Orkney MPA has been identified to conserve an important area for sandeels (specifically *Ammodytes marinus* within offshore waters) based on advice from Marine Scotland Science (Marine Scotland Science, 2012). The area contains suitable sandeel habitat and relatively high densities of sandeel larvae have been recorded. The area is also being considered for geodiversity features representative of the Fair Isle Straight Marine Process Bedforms Key Geodiversity Area (Brooks *et al.,* 2013). The MPA boundary has been drawn to focus on records showing high densities of sandeel larvae (Proctor *et al.,* 1998) and records of adult sandeels from Marine Scotland Science data. In addition, the presence of suitable sediments for colonisation by sandeels was also considered (Wright *et al.,* 2000). The minimum area required to sustain a viable population of sandeel larvae is not currently understood.					

Protected features			
Biodiversity	Sandeels (SE)	**Geodiversity**	Overlaps with a Key Geodiversity Area – Isle Straight Marine Process Bedforms Sediment wave fields, sand banks and sand wave fields from the Marine Geomorphology of the Scottish Shelf Seabed block (Brooks *et al.,* 2013)
Feature exclusions (MPA search features recorded within the MPA but excluded from the assessment with reasons)			
Shelf banks and mounds and shelf deeps – There is no evidence to indicate the wider functional significance of the shelf banks and mounds or shelf deeps found within the MPA. Consequently, they were excluded from further assessment. Offshore subtidal sands and gravels (shelf) – Acoustic data have been processed and interpreted to create a partial coverage habitat map of the area (Sotheran and Crawford-Avis, 2014). Relative to what is known about examples of this habitat in other MPAs, North-west Orkney is not considered to make an equivalent contribution to the conservation of offshore subtidal sands and gravel habitats on the shelf in the Scottish waters of OSPAR Region II. As such, the feature was excluded from further assessment. Fan mussel aggregations – There is a single record of fan mussel in the area that comprises an individual specimen recorded in 1956. Given the age of the record and the no further evidence to show the presence of an 'aggregation' of the species, the feature was excluded from further assessment.			

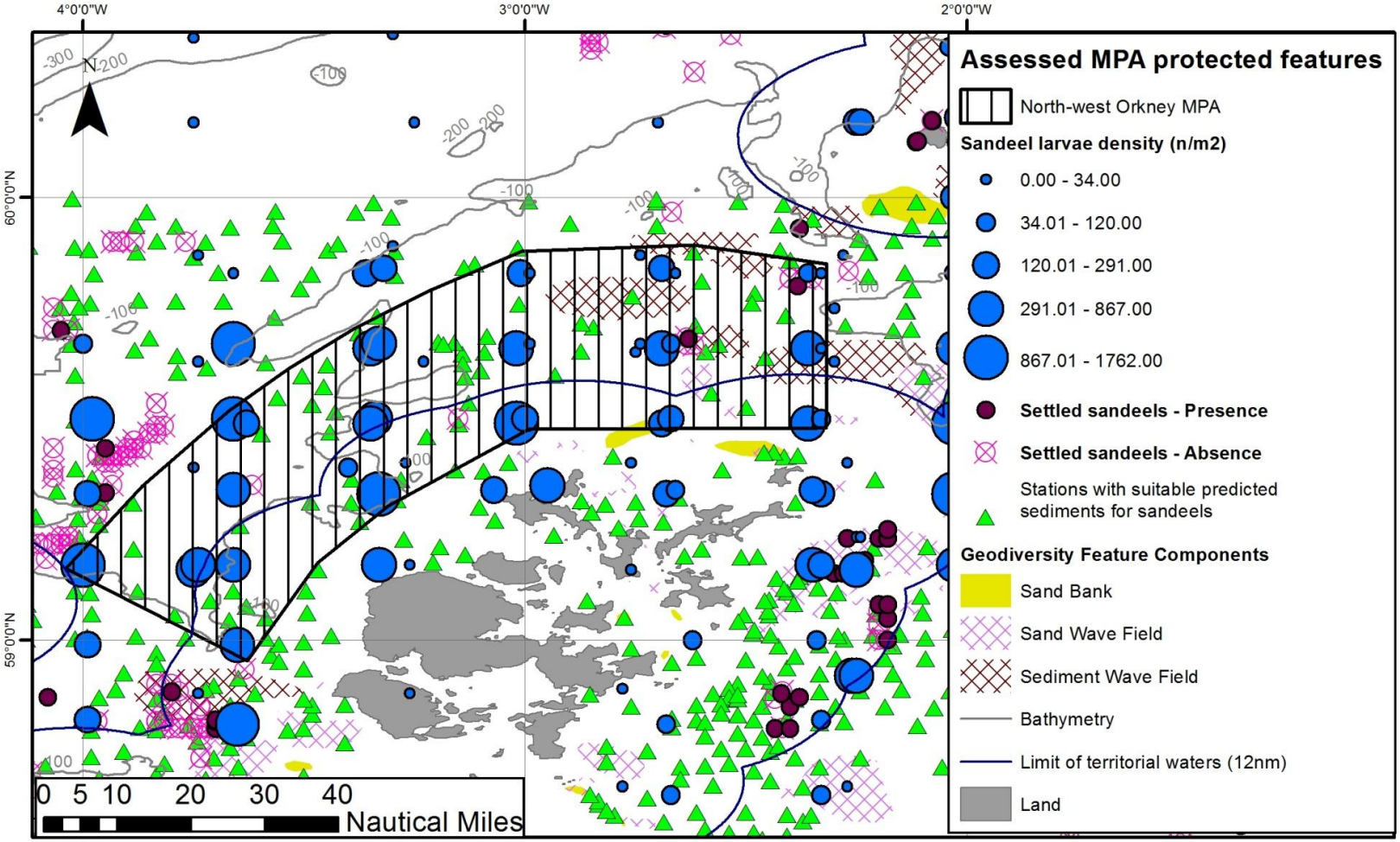
Data used in assessment -			
Version of GeMS holding feature data used to support site selection	Ver.4	**Other datasets used** (not in GeMS) [superscripts are used to reference these datasets in the following discussion]	• [1]Sediment suitability data and information (Wright *et al.* 2000) • [2]Continuous Plankton Recorder data for the North Sea from 1950-2005 (Lynam *et al.,* 2013)

Summary of data confidence assessment (see detailed assessment on following pages)						
Confident in underpinning data	**Yes**	✓	**Partial**	-	**No**	-

Confident in presence of identified features?	✓	**Data suitable to define extent of individual protected features**	**Yes**	**Partial**	**No**
			✓	-	-

Summary	Based on the availability of a peer-reviewed time series dataset, JNCC are confident in the presence and distribution of sandeel larvae across the MPA. Larval density information has been derived from the analysis presented in Proctor *et al.* (1998) (in GeMS v4) and information on the distribution of sandeel larvae (relative abundance – num/m^3) derived from the Continuous Plankton Recorder (CPR) survey data presented in Lynam *et al.,* (2013)[2]. The CPR information consists of processed data from surveys of the North Sea from 1950-2005 providing more recent evidence that sandeel larvae are regularly present within the MPA. We are also confident in the presence of suitable sediment for sandeels[1], and the extensive export of larvae contributing to adult recruitment to populations further afield from Shetland to the Moray Firth (Wright & Bailey, 1996). Evidence shows the feature is distributed across the whole MPA and the data have been collected using appropriate methodologies by Marine Scotland Science and others from the 1960's until the 1990's[1]. Whilst these assessments used both historic and/or modelled data, the source material came from peer-reviewed analyses that demonstrates the quality of the evidence. Such material is considered of appropriate quality to support the judgements underpinning the MPA designation.

Figure 2 The known distribution of protected features within the North-west Orkney MPA (see Map D for Lynam, *et al.* (2013) data)



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

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The Scottish Government

JNCC
Joint Nature Conservation Committee

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). 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. Bathymetry © GEBCO, 2011. Biological data from Geodatabase of Marine features in Scotland (GeMSv4) © Crown Copyright; MPA and geodiversity data © JNCC and SNH 2014.

Data confidence assessment	JNCC's assessment of data confidence considered the age and source of the data, the type of sampling methodologies used and the overall coverage of data across the MPA

Age of data (Map A)			
Multiple or majority of records collected post 2000	✓	**Multiple or majority of records collected pre 2000**	✓
Comments	Data showing the occurrence of adult sandeel within the MPA originates from annual Marine Scotland Science trawl survey data collected between 1986 and 1991 (in GeMSv4). The age of the sandeel larvae data collated and analysed by Proctor *et al.* (1998) (in GeMS v4) ranges from 1961 to 1989 (Marine Laboratory Aberdeen (MLA) plankton survey data) to 1992 (Marine Scotland Science survey data) for the northern North Sea, and 1995 and 1997 (Danish Institute of Fisheries Research data) in other parts of the North Sea. Map A shows these data by the year of analysis in the absence of information on collection date in the source data. The Continuous Plankton Recorder survey data analysed by Lynam *et al.* (2013)[2] were collected between 1950 and 2005. The sediment suitability information was derived from samples collected during surveys in 1985, 1990 and 1993, analysed by Wright *et al.* (2000)[1]. The spatial dataset also incorporates seabed samples collected between 1971 and 1983. The evidence base does contain older records, so there is potential for uncertainty, possibly in the spatial precision of the source data, however the quality of information is considered high given the sources of the data and their collection methods.		

Source of data (Map B)					
Targeted data collection for nature conservation purposes	-	**Statutory monitoring (marine licensing etc)**	-	**Fisheries survey work**	✓
Data collection associated with development proposals (EIA etc.)	-	**Recreational / volunteer data collection**	-	**Other** (specify) – plankton surveys, PSA data collated by MSS	✓
Comments	The data for larval density and distribution collated and analysed by Proctor *et al.* (1998) (in GeMS v4) consists of data from Marine Scotland Science and further published studies. The data from the different sources were not directly comparable with one another (e.g. sampling gear differences) therefore the data were combined into a comparable index of early larval abundance within a grid system. The data sources for sandeel presence/absence include annual Marine Scotland Science trawl surveys. The information on the suitability of seabed sediments was derived from the analysis of samples collected through a series of underwater video systems (for topography) and grab sample techniques (for substrate) by MSS. The data were collected at the same time as information on adult sandeel presence/absence. Both datasets were entered into a General Additive Model (GAM) to derive information on sediment suitability for colonisation of sandeels (Wright *et al.,* 2000)[1]. The spatial dataset incorporates seabed samples from the BGS, assessed by MSS. The Continuous Plankton Recorder survey data originates from instruments deployed on merchant vessels carrying out their normal business ('ships of opportunity') at various times of the year between 1950 and 2005, with the data being held in the CPR database (Lynam *et al.,* 2013)[2].				

Sampling methods / resolution							
Feature	**Modelled**	**Acoustic / remote sensing**	**Remote video / camera**	**Infaunal - grab / core**	**Fisheries trawl**	**Diving**	**Sediment sampling**
SE			✓	✓	✓		✓
Comments	Sandeels and sediment samples were collected using a variety of methods including the Smith-McIntyre Grab, the Day grab, trawl and dredge sampling. A variety of underwater video systems to capture data on topography of the sandeel grounds were also used during some of the research surveys to inform the suitability assessment. A towed Continuous Plankton Recorder using silk rollers collected information on plankton including sandeel larvae.						

Data coverage (Maps A to F)					
Across the MPA					
Numerous protected feature records evenly distributed across the MPA?	✓	**Numerous protected feature records scattered across the MPA with some clumping?**	**-**	**Few or isolated protected feature records - possibly clumped?**	**-**
For Individual features					
Multiple records of individual protected features providing indication of extent and distribution throughout the MPA?	✓	**Few or scattered records of specific protected features making extent and broad distribution assessment difficult?**	**-**	**Few or isolated records of specific protected features**	**-**
Are acoustic remote sensing data available to facilitate the development of a full coverage predictive seabed habitat map?			No, there are multibeam data available for approximately 25% of the MPA area. These data have been used to interpret seabed habitat types within the MPA (Sotheran & Crawford-Avis, 2014), but have not been discussed or presented here because seabed habitats are not protected features of the MPA (see feature exclusions).		

Comments

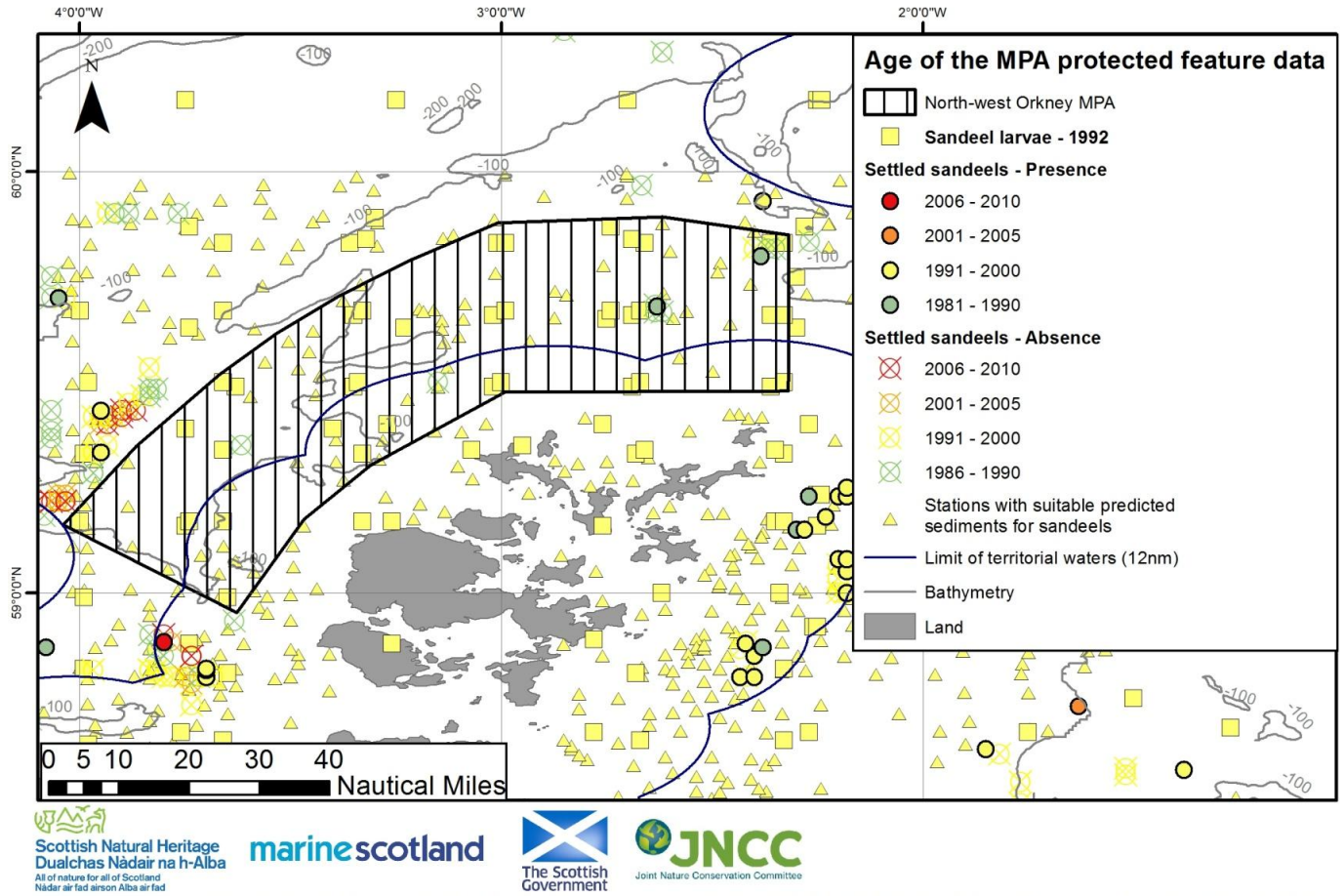
Sandeels (SE)

- Proctor, R., Wright, P.J. and Everitt, A. (1998) (GeMS v4) - High larval densities were recorded across the entire MPA. Of the 39 points within the MPA the density ranges from 0.1m^2 up to 1240/m^2, the mean being 328/m^2 and a std dev of 352.
- Wright, P.J., Jensen, H. and Tuck, I. (2000)[1] - Data on the presence and extent of suitable substrate for sandeels are well distributed across the possible area consisting of 186 records. Of those, 59 records were determined suitable for colonisation by sandeels (i.e. sediments with a low silt/clay fraction). These 'suitable records' are well-distributed across the MPA.
- Lynam, C.P., Pitois, S., Halliday, N.C., Van Damme, C., Wright, P.J., Edwards, M., (2013)[2] - Information on the distribution of sandeel larvae derived from Continuous Plankton Recorder surveys of the northern North Sea from 1950-2005 provide more recent information on sandeel larvae persistence over time within the MPA. Map D shows the spatial variability of overall mean abundance (per m^3) as presented (same symbology) in Figure 1b of Lynam *et al*. (2013) at a scale suitable to give context to the data coinciding with the MPA. Lynam *et al.* (2013) evaluated whether the CPR provides a representative index of the spatio-temporal distribution of sandeel larvae. The authors conclude that temporally, the use of the CPR is a robust method for sampling and detecting patterns in sandeel larvae, but do note that the CPR method may underestimate numbers of sandeel larvae due to the sampling device's small aperture and constant shallow depth of deployment. However in the part of the study comparing the CPR data with the ICES fish larvae surveys they found a significant spatial correlation in abundance.
- Marine Scotland Science (MSS) sandeel survey data (GeMS v4) – MSS survey records show the presence of adult sandeels, located in the eastern half of the MPA, together with isolated records showing absence in the west, centre and east.

Geodiversity

Data coverage (Maps A to F)	
	• In the east of the MPA, features representative of the Fair Isle Straight Marine Process Bedforms Key Geodiversity Area are included (Brooks *et al.,* 2013). This includes sediment wave fields, sand banks and sand wave fields from the Marine Geomorphology of the Scottish Shelf Seabed block (Map E & F).

THE EVIDENCE BASE[1]



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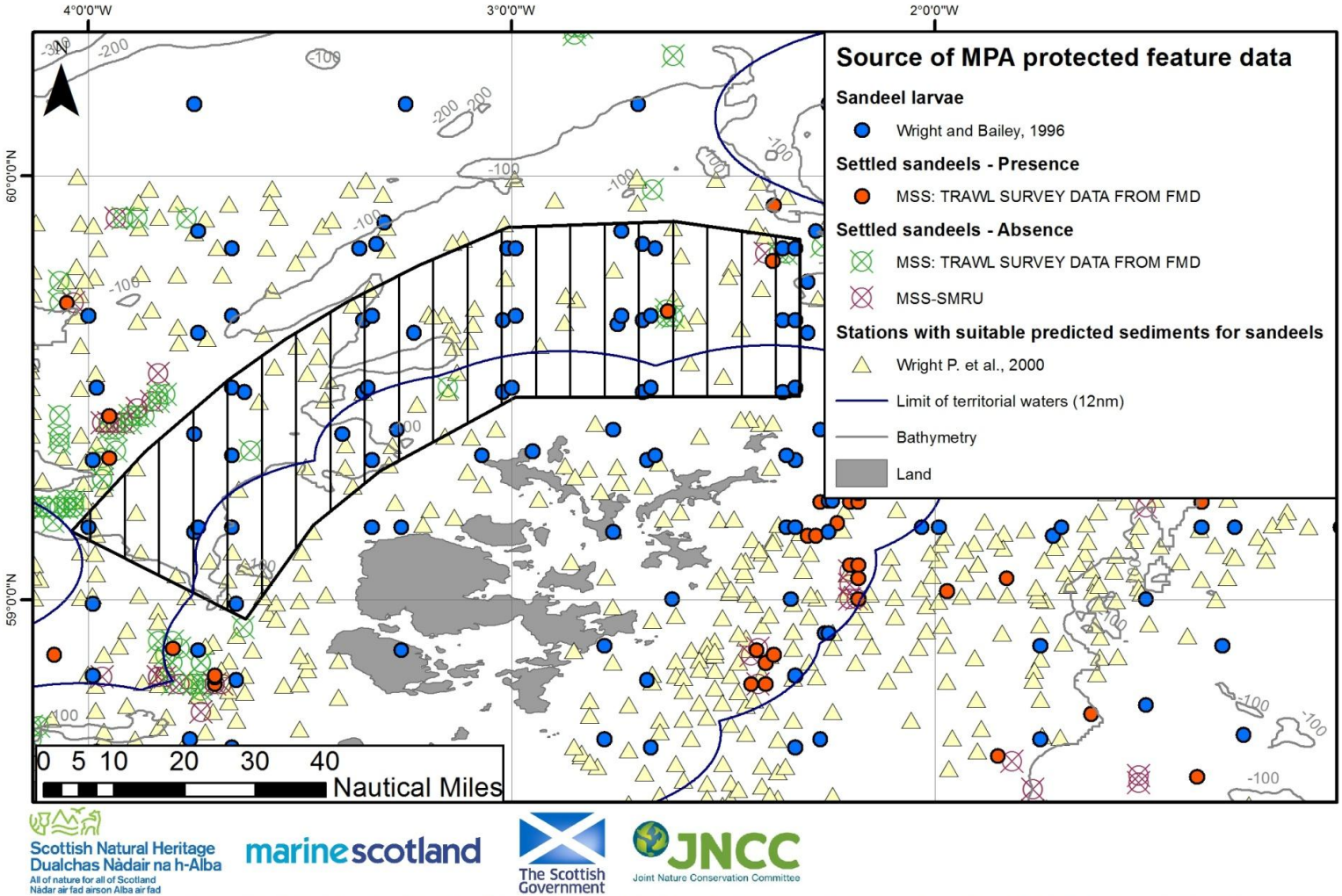
A

[1] **Maps A-C exclude Lynam *et al.* (2013) data which is shown separately on Map D**

THE EVIDENCE BASE[1]



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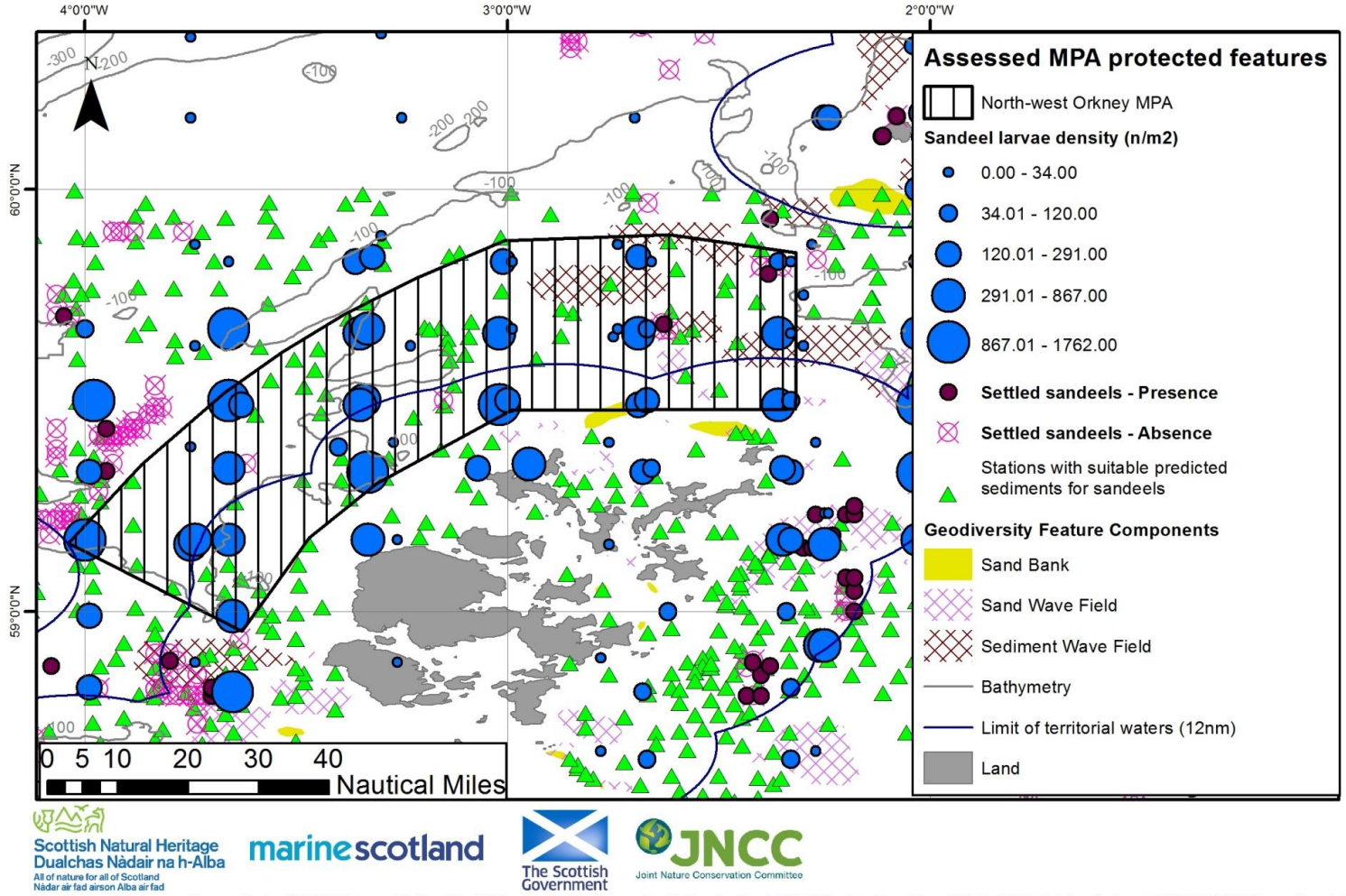
B

THE EVIDENCE BASE[1]



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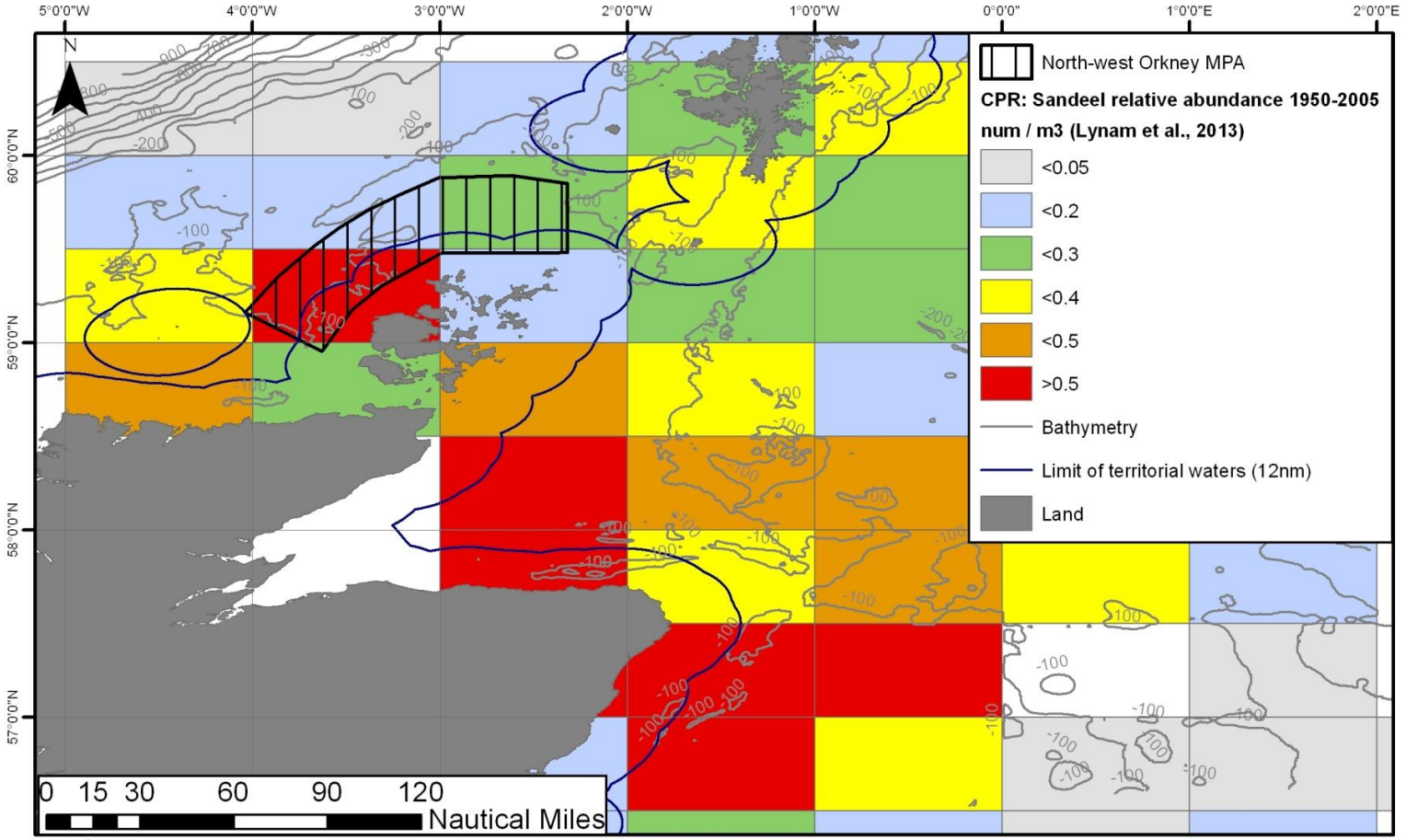
C

THE EVIDENCE BASE[1]



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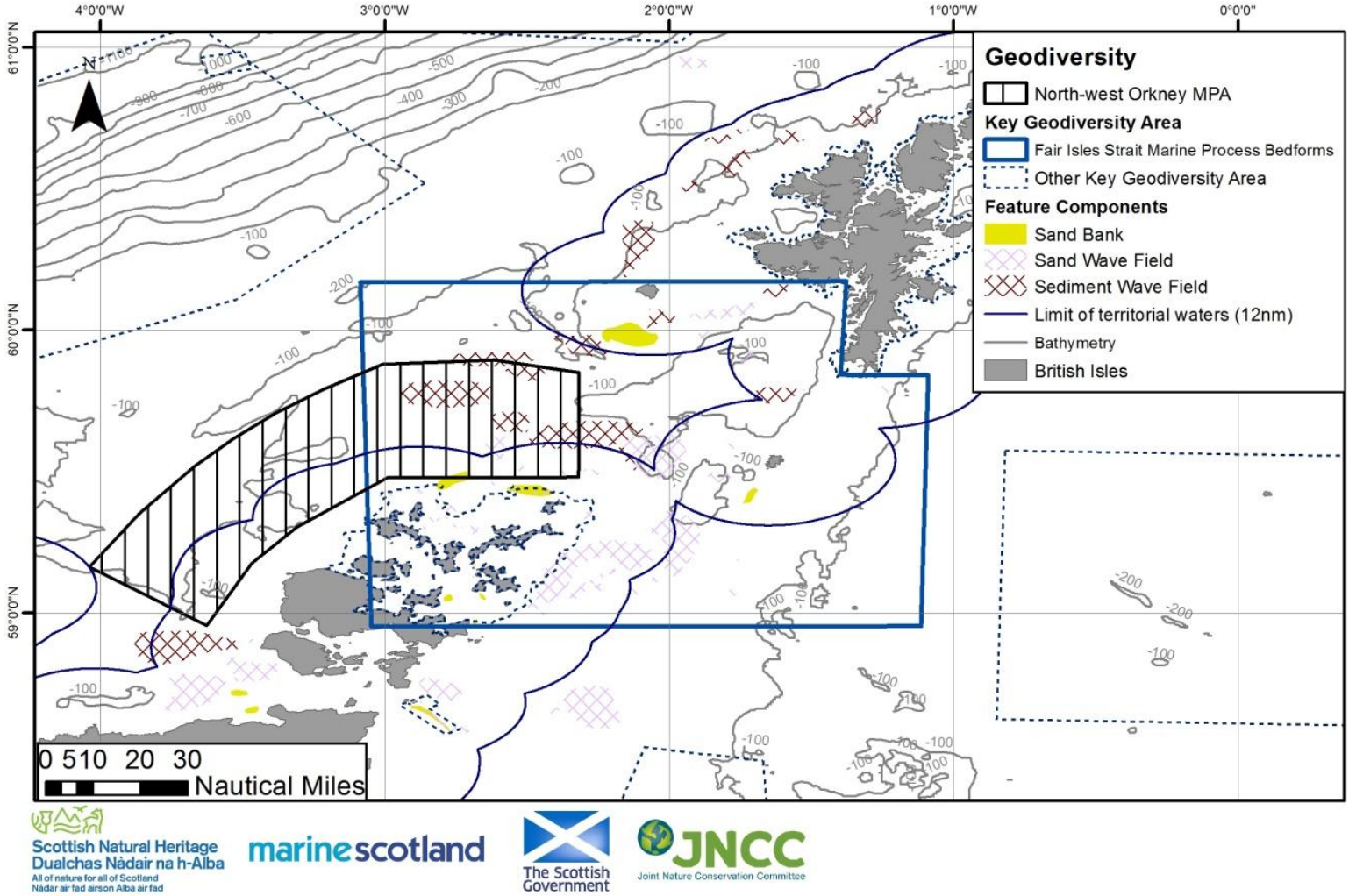
D

THE EVIDENCE BASE[1]



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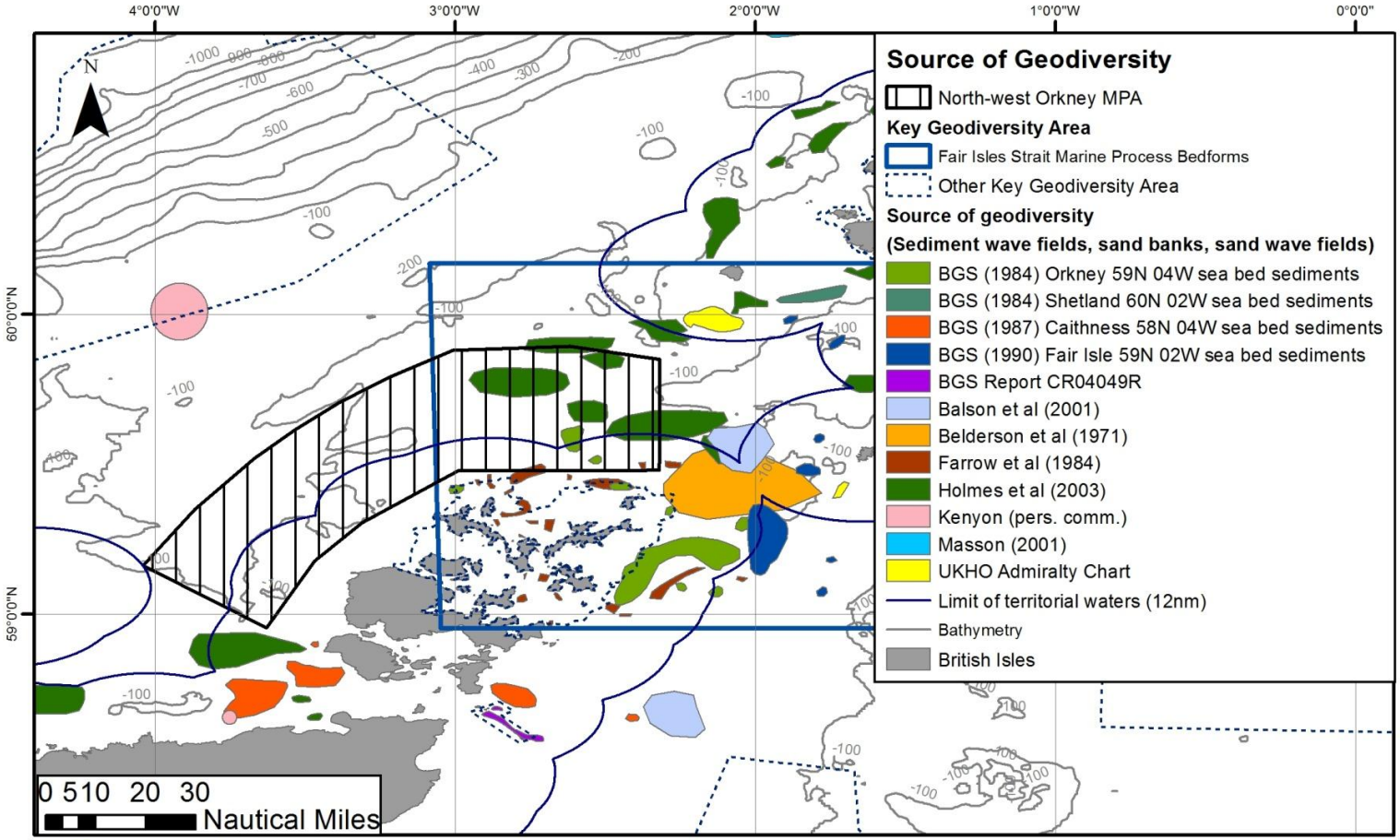
E

THE EVIDENCE BASE[1]



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F

Data sources and bibliography		
Year	**Title**	**Features covered**
2014	Geodatabase of Marine features in Scotland (GeMS) Version 4	SE
2014	Sotheran, I. & Crawford-Avis, O., (2014). Mapping habitats and biotopes to strengthen the information base of Marine Protected Areas in Scottish waters. JNCC Report 503.	-
2013	Lynam, C.P., Pitois, S., Halliday, N.C., Van Damme, C., Wright, P.J., Edwards, M., (2013). Spatial patterns and trends in abundance of larval Ammodytidae from Continuous Plankton Recorder surveys of the North Sea: 1950 – 2005. ICES Journal of Marine Science doi:10.1093/icesjms/fst006.	SE
2013	Brooks, A.J., Kenyon, N.H., Leslie, A., Long,, D., and Gordon, J.E. (2013). Characterising Scotland's marine environment to define search locations for new Marine Protected Areas. Part 2: The identification of Key Geodiversity Areas in Scottish waters. Scottish Natural Heritage Commissioned report No. 432.	Geodiversity
2012	Marine Scotland Science. (2012). *Marine Protected Areas and sandeels (Ammodytes marinus & A. tobianus). Position paper for 4th MPA Workshop, Heriot-Watt University, 14-15 March 2012*. Available online - <http://www.scotland.gov.uk/Resource/0038/00389460.doc>	SE
2000	Wright, P.J., Jensen, H. and Tuck, I. (2000). The influence of sediment type on the distribution of the lesser sandeel, *Ammodytes marinus*. *Journal of Sea Research* **44**(3-4): 243-256.	SE
1998	Proctor, R., Wright, P.J. and Everitt, A. (1998). Modelling the transport of larval sandeels on the north-west European shelf. *Fisheries Oceanography* **7** (3-4): 347-354.	SE
1996	Wright, P.J. and Bailey, M.C. (1996). Timing of hatching in *Ammodytes marinus* from Shetland waters and its significance to early growth and survivorship. *Marine Biology* **126** (1): 143-152.	SE