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Scottish MPA Programme

Data confidence assessment

NORTH-EAST LEWIS POSSIBLE MPA

JUNE 2019

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www.nature.scot/mpas or www.jncc.defra.gov.uk/scottishmpas

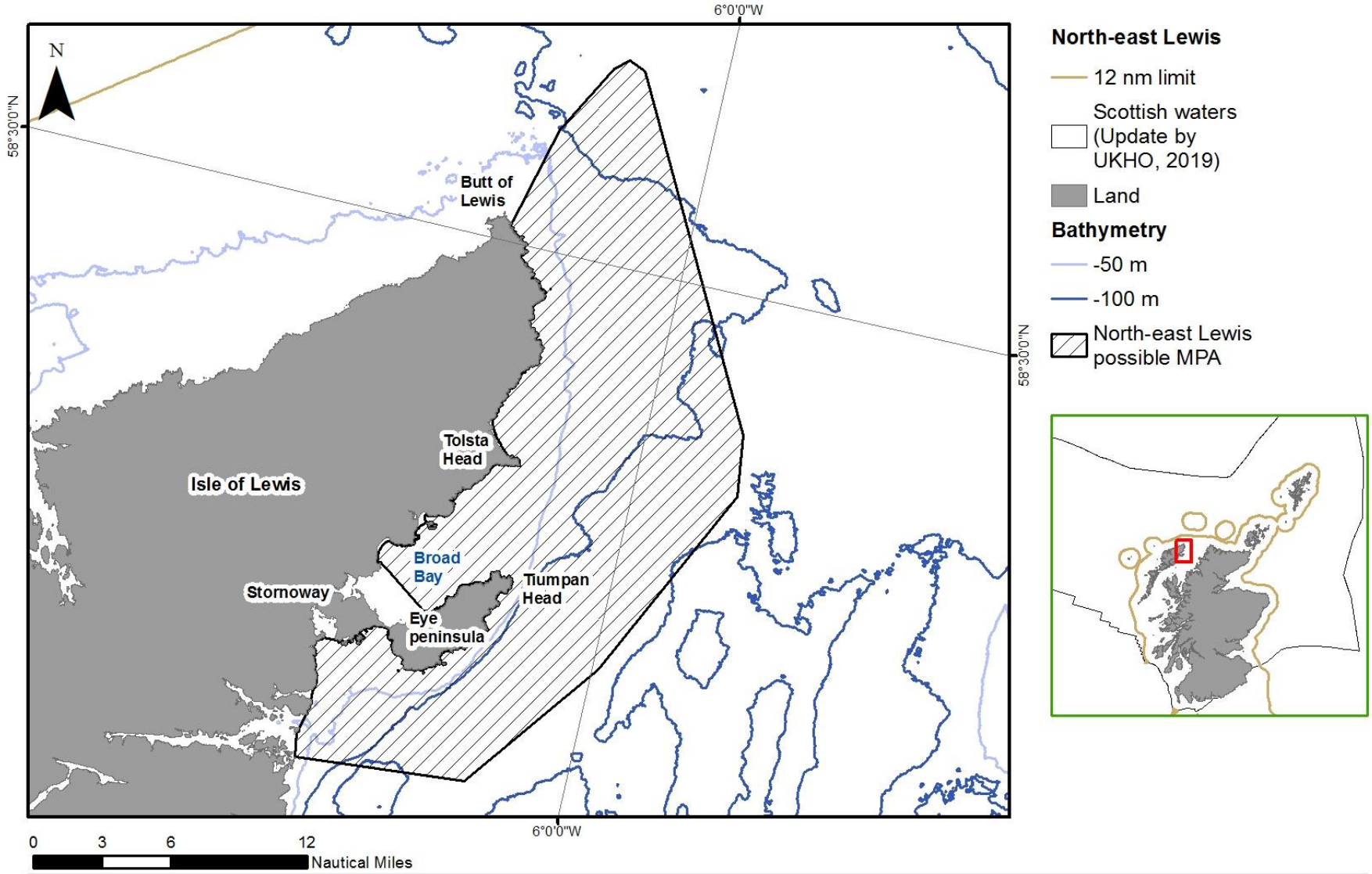
Document version control			
Version	**Date**	**Author**	**Reason / Comments**
Version 1	29/01/2014	Laura Clark	Revised MPA proposal format, updating MPA search location version (ver. 11 - 14/12/2012).
Version 2	17/02/2014	Morven Carruthers	Revised text and mapping.
Version 3-4	26/03/2014-15/07/2014	Morven Carruthers & Katie Gillham	Edits to address comments from SAC and mapping.
Version 5	21/07/2014	John Baxter	QA review and sign-off.
Version 6-7	24/07/2014-26/03/2015	Various	Refinements and document development.
Version 8	30/03/2015	John Baxter	QA review and sign-off.
Version 9	01/04/2015	Ben James & Katie Gillham	Text edits to address QA comments ready for Scientific Advisory Committee.
Version 10	18/09/2018	Sam Black & Katie Gillham	Review and Update.
Version 11	21/09/2018	Ben James	QA review.
Version 12	24/09/2018	Sam Black	Refinements in response to initial QA review. Finalisation for SNH Scientific Advisory Committee.
Version 13	17/10/2018	Sam Black & Katie Gillham	Review and update.
Version 14	17/10/2018	Ben James	QA Review.
Version 15	18/10/2018	Sam Black & Katie Gillham	Refinements in response to initial QA review. Finalisation for SNH Senior Leadership Team review.
Version 16	02/11/2018	Sam Black	Finalisation for SNH Protected Areas Committee.
Version 17	03/11/2018	Sam Black	Updating scale bar on adjusted density maps for Risso's dolphin following SAC comments.

Distribution list			
Format	**Version**	**Issue date**	**Issued to**
Electronic	SL11	14/12/2012	SNH web publication [B1149386 / 36(#64)].
Electronic	2	17/02/2014	SNH SAC MPA Sub-group.
Electronic	5	23/07/2014	Marine Scotland officials.
Electronic	6	24/07/2014	SNH web publication [A1185038 / 15(#20)].
Electronic	9	13/04/2015	SNH SAC MPA Sub-group.

Electronic	9	16/11/2015	SNH web publication [A1568049 / 8(#12)].
Electronic	10	20/09/2018	Ben James.
Electronic	12	25/09/2018	Sally Thomas.
Electronic	12	28/09/2018	SNH Scientific Advisory Committee.
Electronic	15	18/10/2018	Sally Thomas (SLT).
Electronic	16	02/11/2018	SNH Protected Areas Committee.
Electronic	17	05/04/2019	Marine Scotland officials.

NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT

Figure 1 North-east Lewis possible MPA



Name of possible MPA	North-east Lewis	**Assessor(s)**	LC; PW; SM; KG; BJ; MC; GE; SB

North-east Lewis possible MPA is shown in Figure 1. It encompasses waters off the north-east of the Isle of Lewis, extending from the Butt of Lewis to south of the Eye Peninsula. The possible MPA is for four protected features; Risso's dolphin, sandeels and geodiversity features associated with the Quaternary of Scotland and Marine Geomorphology of the Scottish Shelf Seabed. The north of the possible MPA extends approximately 16 km from the Butt of Lewis to incorporate the full extent of a coastal sandeel ground and predicted sandeel habitat. Broad Bay, to the north of the Eye Peninsula, also represents an area of predicted sandeel habitat with high numbers of sandeels recorded in trawl surveys carried out between 1985 and 2011. The possible MPA boundary also incorporates an area with relatively high effort-corrected sightings data for Risso's dolphin, and includes part of an area that has supported above average densities of the species (relative to wider Scottish territorial waters) over the period from 1994 to 2012 (Paxton *et al.,* 2014a). Repeated sightings of individual Risso's dolphins within the possible MPA suggest that some animals may be semi-resident (Weir *et* al., 2017). Geologically important longitudinal bedform fields cover parts of the sea bed extending from the northern limit of the possible MPA to the area between the Butt of Lewis and Tolsta Head, representing an important component of the Marine Geomorphology of the Scottish Shelf Seabed. The southern extent of the possible MPA covers a number of erosional glacigenic features representative of the Summer Isles to Sula Sgeir Fan key geodiversity area (Brooks *et al*., 2013). North-east Lewis possible MPA incorporates part of the North Minch third-party proposal submitted jointly by Whale and Dolphin Conservation, the Hebridean Whale and Dolphin Trust and Cetacean Research and Rescue Unit for Risso's and white-beaked dolphin. The possible MPA encompasses the area suggested for Risso's dolphin but excludes the outer portion of the third-party proposal which was for white-beaked dolphin. This is because of a possible shift in the range of this species linked to climate change (MacLeod *et al.*, 2005). In addition, modelling suggests that white-beaked dolphins are a highly dispersed species in Scottish waters and it was not possible to identify persistent concentrations of the species (Paxton *et al*., 2014a).

Proposed protected features			
Biodiversity	*Risso's dolphin (RD)* *Sandeels (SE)*	**Geodiversity**	*Quaternary of Scotland - glaciated channel/troughs, landscape of areal glacial scour, megascale glacial lineations (GEO)* *Marine Geomorphology of the Scottish Shelf Seabed - longitudinal bedform field (GEO)*

Data used in assessment			
Version of GeMS database	*Ver.7*	**Other datasets used in feature map** (specify) -	• *Habitat modelling: Amalgamated effort-corrected sightings data and predicted densities and persistence of Risso's dolphin 1994 - 2012.* • *Whale & Dolphin Conservation (WDC) Lewis Risso's project - land-based observations.* • *Whale & Dolphin Conservation (WDC) Lewis Risso's project - photo identification data.* • *Whale & Dolphin Conservation (WDC) dedicated boat surveys 2010 - 2017 (from Weir* et al., 2017). • *Marine Scotland Science (MSS) trawl surveys from 1927 - 2010.* • *Sandeel larval density maps (from Proctor* et al., *1998).* • *Predicted presence of sandeels from application of a general additive model to BGS sediment data (Wright* et al., *2000).*

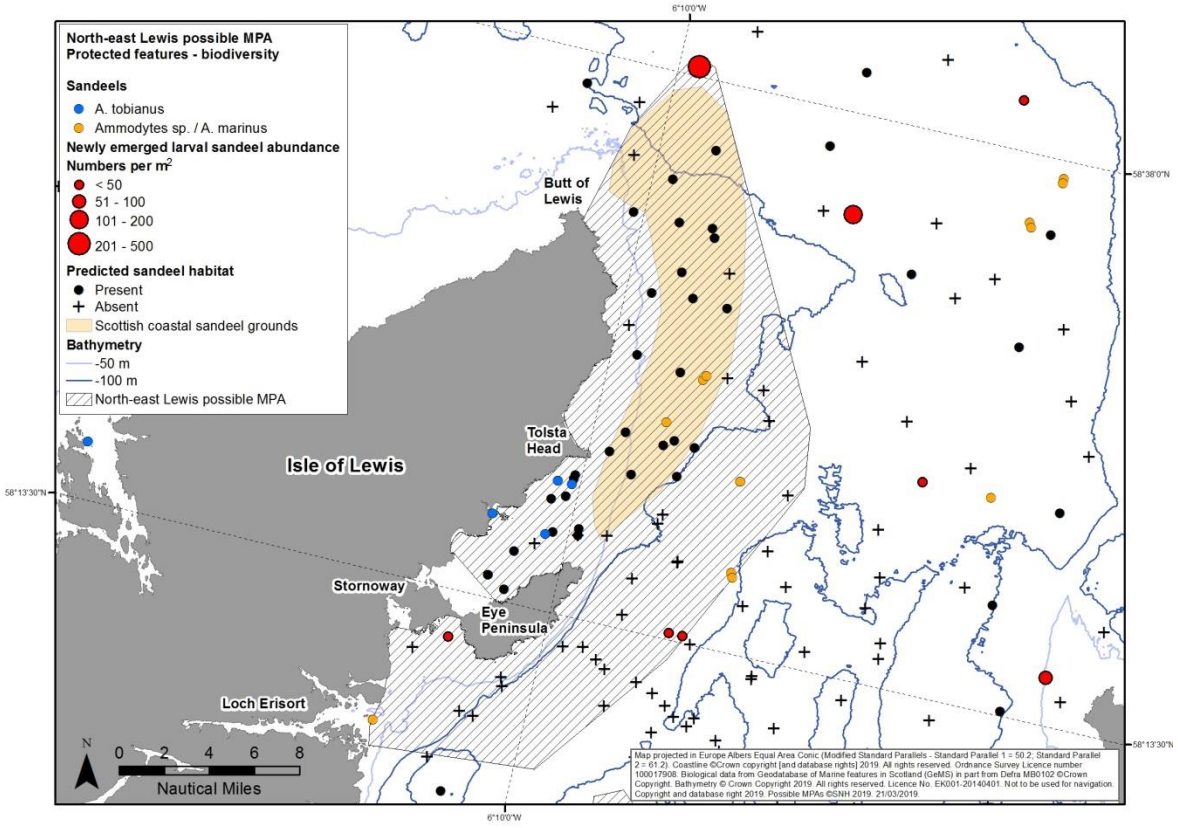
<table>
<tr><td colspan="8">Summary of data confidence assessment (see detailed assessment on following pages)</td></tr>
<tr><td colspan="3">Confident in underpinning data</td><td>Yes</td><td>✓</td><td>Partial</td><td></td><td>No</td><td></td></tr>
<tr><td colspan="2">Confident in presence of identified features?</td><td>✓
RD;SE;GEO</td><td colspan="2">Data suitable to define extent of individual proposed protected features</td><td>✓
RD;SE;GEO</td><td>Partial</td><td></td></tr>
<tr><td>Summary</td><td colspan="8">We are confident in the presence of the protected features within the possible MPA and the underpinning data. The data on these features are shown in Figure 2 overleaf.

The northern part of the possible MPA incorporates a large coastal sandeel ground that was identified by J. Gauld (FRS now MSS) in the 1980s. Available data were used to identify large areas of predicted sandeel habitat and data from larval surveys showed a high proportion of newly emerged larval sandeels. This is consistent with the data from MSS trawl surveys carried out between 1985 and 2011. The data provide a reasonable understanding of the extent of the sandeel ground and the presence of sandeels within the possible MPA.

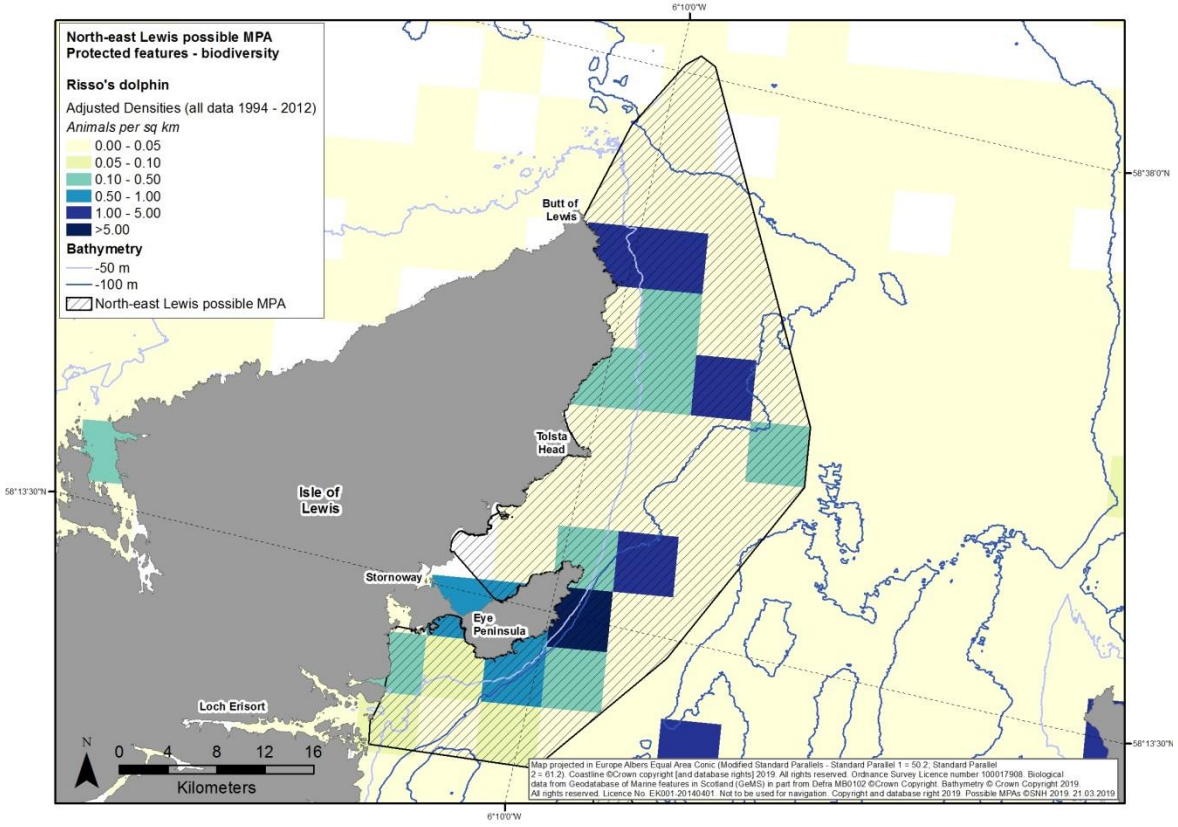
There is high confidence in the presence of Risso's dolphin based on effort corrected sightings data collated for the Joint Cetacean Protocol (JCP) and analysed by Paxton et al. (2014a) as part of spatial modelling undertaken to inform the MPA project. The analysis used survey data (1994 - 2012) from 23 distinct datasets, including boat-based data from Whale and Dolphin Conservation (2011 - 2012) and Alison Gill (1996), both of whose study areas overlap the possible MPA. Aggregated adjusted densities for Risso's dolphin, based on all available boat-based data, indicate that the species is observed at high relative densities within the possible MPA when compared with wider Scottish territorial waters. Based on modelling, areas to the north and north-east of Lewis (overlapping with but much larger than the possible MPA) are predicted to have supported above average densities of the species (again relative to wider Scottish territorial waters) persistently over the period 1994 - 2012 (Paxton et al., 2014a). A high level of data confidence is further supported by recent Whale and Dolphin Conservation survey work, which collected data during 72 dedicated boat surveys between 2010 and 2017 in the southern part of the possible MPA. A WDC citizen science project involving a total of 2,404 shore-based scans also contributed to the findings. This survey work highlighted that the core area used by the Risso's dolphins lies within the possible MPA. The majority of sightings occurred at distances < 1 km from shore, with dolphins being tracked to less than 10 m from the shoreline in some instances (Weir et al., 2017). Photo-identification studies (Atkinson et al., 1998; Dolman et al., 2013; Weir et al., 2017) within the possible MPA report repeated sightings of individual animals, estimating that a population of at least 117 Risso's dolphins in the area may be at least semi- resident. Juveniles are observed regularly within the possible MPA (Dolman et al., 2013; Weir et al., 2017). Figure 2(iii) shows the available effort-corrected sightings data for Risso's dolphin within the much larger area over which the results of the modelling predict that Risso's dolphin would be present persistently at above average densities.</td></tr>
</table>

Figures 2i - iv *The known/modelled distribution[1] of proposed protected features within the North-east Lewis possible MPA*

(i)

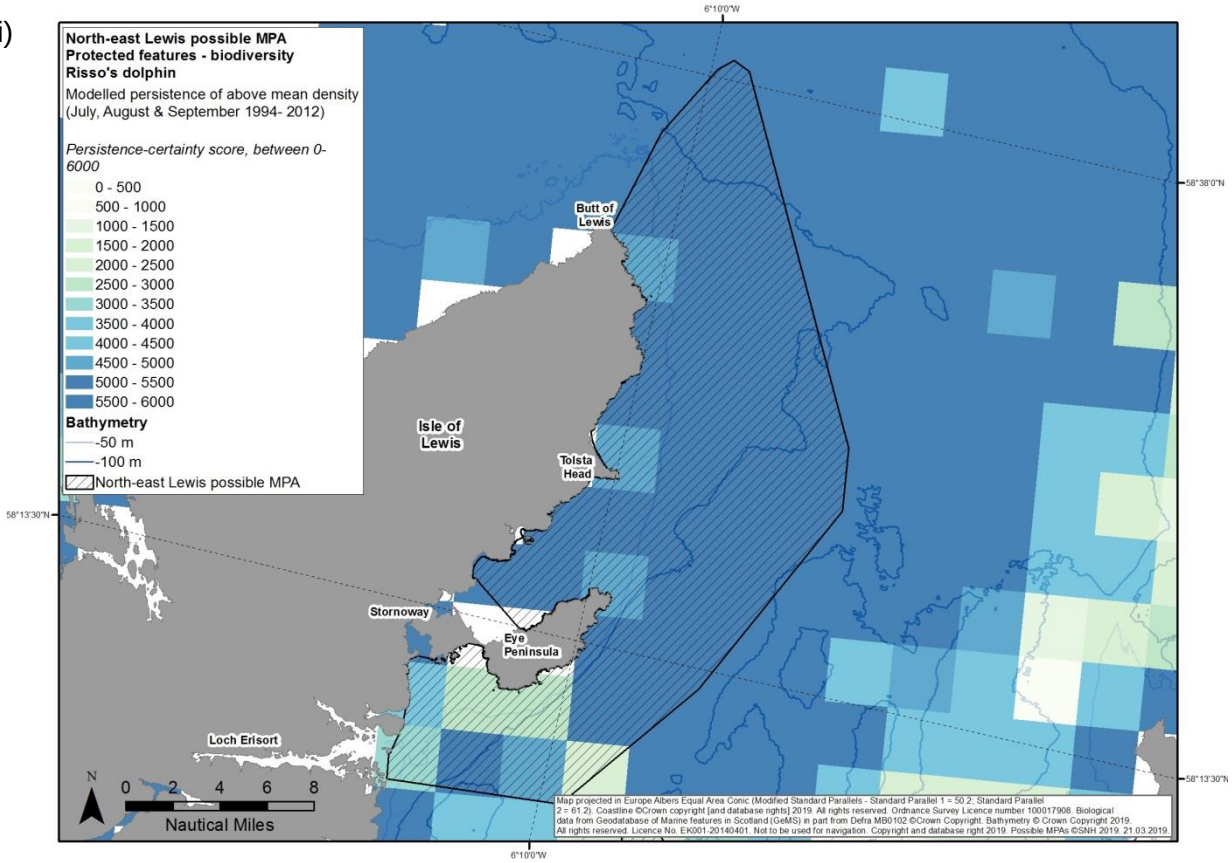


(ii)

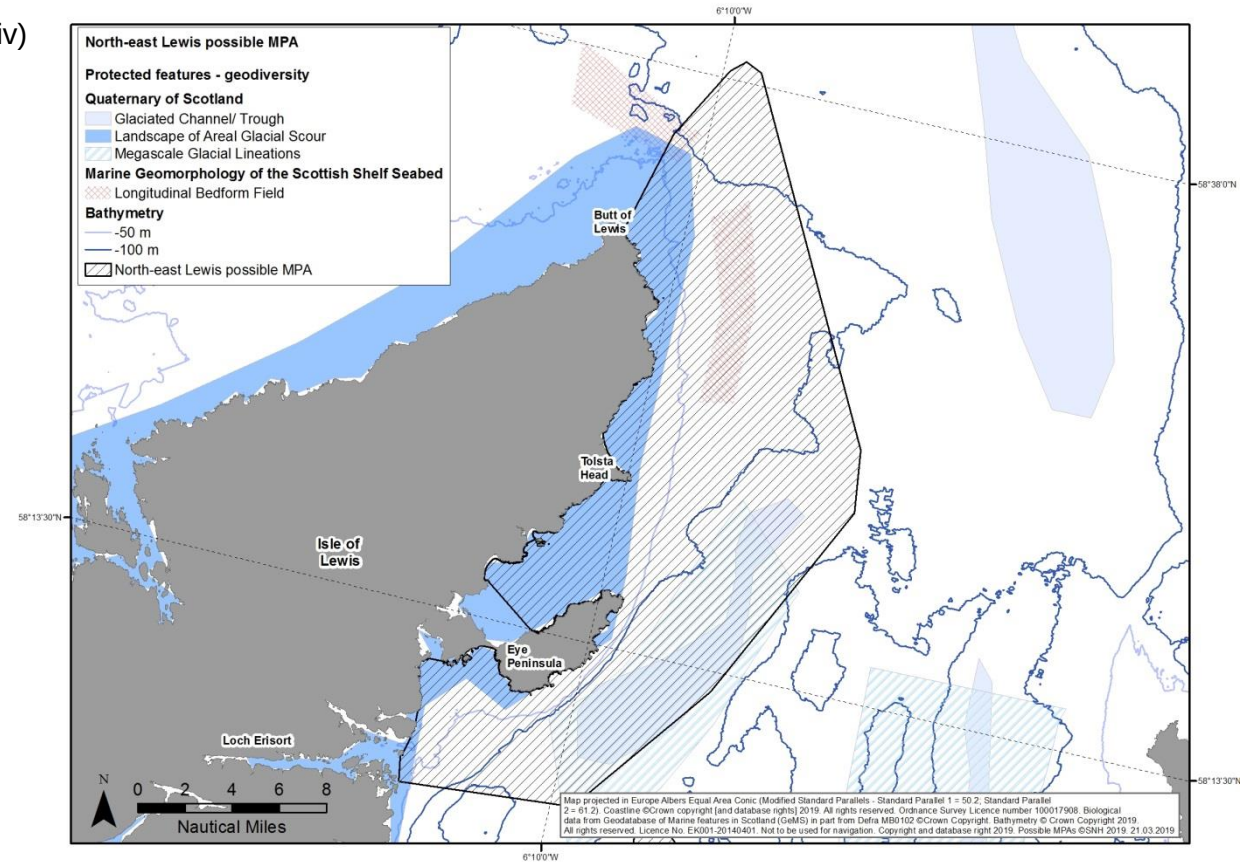


[1] Note: Grid boxes used in modelling work are 5 x 5 km.

(iii)


North-east Lewis possible MPA
Protected features - biodiversity
Risso's dolphin
Modelled persistence of above mean density (July, August & September 1994- 2012)
Persistence-certainty score, between 0-6000
0 - 500
500 - 1000
1000 - 1500
1500 - 2000
2000 - 2500
2500 - 3000
3000 - 3500
3500 - 4000
4000 - 4500
4500 - 5000
5000 - 5500
5500 - 6000
Bathymetry
-50 m
-100 m
North-east Lewis possible MPA
Butt of Lewis
Isle of Lewis
Tolsta Head
Stornoway
Eye Peninsula
Loch Erisort
N
0 2 4 6 8
Nautical Miles
6°1'0"W
58°38'0"N
58°13'30"N
Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2, Standard Parallel 2 = 61.2). Coastline ©Crown copyright [and database rights] 2019. All rights reserved. Ordnance Survey Licence number 100017908. Biological data from Geodatabase of Marine features in Scotland (GeMS) in part from Defra MB0102 ©Crown Copyright. Bathymetry © Crown Copyright 2019. All rights reserved. Licence No. EK001-20140401. Not to be used for navigation. Copyright and database right 2019. Possible MPAs ©SNH 2019. 21.03.2019

(iv)


North-east Lewis possible MPA
Protected features - geodiversity
Quaternary of Scotland
Glaciated Channel/ Trough
Landscape of Areal Glacial Scour
Megascale Glacial Lineations
Marine Geomorphology of the Scottish Shelf Seabed
Longitudinal Bedform Field
Bathymetry
-50 m
-100 m
North-east Lewis possible MPA
Butt of Lewis
Isle of Lewis
Tolsta Head
Eye Peninsula
Loch Erisort
N
0 2 4 6 8
Nautical Miles
6°1'0"W
58°38'0"N
58°13'30"N
Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2, Standard Parallel 2 = 61.2). Coastline ©Crown copyright [and database rights] 2019. All rights reserved. Ordnance Survey Licence number 100017908. Biological data from Geodatabase of Marine features in Scotland (GeMS) in part from Defra MB0102 ©Crown Copyright. Bathymetry © Crown Copyright 2019. All rights reserved. Licence No. EK001-20140401. Not to be used for navigation. Copyright and database right 2019. Possible MPAs ©SNH 2019. 21.03.2019

NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT

Data confidence assessment	Our assessment of data confidence is based on consideration of the age and sources of the data, sampling methods used and overall coverage across the possible MPA (see also Maps A - E for additional context). Existing protected areas are shown on Map G.

Age of proposed protected feature data					
Number of records collected within last 6 years	**Many** *RD*	**Number of records collected 6-12 years ago**	**Many** *SE; RD*	**Number of records >12 years old**	**Many** *SE; RD*
Comments	*The ages of data for the protected features within the possible MPA vary between <6 to >12 years old. For sandeels there are data available from trawl surveys undertaken by MSS and its predecessors since 1927, although the trawl data in the possible MPA were collected during annual 1st and 4th quarter surveys between 1985 and 2011. Larval survey data were collected in the 1960s and 70s. The physical characteristics that make the habitat suitable for sandeels are unlikely to have changed.* *The Risso's dolphin data analysed by Paxton* et al. *(2014a) primarily comprise datasets collated for the Joint Cetacean Protocol (JCP) with a few additions. Twenty-three discrete datasets (with records from between 1994 - 2012) were used to inform the analysis, including WDC data (2011 - 2012) and data from Alison Gill (1996), both of which were collected from within the possible MPA. These data are complemented by survey work led by Whale and Dolphin Conservation which collected data including photo identification during 72 dedicated boat surveys between 2010 and 2017 within and due south of the possible MPA (Weir* et al*., 2017). A WDC citizen science project involving a total of 2,404 shore-based scans over the same 2010 - 2017 period also contributed to the findings.*				

Source of proposed protected feature data					
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) -	
Comments	*Sandeel landings and effort data by ICES rectangles are available annually from the date that the fishery started until the present time. Larval survey data and trawl data were collected by MSS. The underlying sandeel habitat maps are derived from an application of a general additive model (GAM) by Wright* et al. *(2000) to British Geological Survey (BGS) and MSS sediment data.* *Risso's dolphin data comprise datasets collated for the Joint Cetacean Protocol (JCP) and additional datasets, as analysed by Paxton* et al. *(2014a) as part of spatial modelling undertaken to inform the Scottish MPA Programme. The analysis used 23 different datasets including: the SCANS & SCANS-II projects coordinated by the Sea Mammal Research Unit; the European Seabirds at Sea surveys coordinated by the Joint Nature Conservation Committee; data from the Sea Watch Foundation that come from a range of different projects and surveys, including data collected by volunteers; data from the Hebridean Whale and Dolphin Trust, that collects data on cetaceans using trained volunteers between April and October; University of Aberdeen data including from west coast ferry route surveys; data from Whale and Dolphin Conservation, that runs a Risso's project in north-east Lewis; and Alison Gill's data also from north-east Lewis. The full list of datasets used in the analysis is described in Paxton* et al. *(2014a & b). The dataset is complemented by additional survey work carried out by Whale and Dolphin Conservation, which involved both dedicated boat and shore-based surveys alongside photo identification (Weir* et al*., 2017).*				

NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT

Sampling methods / resolution							
Feature	**Modelled**	**Acoustic / remote sensing**	**Remote video / camera**	**Infaunal - grab / core**	**Sediment**	**Fisheries survey**	**Visual census**
RD	✓						✓
SE	✓			✓		✓	
Comments	*Sandeel data are available as a result of targeted fisheries surveys and trawls. Two species of sandeels make up the proposed protected feature:* Ammodytes marinus *and* A. tobianus*. The focus of the fisheries studies was on* A. marinus*. Whilst there are records of* A. tobianus *that confirm its presence, this is an inshore species that is less well documented in fisheries data. There have also been modelling studies to predict the presence of sandeels using General Additive Models (GAM). All Risso's dolphin data used as part of the habitat modelling were collected by visual census and only effort-corrected boat and aircraft-based sightings data were used. Twenty-three discrete datasets were incorporated, containing data from various platforms including both boats and aircraft. To be used in the analysis all data had to be collected by observers who had observation as their primary task while on effort. The data were used to create estimated densities (corrected for availability and detectability) of Risso's dolphin per square km. These are mapped at a resolution of 5 km x 5 km. Generalised Estimating Equation (GEE) models were then used to predict relative densities of Risso's dolphin for all of Scottish territorial waters on a 5 km x 5 km resolution grid. The highest survey effort for Risso's dolphin is during summer, which largely reflects the fact that cetacean surveys are highly dependent on weather and sea-state. Dedicated boat-based and photo identification work from WDC surveys from 2010-2017 was predominantly carried out between August and September. WDC Shorewatch surveys were carried out by volunteers throughout the year in the same period.*						

Proposed protected feature data coverage (Figure 2 and Maps A – E)							
Across the possible MPA							
Large numbers of proposed protected feature records distributed across the possible MPA		**Numerous proposed protected feature records scattered across the possible MPA with some clumping**	✓	**Numerous proposed protected feature records possibly with some clumping. Boundary not defined solely by recorded feature distribution**		**Few or isolated proposed protected feature records - possibly clumped**	
For individual features							
Multiple records of individual proposed protected features providing an indication of extent and distribution throughout the possible MPA	✓	**Few or scattered records of specific proposed protected features making extent and broad distribution assessment difficult**		**Few or isolated records of specific proposed protected features**			
Are modelled data available to facilitate understanding of feature distribution across the possible MPA?		*Yes - available modelled data provides a good understanding of the distribution of the proposed protected features (see Maps 2i-iii and Maps A-B).*					

NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT

Proposed protected feature data coverage (Figure 2 and Maps A – E)	
Comments	*There is high confidence in the presence of sandeel habitat within the possible MPA and there are multiple records of sandeels. The data provide adequate information regarding the extent of the coastal sandeel ground and the distribution of sandeels within the area. Geodiversity data adequately inform the extent and distribution of the geological features of interest. There is high confidence in the presence of high relative densities of Risso's dolphin within the possible MPA in summer (compared to wider Scottish territorial waters) based on effort-corrected sightings and the results of spatial modelling. Sightings of Risso's dolphins within the possible MPA are most frequent during summer and autumn, although observations have been made throughout the year (Atkinson* et al., *1998). Re-sights of individual animals (Dolman* et al., *2013; S. Dolman,* pers comm*. 2014; Weir* et al*.,2017) suggest that the Risso's dolphin population around north-east Lewis may be at least semi- resident. Mother-calf pairs have been sighted within the possible MPA on several occasions during the 1990s and in more recent boat-based surveys by WDC from 2010 - 2017. (Dolman* et al., *2013; Weir* et al*., 2017).*

Data sources and bibliography		
Year	**Title**	**Features covered**
2017	Weir, C., Hodgins, N., Dolman, S. and Walters, A. (2017). Risso's dolphins (Grampus griseus) in a proposed Marine Protected Area off east Lewis (Scotland, UK), 2010–2017. In Press. *Journal of the Marine Biological Association of the United Kingdom.*	RD
2014	Paxton, C.G.M., Scott-Hayward, L.A.S. and Rexstad, E. (2014a). Statistical approaches to aid the identification of Marine Protected Areas for minke whale, Risso's dolphin, white-beaked dolphin and basking shark. *Scottish Natural Heritage Commissioned Report No. 594*. Available from <https://www.nature.scot/snh-commissioned-report-594-statistical-approaches-aid-identification-marine-protected-areas-minke>	RD
2014	Paxton, C.G.M., Scott-Hayward, L.A.S. and Rexstad, E. (2014b). Review of available statistical approaches to help identify Marine Protected Areas for cetaceans and basking shark. *Scottish Natural Heritage Commissioned Report No. 573.* Available from < https://www.nature.scot/snh-commissioned-report-573-review-available-statistical-approaches-help-identify-marine-protected>	RD
2013	Dolman, S.J., Hodgins, N.K. and Gill, A. (2013). *Land and boat-based observations of Risso's dolphins off north-east Isle of Lewis, Scotland from 2010 to 2012.* Proceedings of the European Cetacean Society (ECS) workshop *Grampus griseus* 200th Anniversary: Risso's dolphins in the contemporary world at the 26th ECS Conference. *ECS Special Publication Series No. 54*.	RD
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 (final report). *Scottish Natural Heritage Commissioned Report No. 432*. Available from <http://www.nls.uk/e-monographs/2013/432.pdf>	GEO
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 from <http://www.scotland.gov.uk/Resource/0038/00389460.doc>	SE
2012	Scottish Natural Heritage. (2012). *Marine Protected Areas and cetaceans. Position paper for the 4th MPA Workshop, Heriot-Watt University, 14-15 March 2012.* Available from <http://www.scotland.gov.uk/Resource/0038/00389523.doc>	RD

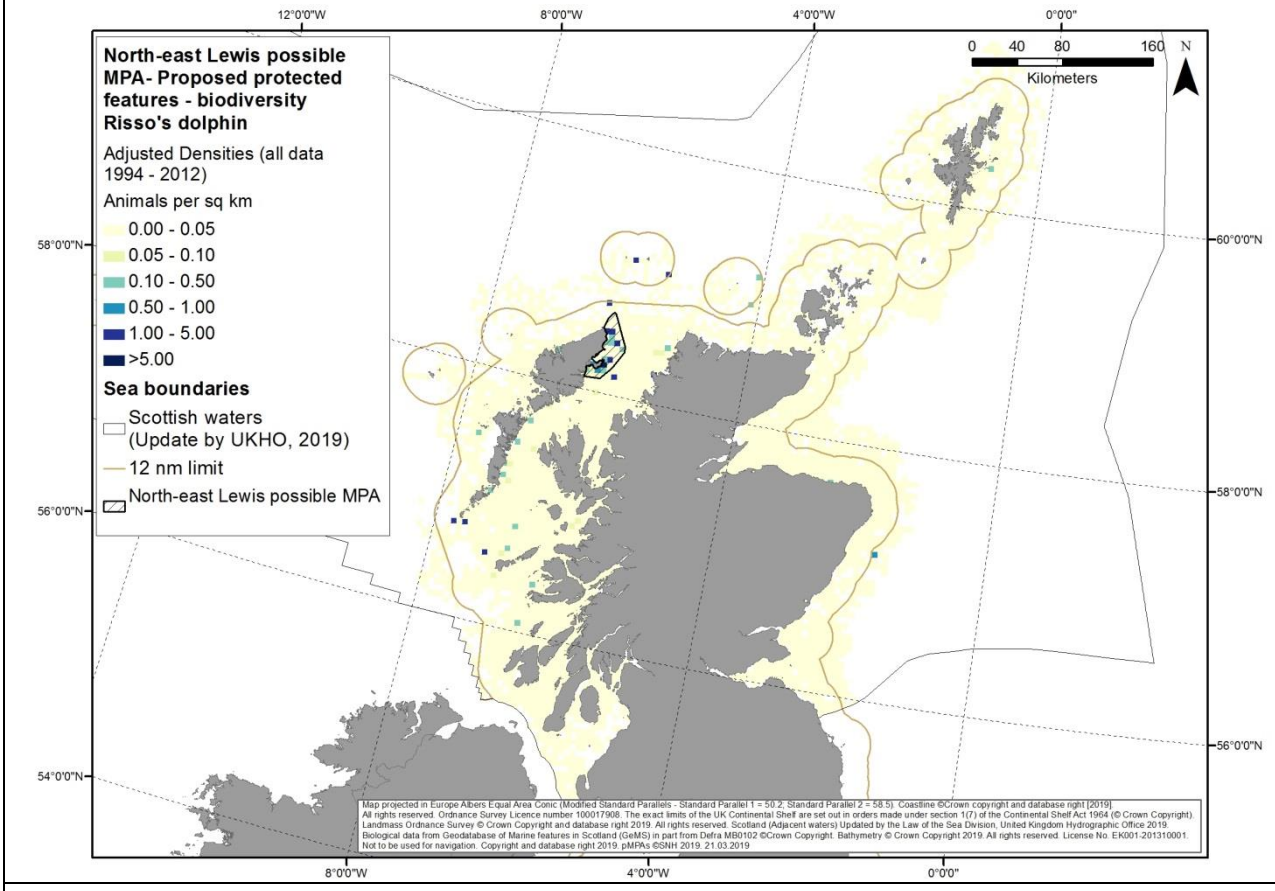
NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT

Data sources and bibliography		
Year	**Title**	**Features covered**
2009	Brooks, A.J., Roberts, H., Kenyon, N.H. and Houghton, A.J. (2009). *Accessing and developing the required biophysical datasets and datalayers for Marine Protected Areas network planning and wider marine spatial planning purposes. Report No 8: Task 2A. Mapping of Geological and Geomorphological Features*. ABP Marine Environmental Research Ltd. Available from <http://randd.defra.gov.uk/Document.aspx?Document=mb0102_8589_TRP.pdf>	GEO
2006	Holmes, R., Hitchen, K. and Ottemoller, L. (2006). Strategic Environmental Assessment Area 7: hydrocarbon prospectively, earthquakes, continental shelves and Rockall Trough surficial and sea-bed geology and sea-bed processes. *British Geological Survey Commissioned Report CR/ 06/ 063*. Available from <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/197033/SEA7_Geology_BGS.pdf>	GEO
2005	MacLeod, C.D., Bannon, S.M., Pierce, G.J., Schweder, C, Learmonth, J.A., Reid, R.J. and Herman, J.S. (2005). Climate change and the cetacean community of northwest Scotland. *Biological Conservation* **124**: 477-483.	WBD
2005	Stoker, M.S. and Bradwell, T. (2005). The Minch palaeo-ice-stream: NW sector of the British-Irish Ice Sheet. *Journal of the Geological Society of London* **162**: 425-428.	GEO
2003	Reid, J.B., Evans, P.G.H. and Northridge, S.P. (2003). Atlas of Cetacean distribution in north-west European waters, 76 pages. Available from <http://jncc.defra.gov.uk/page-2713>	RD
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**: 243-256.	SE
1998	Atkinson, T., Gill, A. and Evans, P.G.H. (1998). A photo-identification study of Risso's dolphins in the Outer Hebrides, Northwest Scotland. *European Research on Cetaceans* **12**: 102.	RD
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**: 347-354.	SE
1997	Wright, P.J. and Begg, G.S. (1997). A spatial comparison of common guillemots and sandeels in Scottish waters. *ICES Journal of Marine Science* **54**: 578-592.	SE
1979	Kenyon N.H. and Pelton C.D. (1979). *Seabed conditions west of the Outer Hebrides, where energy convertors may be sited*. Institute of Oceanographic Sciences. Internal Document No.72.	GEO

NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT

THE EVIDENCE-BASE

A



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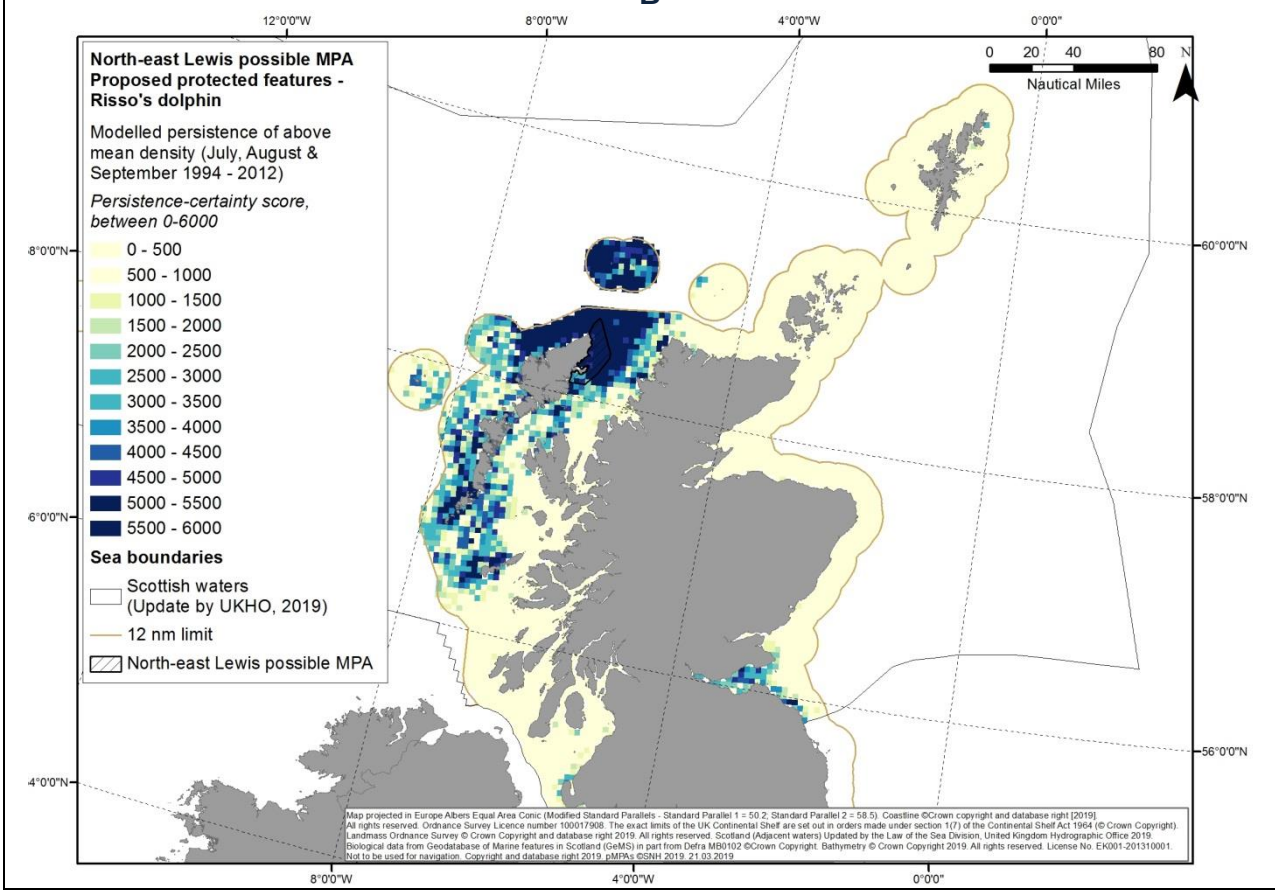
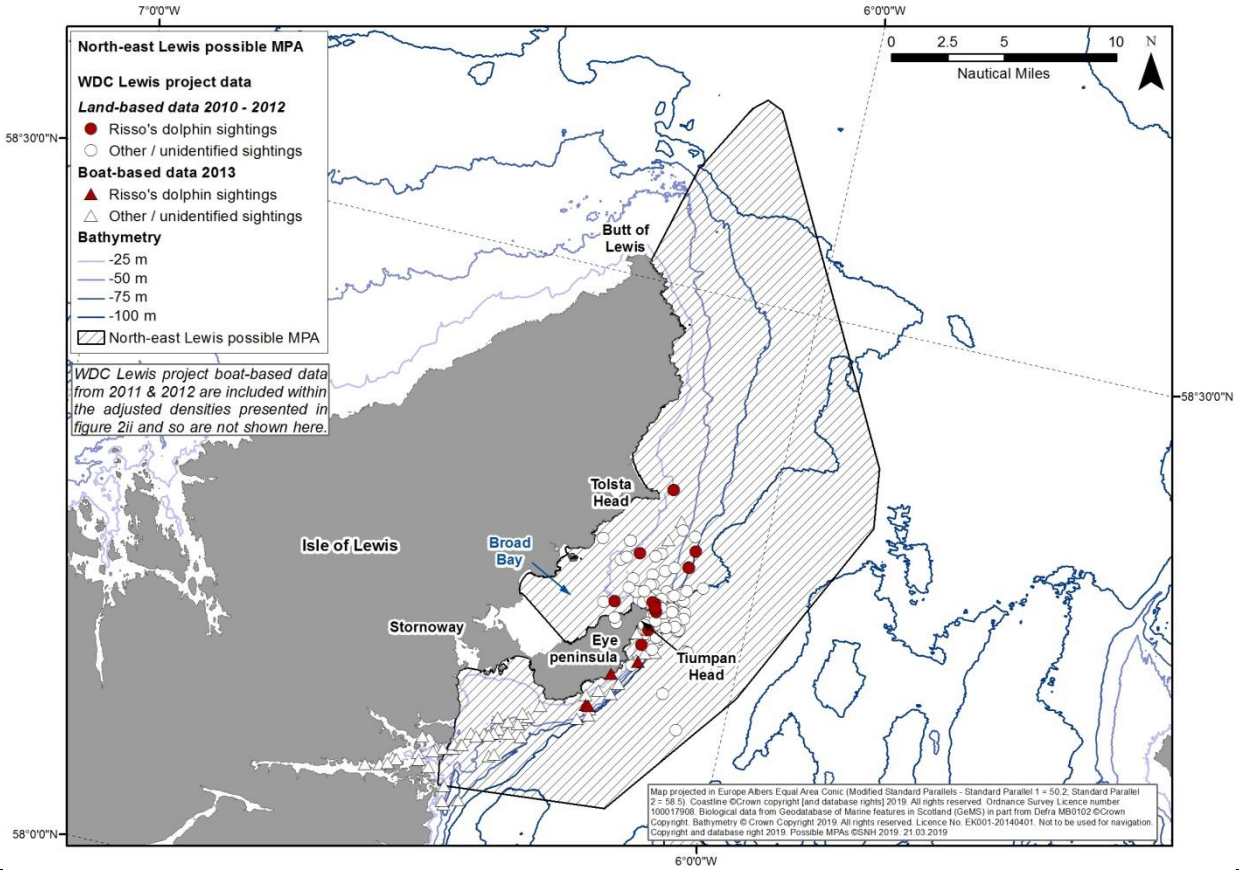
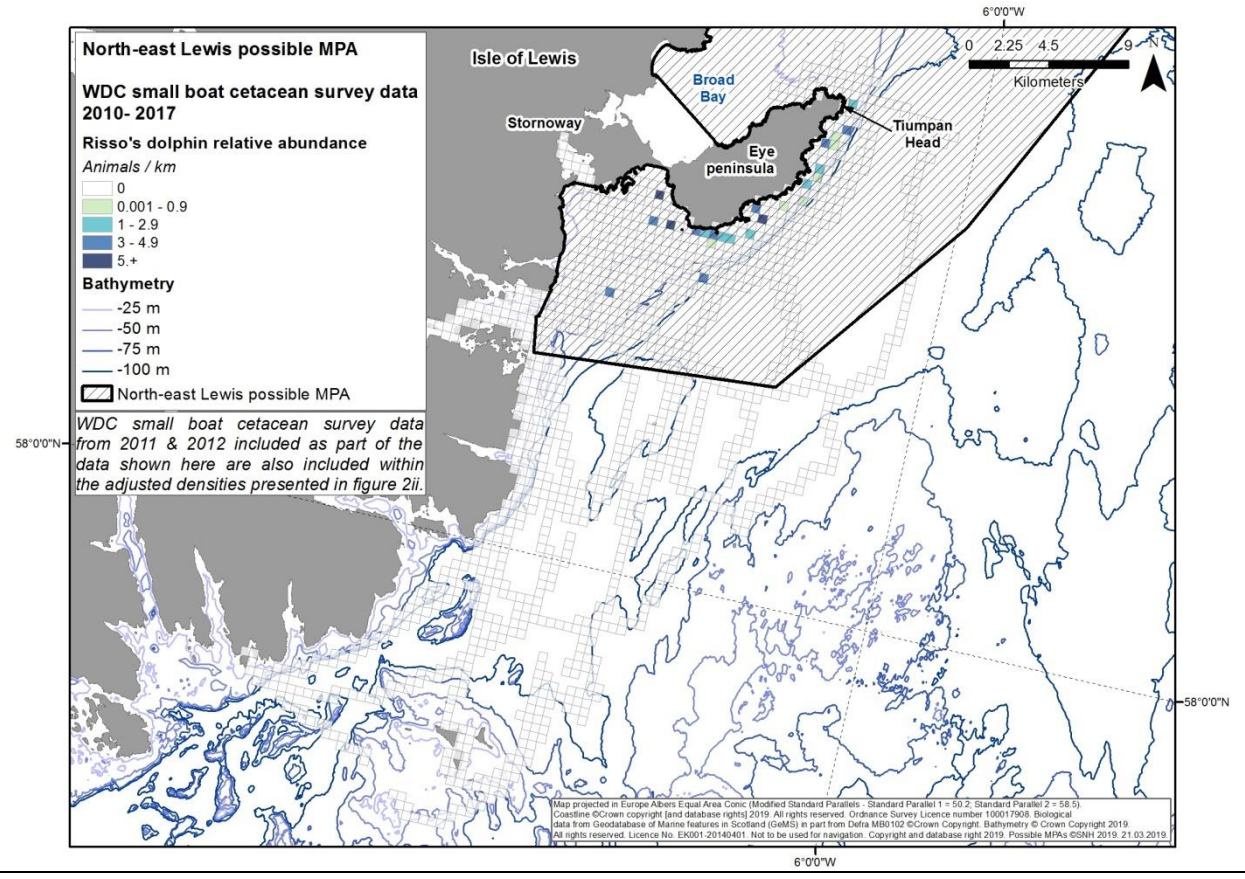


NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT

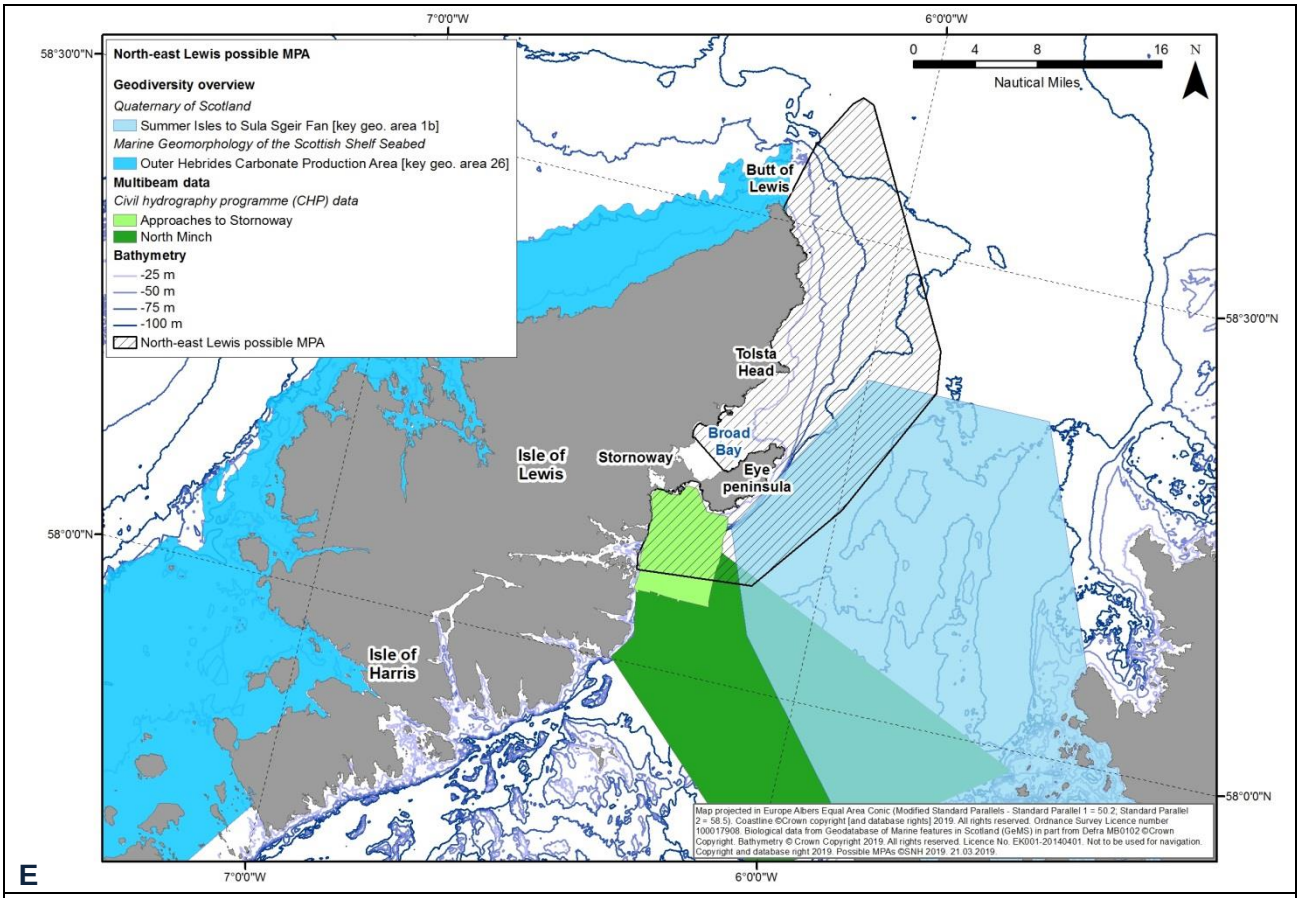
C



D



NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT



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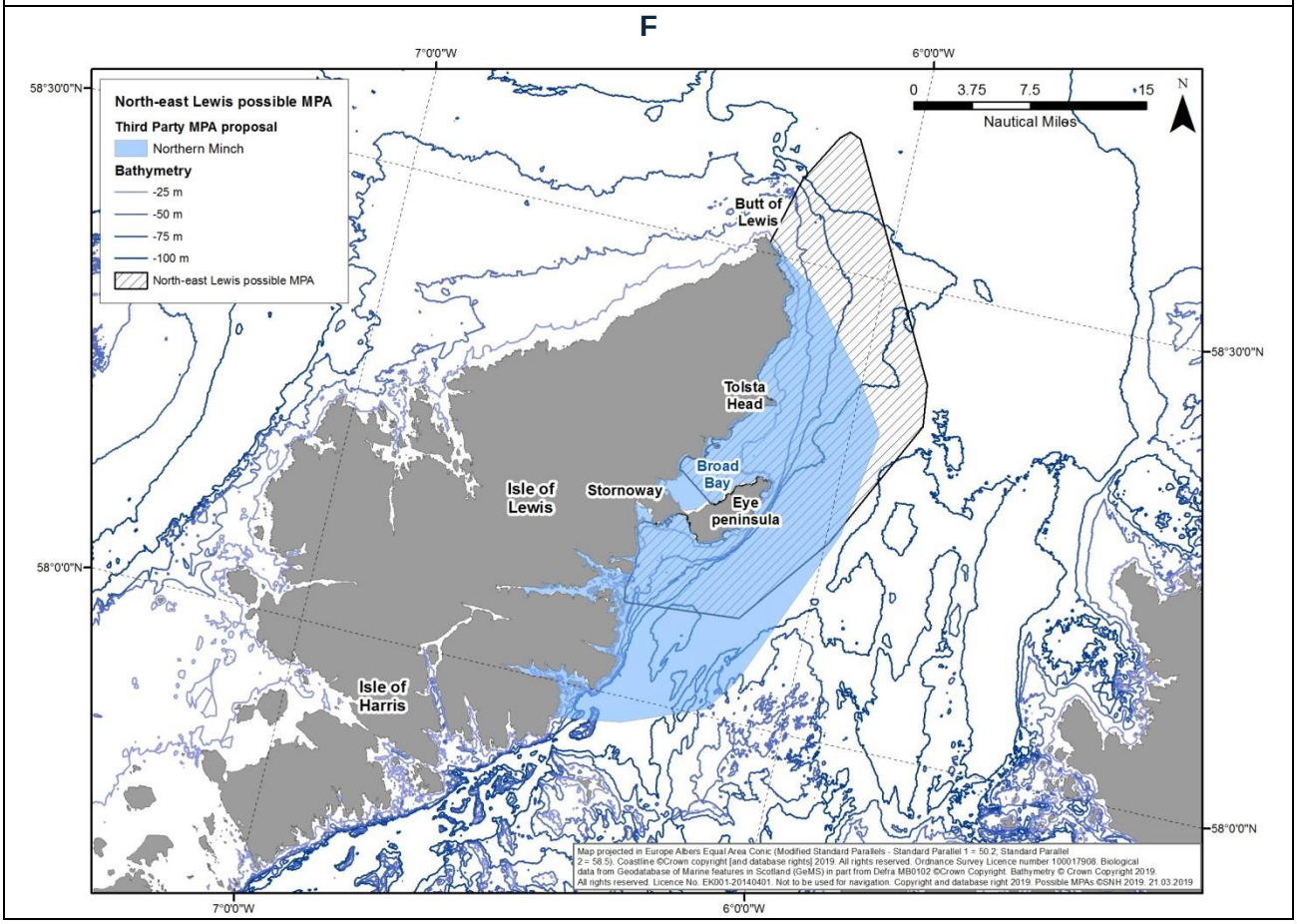

NORTH-EAST LEWIS POSSIBLE MPA - DATA CONFIDENCE ASSESSMENT