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Scottish MPA Project
Data Confidence Assessment

LOCH SUNART NATURE CONSERVATION MPA

SEPTEMBER 2014

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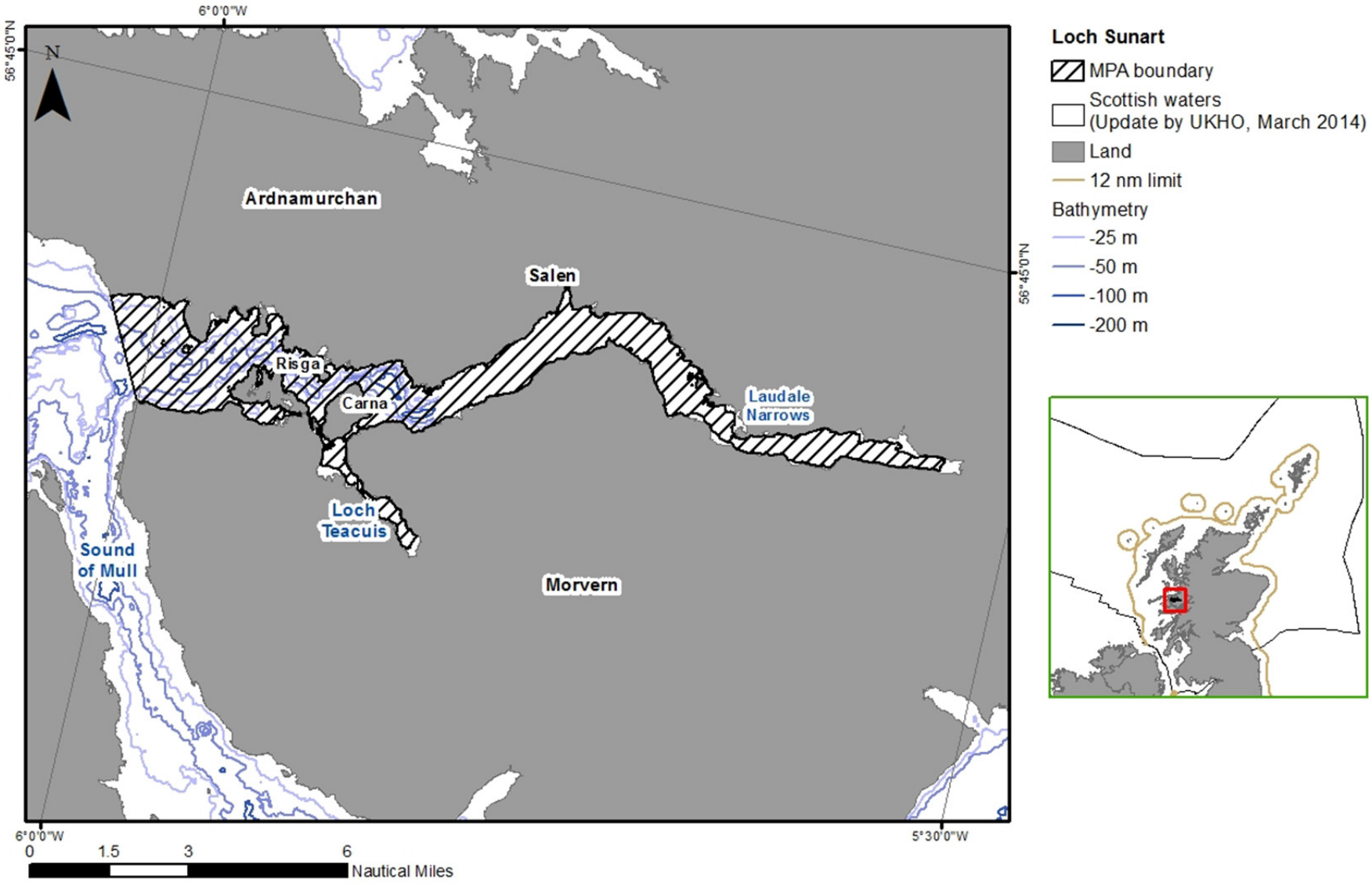
Document version control			
Version	**Date**	**Author**	**Reason / Comments**
Version 1	02/10/2012	Laura Clark and Ben James	Revised protected feature / MPA proposal format, updating search location version (ver. 12).
Version 2	09/10/2012	Lisa Kamphausen	Review and update of full data confidence assessment.
Version 3	10/10/2012	Lisa Kamphausen	Addition of serpulid aggregations.
Version 4	12/10/2012	Ben James and Laura Clark	Initial review. Production and insertion of revised mapping.
Version 5	15/10/2012	John Baxter	QA review.
Version 6	18/10/2012	Laura Clark and Lisa Kamphausen	Refinements in response to QA review comments.
Version 7	06/11/2012	Ben James	Review.
Version 8	29/11/2012	Ian Bainbridge	QA review and sign-off.
Version 9	19/07/2013	Laura Clark	Updated into possible MPA format.
Version 10	16/08/2013	Ben James	Review.
Version 11	20/08/2013	John Baxter	QA review and sign-off.
Version 12	23/07/2014	Laura Steel and Morven Carruthers	Updated into MPA format with refinements in response to 2013 consultation and IER feedback.
Version 13	18/08/2014	Ben James	Review.
Version 14	21/08/2014	John Baxter	QA review and sign-off.

Distribution list			
Format	**Version**	**Issue date**	**Issued to**
Electronic	8	14/12/2012	SNH web publication.
Electronic	11	20/08/2013	SNH web publication [A990660 / 8(#8)].
Electronic	14	01/09/2014	Marine Scotland officials.
Electronic	14	02/09/2014	SNH web publication [A1333235 / 16(#16)].

LOCH SUNART NATURE CONSERVATION MPA - DATA CONFIDENCE ASSESSMENT

Figure 1 Loch Sunart MPA



Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2; Standard Parallel 2 = 58.5). The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (© Crown Copyright). Landmass Ordnance Survey © Crown Copyright and database right 2013. All rights reserved. Scotland (Adjacent waters) Updated by the Law of the Sea Division, United Kingdom Hydrographic Office October 2005. Bathymetry © Crown Copyright 2014. All rights reserved. License No. EK001-201310001. Not to be used for navigation. MPAs ©SNH 2014.

LOCH SUNART NATURE CONSERVATION MPA - DATA CONFIDENCE ASSESSMENT

MPA name	Loch Sunart	**Assessor(s)**	BJ; LC; LK; MC; LS

Loch Sunart is a complex fjordic sea loch, situated between the Ardnamurchan and Morvern Peninsulas on the west coast of Scotland (see Figure 1). Six shallow sills divide the loch into a series of steeply shelving basins with a maximum depth of 125 m. The mouth of Loch Sunart opens into the northern end of the Sound of Mull. Loch Teacuis, a small and extremely sheltered sea loch (max. depth ~30 m), enters the south side of Loch Sunart. Loch Sunart is already designated as a Special Area of Conservation (SAC) for its rocky reefs and otters (and other terrestrial habitat interests). The MPA boundary encompasses multiple records of each of three protected features: flame shell beds, serpulid aggregations and northern feather star aggregations on mixed substrata. Loch Sunart supports one of the largest known populations of flame shells in Scotland, through a large bed in the Laudale Narrows together with other examples of the feature distributed throughout the loch (Moore *et al*., 2013). The aggregations of the beautiful organ-pipe worm *Serpula vermicularis* are restricted to the mixed muddy sediments around the shallow margins of Loch Teacuis. These extremely rare biogenic structures have only been recorded at five other known locations in Europe (Dodd *et al.,* 2009). They are quite small (about 50 x 50 cm max., Dodd *et al*., 2009; Last, 2014; SNH, 2014a) and it is currently not known whether they will develop into substantial reef structures comparable with those present in Loch Creran, another west coast sea loch. Fields of northern feather stars have a scattered distribution throughout the central and outer parts of the loch. These elegant animals attach to small pebbles on the surface of muddy seabed sediments and extend their arms into the water column above to feed. Loch Sunart MPA significantly overlaps with a third-party MPA proposal from the Scottish Sea Angling Conservation Network (SSACN) for common skate (the subject of the separate Loch Sunart to the Sound of Jura MPA - Scottish Government, 2014; SNH, 2014b) and fully encompasses a third-party MPA proposal from the Marine Conservation Society (MCS).

Protected features			
Biodiversity	*Flame shell beds (FS)* *Northern feather star aggregations on mixed substrata (NF)* *Serpulid aggregations (SAG)*	**Geodiversity**	*n/a*

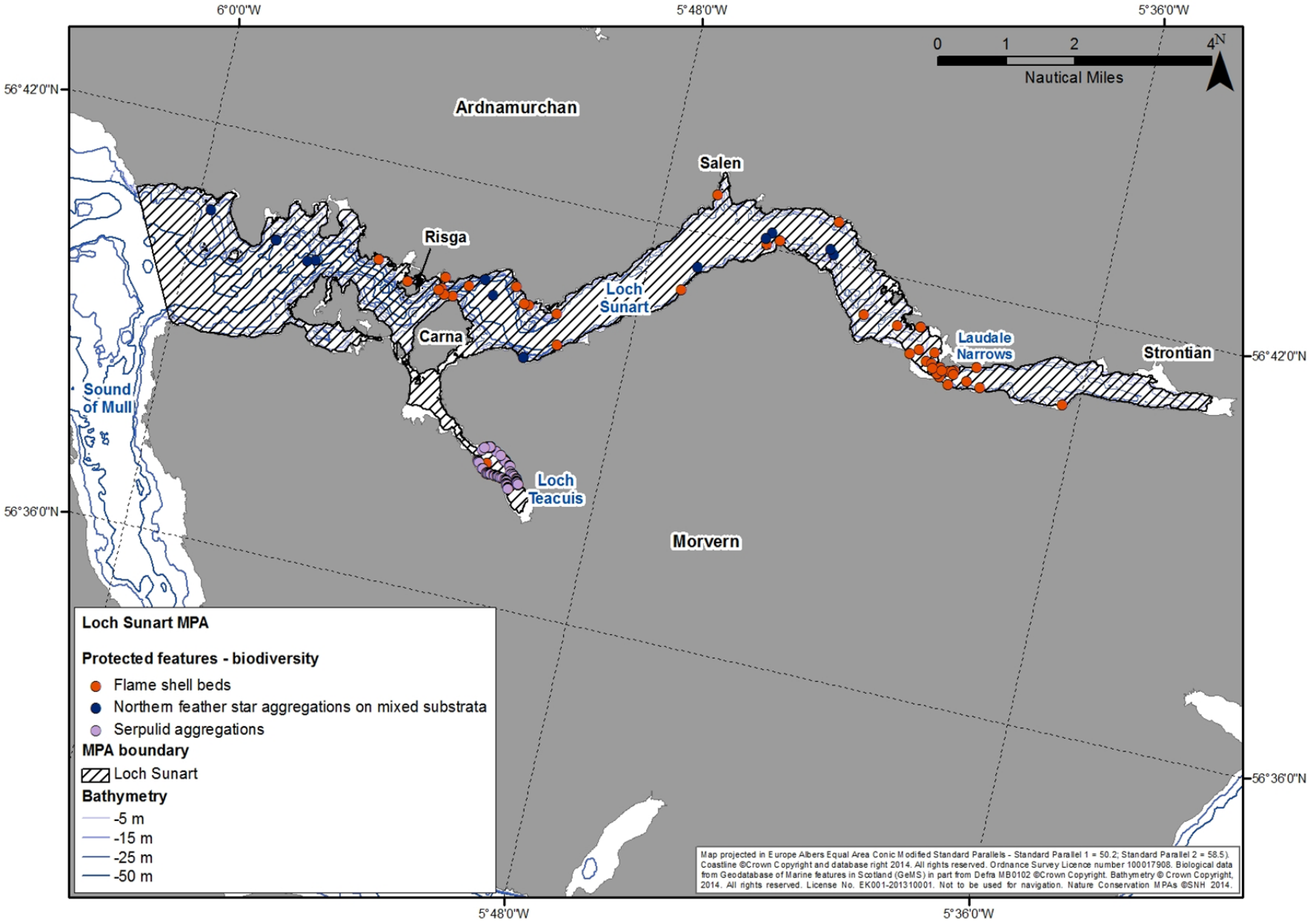
Data used in assessment			
Version of GeMS database	*Ver.4*	**Other datasets used in feature map** (specify) -	• *Contextual mapping (coastline; bathymetry; MPA boundaries; other protected areas).* • *Marine Recorder data [for null records on Map A - ver. 190614].* • *Bathymetric sidescan data from Bates* et al. *(2004) [Heriot-Watt University, St Andrews University and Edinburgh University] (Map D).* • *Civil Hydrography Programme (CHP) survey areas (Map D).*

Summary of data confidence assessment (see detailed assessment on following pages)							
Confident in underpinning data		**Yes**	✓	**Partial**		**No**	
Confident in presence of identified features?	✓ *All features*	**Data suitable to define extent of individual protected features**		✓	**Partial**		✖
				SAG	FS; NF		

LOCH SUNART NATURE CONSERVATION MPA - DATA CONFIDENCE ASSESSMENT

Summary of data confidence assessment (see detailed assessment on following pages)	
Summary	*We have high confidence in the data underpinning this MPA and in the presence of the protected features. All known feature records in the loch are fully encompassed within the boundary of the MPA. The most recent detailed marine biological studies were undertaken in 2001 (Bates* et al.*, 2004) and 2006 (Mercer* et al.*, 2007), and the data from these surveys are suitable for defining the distribution and extent of the serpulid aggregations in Loch Teacuis and that of the largest known flame shell bed in the loch system at the Laudale Narrows. The data are also suitable for coarsely defining the distribution and likely extent of northern feather star aggregations on mixed substrata. Additional, smaller flame shell beds have been recorded from a number of other parts of Loch Sunart, especially off Risga and Carna, but existing data are too sparse to gauge their extent accurately (Moore* et al.*, 2013; Envision Mapping Ltd., 2014). It is likely that additional discrete areas of flame shell beds and northern feather star aggregations (e.g. Moore, 2013) will be recorded within the MPA in the future. More recent survey work in 2013 (Last, 2014) and 2014 (SNH, 2014a) confirmed the continued presence of serpulid aggregations within Loch Teacuis (albeit potentially at a lower density than observed in 2006 - see the Loch Sunart 'Detailed assessment against the MPA Selection Guidelines' document for further details). Further work to better quantify the scale and significance of possible changes in the distribution and abundance of the serpulid reefs is planned for late 2014 / early 2015.*

Figure 2 The known distribution of protected features within Loch Sunart MPA



LOCH SUNART NATURE CONSERVATION MPA - DATA CONFIDENCE ASSESSMENT

Data confidence assessment	Our assessment of data confidence is based on consideration of the age and source of the data, sampling methods used and overall coverage across the MPA (see also Maps A - D). Other protected areas are shown on Map E.

Age of protected feature data (Map A)					
Number of records collected within last 6 years	**Some** *NF;SAG*	**Number of records collected 6-12 years ago**	**Many** *FS;NF;SAG*	**Number of records >12 years old**	**Many** *FS;NF*
Comments	*The core multiple records of the three protected features are from broadscale habitat mapping and subsequent site condition monitoring surveys undertaken in 2001 (Bates* et al.*, 2004) and 2006 (Mercer* et al.*, 2007) respectively. The first records of the flame shell beds feature came from Seasearch volunteer diving surveys and nature conservation-orientated surveys conducted in the late 1980s and early 1990s (Mackinnon and Lumb, 1988; Davies and Connor, 1993). Whilst these identified an unusually high abundance of flame shells within the loch, they did not recognise the extent of the beds of this species in shallow water. Survey work undertaken in the shallow sublittoral zone in 1995 (Howson, 1996) found the beds to cover a very wide area around the Laudale Narrows and a number of headlands in the loch system, often extending from the sublittoral fringe to beyond the maximum survey depth of the study. Northern feather star aggregations on mixed substrata were first recorded during the 1989 MNCR sublittoral survey (Davies, 1990) and subsequently in a joint MCS / JNCC Seasearch survey in 1997 (JNCC and MCS, unpublished). The serpulid aggregations were first recorded in Loch Teacuis in 2006 (Mercer* et al.*, 2007; Dodd* et al.*, 2009). Since 2006 a small number of additional records of northern feather star aggregations have been collected within the main basin of the loch (opportunistic JNCC remote video sampling reported in Moore, 2013), with diver studies undertaken in Loch Teacuis in 2013 (Last, 2014) and 2014 (SNH, 2014a) to assess the status of the serpulid aggregations.*				

Source of protected feature 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) -	
Comments	*The majority of records of the protected features within Loch Sunart have come from targeted nature conservation-orientated surveys undertaken since 1989. The most numerous recent records are from a 2001 broadscale mapping survey completed to inform the development of a management plan for the Sunart Special Area of Conservation, and subsequent site condition monitoring work carried out in 2006. Seasearch diver records in 1987 first highlighted the presence of flame shells and subsequent volunteer recording in 1997 refined our understanding of the distribution of flame shell beds and northern feather star aggregations on mixed substrata.*				

Sampling methods / resolution							
Feature	**Modelled**	**Acoustic / remote sensing**	**Remote video / camera**	**Infaunal - grab / core**	**Sediment**	**Diving**	**Visual census**
FS		✓	✓	✓	✓	✓	
NF			✓			✓	
SAG			✓			✓	✓

LOCH SUNART NATURE CONSERVATION MPA - DATA CONFIDENCE ASSESSMENT

Sampling methods / resolution	
Comments	*The flame shell beds within Loch Sunart have been sampled using a range of techniques of differing resolution. These include acoustic remote sensing (swath bathymetry with co-registered sidescan sonar) in 2001; infaunal grab sampling; remote video sampling (drop-down systems and ROV); and* in-situ *diver studies (observations and recording of associated epifaunal / floral communities; infaunal core and 'turf' sampling; and estimates of flame shell nest coverage using gridded quadrats). Northern feather star aggregations were recorded in the 1990s in shallower waters by divers and have subsequently been observed in deeper parts of the loch using remote video / camera techniques. The serpulid aggregations were first encountered during a remote video survey of Loch Teacuis in 2006, with more detailed biological observations collected by divers as part of that same survey, and subsequently in 2013 and 2014. In 2006 a glass-bottomed bucket deployed over the side of a small boat (visual census) was used to target the diving work to suitable locations around the margins of Loch Teacuis.*

Protected feature data coverage (Maps A - D)							
Across the MPA							
Large numbers of protected feature records distributed across the MPA		**Numerous protected feature records scattered across the MPA with some clumping**	✓	**Numerous protected feature records possibly with some clumping. Boundary not defined solely by recorded feature distribution**		**Few or isolated protected feature records - possibly clumped**	
For individual features							
Multiple records of individual protected features providing an indication of extent and distribution throughout the MPA	✓ *FS (part); SAG*	**Few or scattered records of specific protected features making extent and broad distribution assessment difficult**	✓ *FS (part); NF*	**Few or isolated records of specific protected features**			
Are acoustic remote sensing data available?	*A Civil Hydrography Programme (CHP)-led acoustic multibeam survey of the outer part of the loch was completed in 2012 (CHP, 2012). SNH commissioned a bathymetric sidescan survey of Loch Sunart in 2001 as part of work to map the distribution of benthic habitat interests of the existing Sunart SAC (Bates* et al.*, 2004).*						
Has the extent of seabed habitat protected features been mapped?	*Yes - predictive habitat mapping for all three protected features (Map C) derived from Envision Mapping Ltd. (2014). The study concluded high confidence in the mapping of the serpulid aggregations and high to moderate confidence in the flame shell bed polygons in the Laudale Narrows and off Carna (with low confidence for the other polygons of this feature). The mapped extent of six discrete areas with northern feather star aggregations was assigned moderate to low confidence ratings.*						
Comments	*Benthic sampling records are scattered throughout the MPA. The outer extent of the MPA boundary mirrors that of the existing SAC rather than being tightly defined around existing records of the protected features. The central parts of the main loch basins have been subject to a lower intensity of sampling to date, reflecting the distribution of designated reef features within the SAC. The clumping of records of the flame shell beds and serpulid aggregations reflects their habitat preferences: the majority of flame shell bed records are associated with increased tidal streams in 'narrows' areas, while serpulid aggregations occur in the extremely sheltered conditions afforded by Loch Teacuis with a very low flushing rate. The northern feather star aggregations have a scattered distribution, possibly reflecting the availability of mixed substrates (they do also occur on bedrock reef which is afforded protection by the existing SAC designation) and suitable tidal flow conditions. It is likely that this feature is more widespread within the loch than existing records suggest.*						

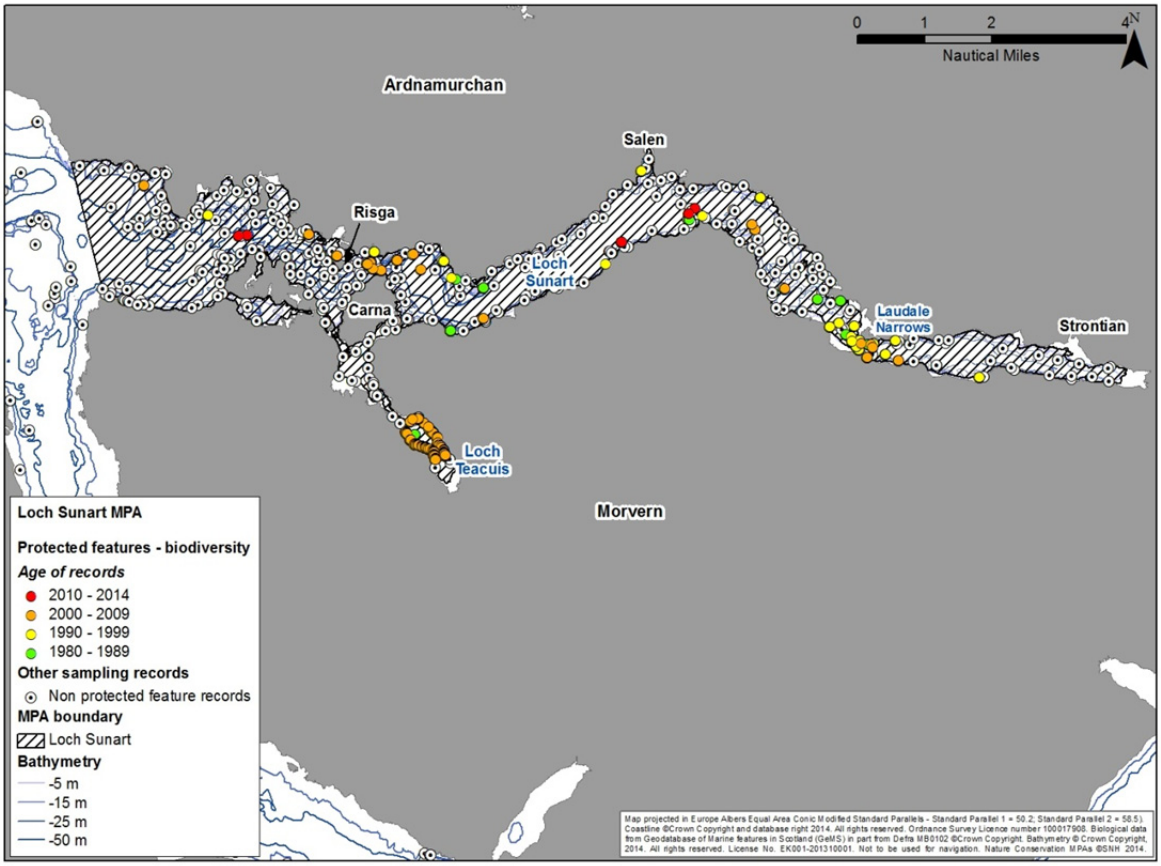
LOCH SUNART NATURE CONSERVATION MPA - DATA CONFIDENCE ASSESSMENT

Data sources and bibliography			
Year	**Title**	**Survey (Map B)**	**Features covered**
2014	Envision Mapping Ltd. (2014). Predictive Mapping of MPA protected features within selected possible Nature Conservation MPAs in Scottish territorial waters using available datasets. *Scottish Natural Heritage Commissioned Report No. 600.* Available from <http://www.snh.org.uk/pdfs/publications/commissioned_reports/600.pdf>		FS; NF; SAG
2014	Last, E. (2014). *An investigation into factors affecting Serpula vermicularis (L.) reefs in three Scottish sea lochs*. BSc (Hons) thesis, Geography, Newcastle University.		SAG
2014	Scottish Government. (2014). *Loch Sunart to the Sound of Jura Nature Conservation Marine Protected Area Order.* Scottish Ministerial Order. Available from <http://www.scotland.gov.uk/Resource/0045/00456493.pdf>		[designation order for overlapping Loch Sunart to the Sound of Jura MPA]
2014	SNH. (2014a). *SNH diver survey of the serpulid aggregations in Loch Teacuis, 16 - 18 June 2014*. Unpublished field data.		SAG
2014	SNH. (2014b). SNH's advice on selected responses to the 2013 Marine Scotland consultation on Nature Conservation Marine Protected Areas (MPAs). *Scottish Natural Heritage Commissioned Report No. 747*. Available from <http://www.snh.org.uk/pdfs/publications/commissioned_reports/747.pdf>		[background information on overlapping Loch Sunart to the Sound of Jura MPA]
2013	Moore, C.G. (2013). Biological analyses of underwater video from research cruises in Lochs Kishorn and Sunart, off the Mull of Kintyre and islands of Rum, Tiree and Islay, and in the Firth of Lorn and Sound of Mull approaches. *Scottish Natural Heritage Commissioned Report No. 574.* Available from <http://www.snh.org.uk/pdfs/publications/commissioned_reports/574.pdf>	2012 JNCC Loch Sunart benthic camera survey	NF
2013	Moore, C.G., Harries, D.B., Cook, R.L., Hirst, N.E., Saunders, G.R., Kent, F.E.A., Trigg, C. and Lyndon, A.R. (2013). The distribution and condition of selected MPA search features within Lochs Alsh, Duich, Creran and Fyne. *Scottish Natural Heritage Commissioned Report No. 566*. Available from <http://www.snh.org.uk/pdfs/publications/commissioned_reports/566.pdf>		FS
2012	CHP. (2012). *Civil Hydrography Programme Data. Sound of Mull HI1364*. Accessed August 2014. Available from <http://www.mcga..gov.uk/hydrography/HI1363_GE.kmz>		[multibeam bathymetry data coverage (Map D)]
2009	Dodd, J., Baxter, L. and Hughes, D.J. (2009). Mapping *Serpula vermicularis* (Polychaeta: Serpulidae) aggregations in Loch Teacuis, western Scotland, a new record. *Marine Biology Research* **5**: 200-205.		SAG
2007	Mercer, T., Howson, C.M. and Moore, J.J. (2007). Site Condition Monitoring: Loch Sunart marine SAC and SSSI. *Scottish Natural Heritage Commissioned Report No. 286*. Available from <www.snh.org.uk/pdfs/publications/commissioned_reports/286.pdf>	2006 SNH marine SCM survey of Sunart SAC & SSSI	FS; NF; SAG
2004	Bates, C.R., Moore, C.G., Harries, D.B., Austin, W. and Lyndon, A.R. (2004). Broad scale, mapping of sublittoral habitats in Loch Sunart, Scotland. *Scottish Natural Heritage Commissioned Report No. 006*. Available from <www.snh.org.uk/pdfs/publications/commissioned_reports/006.pdf>	2001 survey of Loch Sunart sublittoral habitats	FS; NF

LOCH SUNART NATURE CONSERVATION MPA - DATA CONFIDENCE ASSESSMENT

Data sources and bibliography			
Year	**Title**	**Survey (Map B)**	**Features covered**
1997	JNCC and MCS. (1997). *1997 JNCC/MCS Seasearch Loch Sunart survey*. Joint Nature Conservation Committee and Marine Conservation Society. Unpublished.	1997 JNCC/MCS Seasearch Loch Sunart survey	FS; NF
1996	Howson, C.M. (1996). Survey of the shallow sublittoral biotopes in Loch Sunart. *Scottish Natural Heritage Research, Survey and Monitoring Report No. 67*. Available from <http://www.snh.org.uk/pdfs/publications/research/67.pdf>	1995 SNH survey of sublittoral biotopes in Loch Sunart survey	FS
1993	Davies, M.L. and Connor, D.W. (1993). Littoral survey and sublittoral sampling in Loch Sunart. *Joint Nature Conservation Committee Report No. 121*.	1990 MNCR Loch Sunart sediment survey	FS
1990	Davies, J. (1990). Sublittoral survey of Loch Sunart and Loch Teacuis. *Nature Conservancy Council, CSD Report, No. 1075*. (Marine Nature Conservation Review Report, No.MNCR/SR/8).	1989 MNCR Loch Sunart survey	FS; NF
1988	Mackinnon, M.C. and Lumb, C.M. (1988). Loch Sunart sublittoral survey. 10th - 11th October 1987. Contractor: M.C. Mackinnon). *Nature Conservancy Council, CSD Report, No. 794*.	1987 NCC/MCS Seasearch Loch Sunart sublittoral survey	FS

THE EVIDENCE-BASE



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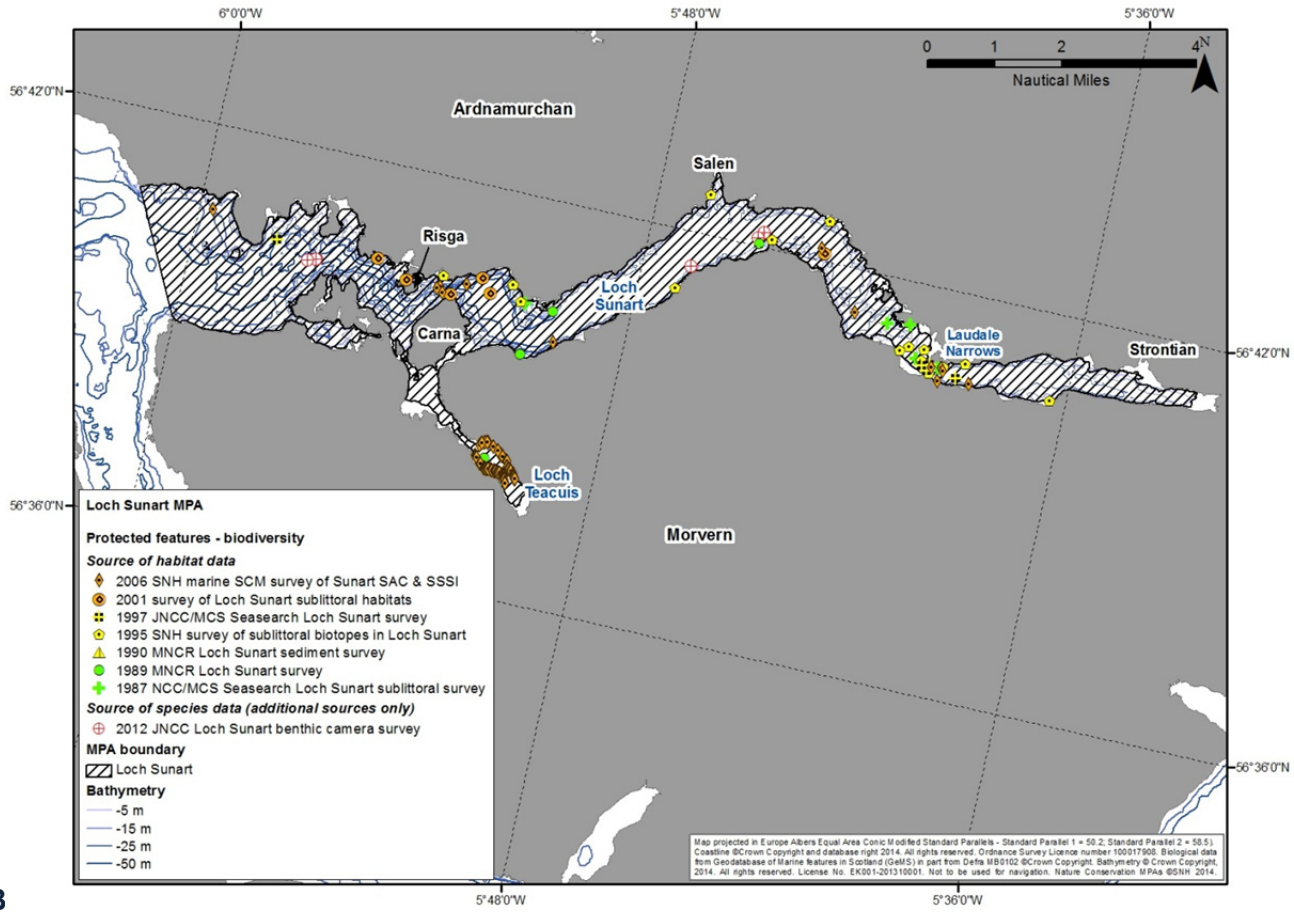

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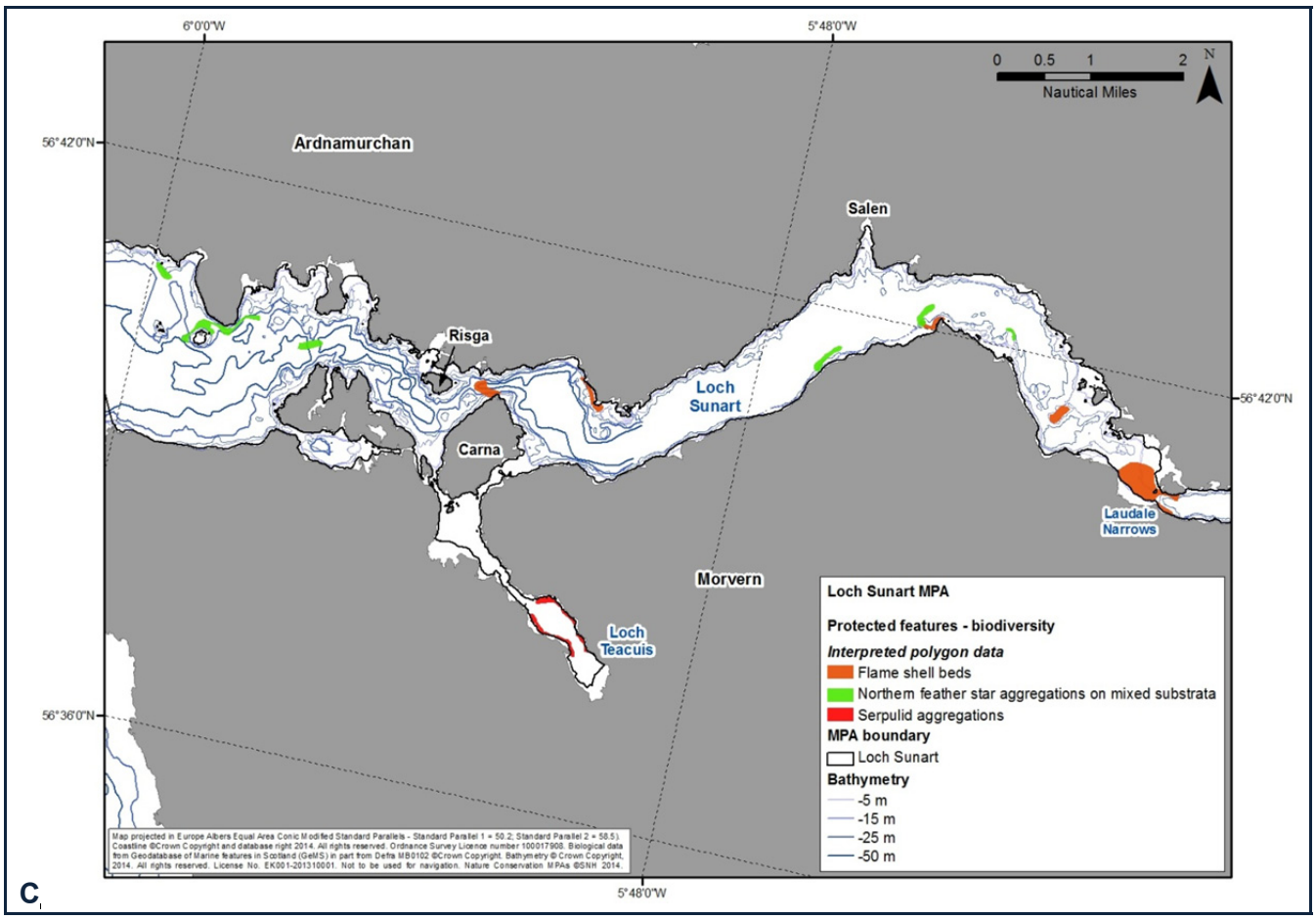
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Ardnamurchan
Salen
Risga
Loch Sunart
Carna
Laudale Narrows
Morvern
Loch Teacuis
56°36'0"N
Loch Sunart MPA
Protected features - biodiversity
Interpreted polygon data
Flame shell beds
Northern feather star aggregations on mixed substrata
Serpulid aggregations
MPA boundary
Loch Sunart
Bathymetry
-5 m
-15 m
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-50 m
Map projected in Europe Albers Equal Area Conic Modified Standard Parallels - Standard Parallel 1 = 50.2, Standard Parallel 2 = 58.5).
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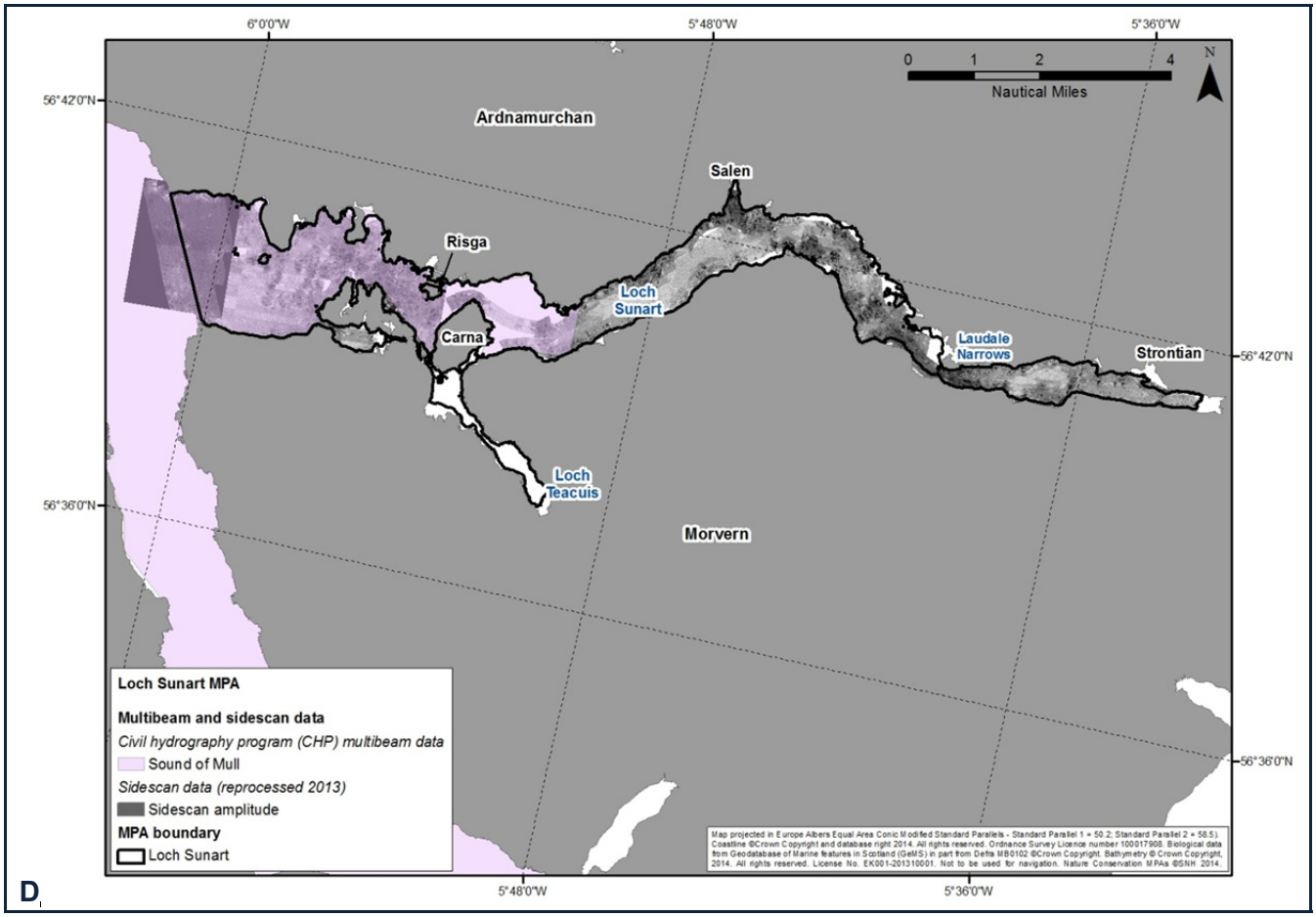
C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56°36'0"N
Loch Sunart MPA
Multibeam and sidescan data
Civil hydrography program (CHP) multibeam data
Sound of Mull
Sidescan data (reprocessed 2013)
Sidescan amplitude
MPA boundary
Loch Sunart
Map projected in Europe Albers Equal Area Conic Modified Standard Parallels - Standard Parallel 1 = 50.2, Standard Parallel 2 = 58.5).
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D

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