



Outer Hebrides Coastal Community Marine Archaeology Pilot Project

2011 Report



Royal
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Scotland

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**OUTER HEBRIDES COASTAL COMMUNITY MARINE
ARCHAEOLOGY PILOT PROJECT**

2011 REPORT

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OUTER HEBRIDES COASTAL COMMUNITY MARINE ARCHAEOLOGY PILOT PROJECT

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EXECUTIVE SUMMARY

The Outer Hebrides Coastal Community Marine Archaeology Pilot Project (OHCCMAPP) is a partnership between WA Coastal & Marine, The Royal Commission on the Ancient and Historic Monuments of Scotland (RCAHMS) and the Outer Hebrides archaeology service (CNE-Siar). It is designed to investigate the potential for intertidal and marine archaeological sites to be discovered in the Outer Hebrides and for the local and national record to be enhanced both qualitatively and quantitatively with respect to intertidal and marine archaeology.

This report represents the summary of the initial feasibility study (envisaged in two parts to be carried out in 2011 and 2012; with this report representing the 2011 season) for undertaking a community-engagement archaeological pilot study, focused on intertidal and marine archaeology and involving three main thematic topics for investigation:

- **Marine Resource Exploitation;**
- **Maritime History & Transport;**
- **Submerged Prehistory (potential).**

The OHCCMAPP does not have a temporal constraint, but rather focuses on these three themes; chronology is dictated by the type of archaeology and (palaeo)geographic configuration of the land and sea. Due to the enduring seaway of The Minch (even during very lower sea levels during the last glacial) maritime transport was important to the Islands since its earliest known occupation in the Mesolithic and has maintained importance throughout history. By association, Marine Resource Exploitation is a key factor for this time span for food, fuel and other resources relating to subsistence and economy. Changing (mainly rising) sea levels are important for defining the coastline (and therefore archaeological potential) from the earliest Holocene (c. 10,000 BC) until the Iron Age. Over the last 2000 years there is perhaps a rise in mean sea level of around 1m, leading to some Iron Age archaeology at the margins of the current coastline with some potential to have been, at least partially, inundated.

As initially set out, the objectives of this pilot study were to gauge locations, site concentration, environmental and cultural variables that would underpin a full research agenda to be carried out in the future. Objectives were to:

- engage with the local community through existing and newly formed knowledge networks, friendships and contacts, public lectures and media interviews in order to access a living and finite knowledge base;



- assess the results from this engagement process and apply them to further field investigation;
- focus on under-represented areas, particularly the east coasts of the archipelago (i.e. complementing SCAPE's previous work with a focus on areas that remain un-surveyed);
- enhance local and national datasets; through the addition of new sites and enhancement of records of existing sites located across the coastal, intertidal and marine zones;
- begin to establish a model for site discovery in the marine environment of the Outer Hebrides;
- identify specific locations for future study which would use investigative techniques such as marine geophysics, geotechnical (coring) assessment and archaeological diving;
- help inform future management of the Outer Hebrides' marine environment.

This first part of the pilot project was designed in four phases, each cumulatively informing the next. These were:

1. Community Introduction and public outreach plan;
2. Selection of Study Areas;
3. Refinement of Study Areas;
4. Analysis and Reporting.

Phase 1 was developed early, prior to the formal commencement of the project. A public lecture at the CNE-Siar chamber in Stornoway was given in July 2011 by WA Coastal & Marine representatives (carried out at WA's own expense as part of our objectives toward public outreach and education as a registered Scottish Charity) on the least well-known topic of submerged prehistory potential in the Islands. The talk was well attended and by a broad demographic; public interest was gauged to be very high. Funds were then sought to undertake this feasibility study.

Phases 2 and then 3 were developed through short field visits to a variety of locations across the Islands in July and October 2011. Two additional study areas were added; Loch Roag and Loch Eynort after discussions with locals.

During Phases 2 and 3 a series of preliminary examinations of aerial photography (AP) focusing upon identifying man-made features in the intertidal zone were made as a focus for later ground-observation. This assessment was made upon existing APs held by RCAHMS, and a set of oblique APs taken by RCAHMS with WA C&M in November 2011.

During the fieldtrips in Phases 2 and 3:

- 17 new sites were recorded (and logged in the SMR/NMRS);
- 22 sites were visited in total (some previously or partly recorded) in person;
- at least 7 unrecorded features were identified by aerial photography survey in addition to those visited in person;
- the study areas were defined, re-defined and queried as a result of assessments and analysis of the available disparate datasets;
- the preliminary methodological approach was tested through field investigation.

Phase 4 sought to digest the field and desk-based research in respect of the three main themes.

Aerial Photography and ground-observation led to the identification and investigation of sites (and site complexes) that contributed to the section on **Marine Resource Exploitation**. Many of the 17 new sites are fishtraps (yairs), which are represented in a variety of



configurations (type). Without the benefits of a national typology, there appears to be a distinct Hebridean type, previously unrecorded in the existing UK record for fishtraps.

Maritime History and Transport was limited to an initial assessment of located wrecks (cf. Wessex Archaeology 2011), and there is a broad range of documented wreck types dating to the early 18th century around the Islands but around two thirds of the wrecks have no detailed information attached to them. During the Phase 3 fieldwork in October 2011, records were made of an undocumented hulk on Vatersay. There is considerable scope for more wrecked vessels or hulks to exist around the Islands but with 50% of the coasts not surveyed (Coastal Zone Assessment – CZA) for archaeological purposes this resource cannot be quantified. Further, it is unclear what level of detail the intertidal zone has been surveyed during coastal survey, given the significant tidal swings, and practical constraints on surveyors. Shallow water sites below the mean high-water mark are also likely to go unrecorded during coastal survey, particularly when that focuses on terrestrial sites and erosion, given real-world and practical constraints. To that end, the focus of the OHCCMAPP has been to begin on the margins and extends into the intertidal and fully submerged environments.

Generally, the expansion of ethnographic studies on these themes will be a priority for future iterations of the project.

Submerged Prehistory Potential and the investigation of parameters that might underpin a model for site prospection in intertidal and submerged contexts was developed partly from the preceding themes of **Marine Resource Exploitation** and **Maritime History and Transport**. Palaeogeographical factors such as sea-level change and isostatic rebound, which dictate where submerged coastlines of prehistoric date now exist, are examined. There is a relative paucity of palaeoenvironmental reconstructions of relative sea level during the Holocene for the Islands. As well as the Mesolithic period, the contemporary Neolithic coastline is now underwater or intertidal. This may have important connotations for investigating questions of marine diets and coastal activity during this period. Later prehistoric coastlines are also partially inundated by high tides which may have connotations for interpreting structures now located in the intertidal zone of up to Iron Age date.

Community engagement was undertaken at every stage of the project. Personal accounts and experience was valuable throughout the first phase of the pilot project providing unrecorded prehistoric material such as a flint core from the Grimsay area of South Uist recovered from the intertidal zone. Early Neolithic pottery was also reported by a diver from a freshwater lochan near Loch Erisort, Loch an Duna (reported to the Regional Archaeologist at the Museum in Stornoway).

A variety of techniques for reconstructing palaeo-coastlines and investigating priority areas for the preservation of submerged Holocene sediments has also been examined.

Recommendations for further development in a full OHCCMAPP research agenda have been made classified by their suitability for community collaboration or specialist research. Where appropriate, recommendations have been scaled up to a national context for future work in coastal communities and marine archaeology throughout Scotland.

This document is designed to be submitted to Historic Scotland and the OHCCMAPP project partners (and distributed internally in the first instance). A more concise, peer-reviewed article will be submitted for publication in 2012. It is envisioned that this document will, in due course, be made publicly available as a technical supplement to that publication.



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ACKNOWLEDGMENTS

The OHCCMAPP is a partnership project that could not be carried out by a single individual or organisation. WA Coastal & Marine (a part of Wessex Archaeology Ltd) would like to extend its gratitude to the Outer Hebrides local authority (CNE-Siar) and, in particular, to Regional Archaeologist Deborah Anderson and assistant Kevin Murphy for their assistance with the SMR data, local community organisation and generous time spent in partnership during the field investigation phase of this pilot study. In addition to the listed co-author (AH), The Royal Commission on the Ancient and Historic Monuments of Scotland (RCAHMS) provided considerable support in-kind in the form of equipment and expert staff time, both terrestrially and in the air. George Geddes and Dave Cowley are recognised individually and our gratitude is extended to them both for their contribution to the OHCCMAPP. Philip Robertson and the entire grants team at Historic Scotland are acknowledged with great appreciation for the funds to carry out this project and their valuable feedback.

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SECTION I: INTRODUCTION & PROJECT DESIGN





1 INTRODUCTION

1.1 RATIONALE

- 1.1.1 This document reports on the initial scoping and feasibility phase of the Outer Hebrides Coastal Communities Marine Archaeology Pilot Project (hereafter OHCCMAPP) which is designed to undertake a broad-scale investigation of the coastal and marine archaeology of the Outer Hebrides. A community-oriented project, OHCCMAPP intends to enhance the archaeological record of the maritime landscape through desk-based study, community engagement, and preliminary landscape and archaeological field assessment. This is based on a phased approach, with each phase informing the design and delivery of the succeeding phases.
- 1.1.2 This document has been designed to supplement, in greater detail, a publication of the 2011 OHCCMAPP methodology and findings that will be submitted to an international peer-reviewed journal in early 2012. The current document will be held by the project partners, and made publicly available following the publication of the article as appropriate.
- 1.1.3 Through original research and a consolidation of existing data the project intends ultimately to: update and enhance the local and national historic environment records (CNE-Siar Sites and Monuments Record and RCAHMS national database); provide a management tool for the local authority (CNE-Siar), national advisory bodies (Historic Scotland) and Marine Scotland, with respect to coastal and marine cultural heritage – an underrepresented, yet significant aspect of the archaeology and history of the Outer Hebrides and north-west Scotland. A further, long-term objective is to establish the potential for creating a model for site prospection in coastal and marine environments.
- 1.1.4 The project's focus is largely thematic examining '*marine resource exploitation*', '*maritime history and transport*' and '*submerged prehistory potential*'. Therefore, the temporal scope is wide-ranging and encompasses all periods: from 20th century maritime history, intertidal archaeology, (such as fish-traps, which can range in date from prehistoric to modern), to submerged prehistoric landscapes that date back to Scotland's earliest occupation.
- 1.1.5 The project has been designed to be managed and carried out by WA Coastal & Marine (Edinburgh office), in partnership with RCAHMS and CNE-Siar. Funding has been provided by Historic Scotland through the archaeology grants scheme. In kind donation and staff time has been provided by all project partners.



1.2 PROJECT BACKGROUND

- 1.2.1 In 2010, the *Journal of Island and Coastal Archaeology* published a forum¹ that focused upon a methodology for submerged prehistoric site discovery and included two regional case studies; one of these areas was the Outer Hebrides. The Outer Hebrides case study was based on sea-level change data, regional geography (including isostatic adjustment) and the potential for such a discovery to have a significant impact on the regional and national archaeological record. Since then, discussions of the potential for not only prehistoric, but more broadly, the archaeology of intertidal and underwater environments have led to the conclusion that new data concerning all periods has the potential to have considerable impact upon the archaeological record of the Outer Hebrides.
- 1.2.2 The potential for new and significant discovery is intensified by the relative lack of study by marine specialists in some areas of the archipelago. There has been significant concentration of effort on the western Machair coasts (e.g. SCAPE, SEARCH, CARP, and research projects, for example by Edinburgh, Glasgow, Durham, Cardiff, Cambridge, and Sheffield Universities. These projects frequently encompassed a coastal element but extensive and detailed intertidal and further offshore study has been rare. Such existing studies are invaluable archives of coastal archaeology and history and will provide a cornerstone for future research.
- 1.2.3 In 2010, WA Coastal & Marine and RCAHMS agreed to a *research partnership* with the objective of securing the resources needed to conduct a study based on community engagement and awareness of marine archaeology. This mandate signifies the commitment that RCAHMS has made toward data enhancement in the Outer Hebrides and marine data in general. At this time, preliminary discussions were undertaken with CNE-Siar's local authority archaeologist, Deborah Anderson.
- 1.2.4 In July 2011, a trip to Lewis and Harris was undertaken by WA Coastal & Marine (J. Benjamin and A. Bicket) at the invitation of the local authority archaeologist. This was financed entirely by WA as part of its remit for outreach and education as a registered Scottish charity. A public lecture was held at the council chambers (Stornoway) fully attended by c.70 people, and results of this event were overwhelmingly positive. In attendance were local residents, from children to senior members of the communities, interested in marine archaeology. Several individuals have made contact to follow-up (including the Lewis and Harris Sub-aqua club). BBC Alba also covered the fact-finding portion of this initial reconnaissance trip and an appeal to local divers was made on Gaelic television. The press release was also covered in the Stornoway Gazette, BBC Scotland, Aberdeen Press and Journal and the Times.
- 1.2.5 Funding was provided through Historic Scotland's research grant programme in September 2011. During October and November 2011 additional public presentations were made in North Uist and at the specialist meeting of SPLASHCOS (hosted by RCAHMS on 25th November 2011)².

¹ Benjamin, J. (2010) Submerged Prehistoric Landscapes and Underwater Site Discovery: Re-evaluating the 'Danish Model' for International Practice. *Journal of Island & Coastal Archaeology*. 5:253-270. (see also A. Hale's published comments on this forum in the same issue; 280-281).

² www.splashcos.org



1.3 OHCCMAPP: AIMS & OBJECTIVES

- 1.3.1 The intention of this work is to enhance the archaeological records of the Outer Hebrides with special reference to the coastal, intertidal and marine environments. A geographical focus is therefore placed on these environments, with a limited inclusion of brackish and freshwater bodies of water where they are directly connected to the sea or are themselves located in the 'coastal zone'.
- 1.3.2 The project will actively seek out and make contact with a broad range of people who have an interest in coastal and maritime archaeology in the Outer Hebrides.
- 1.3.3 A particular focus has been placed on establishing the unrealised potential for submerged archaeology, including previously unknown sites and palaeoenvironmental resources that are both relevant to local archaeology and may inform future investigations. This will help to expand our baseline understanding of the archaeological resource, needs for protection and conservation, and public awareness for known and potential archaeological assets in this highly dynamic, potentially destructive and ultimately transient environment.
- 1.3.4 The project is designed to be in line with Scottish and UK Government objectives with respect to the coastal and marine historic environment. *Our Seas – a shared resource: High level marine objectives*³, describes the broad UK Government objectives (paraphrased here): to achieve sustainable development in the marine area; inform and educate the public and their actions and attitudes; underpin the UK approach to marine policy. *Scotland's national marine plan* is considered, with specific regard to the development of planning in the short term (2015) and medium/long term plans and sustainable development. Knowledge enhancement and understanding of the resource have been specifically defined by the Scottish Government which has also highlighted the need for information to be made public and widely available⁴.
- 1.3.5 Locations, resources and other datasets with potential for informing future research strategies will also be identified, with a focus upon inter-disciplinary, multi-agency collaboration. This is consistent with best-practice principal developed under Aggregates Levy Sustainability Fund (ALSF) between 2002 and 2011, of *collect once, use many times* (cf. Bicket 2011).
- 1.3.6 Furthermore this body of research will be consolidated into one or more peer-reviewed publications and a variety of publically available resources.
- 1.3.7 The objectives of this pilot study are to:
- engage with the local community through existing and newly formed knowledge networks, friendships and contacts, public lectures and media interviews in order to access a living and finite knowledge base;
 - assess the results from this engagement process and apply the results to further field investigation;
 - identify particular study areas where archaeological potential meets appropriate criteria to establish locations worth further consideration;
 - focus on under-represented areas, particularly the east coasts of the archipelago (i.e. complementing SCAPE's previous work while focusing on areas that remain un-surveyed);

³ <http://archive.defra.gov.uk/environment/marine/documents/ourseas-2009update.pdf> (accessed 20/12/2011)

⁴ <http://www.scotland.gov.uk/Topics/marine/seamanagement/marineact/marineobjectives> and <http://www.scotland.gov.uk/Resource/Doc/346796/0115349.pdf>



- enhance local and national datasets⁵, through the addition of new sites and enhance records of existing sites located across the coastal, intertidal and marine zones;
- begin to establish a model for site discovery in the marine environment of the Outer Hebrides;
- identify specific locations for future study which would use investigative techniques such as marine geophysics, geotechnical (coring) assessment and archaeological diving;
- help inform future management of the Outer Hebrides' marine environment.

1.3.8 A phased approach to this pilot study was taken (see **Chapter 2**).

- Phase 1: Community introduction and public outreach plan;
- Phase 2: Desk based study and aerial survey;
- Phase 3: Refinement of Study areas: data gathering and preliminary landscape survey;
- Phase 4: Analysis, reporting, recommendations and legacy.

1.4 CHRONOLOGY

1.4.1 The chronology presented in this report is based wherever possible upon calibrated, calendar dates for historical and prehistoric periods. Prior to the effective range of the radiocarbon calibration curve (roughly the last 8000 years), material dated by radiocarbon dating are referenced to Before Present (BP). In practice the existing archaeological record for the Outer Hebrides can be presented on a calibrated calendar scale. Only elements of the geological baseline must be presented on the BP scale, relating to uncalibrated radiocarbon years. Radiometric dating methods other than radiocarbon generally relate to calendar years (e.g. OSL dating) and will be cited as cal. BP to indicate they refer directly to calendar dates before the present day.

⁵ RCAHMS national database, formerly 'NMRS'



2 PROJECT DESIGN

2.1 INTRODUCTION

2.1.1 The phases and major objectives of this pilot project are outlined in **Figure 1**.

2.2 PHASE 1: COMMUNITY INTRODUCTION AND PUBLIC OUTREACH PLAN

2.2.1 Phase 1 was begun in July 2011 with an initial trip to Lewis and Harris, as a part fact-finding mission and to initiate community outreach. At this time, a lecture, focused primarily on the potential for submerged prehistory in the Outer Hebrides, was presented to around 70 people; a full council chambers. A copy of *Submerged Prehistory* was also donated to the council for its library.

2.2.2 A second lecture was given on North Uist on Wednesday 5th October, in order to include and engage with Uist residents. Potential future events will engage directly with communities on Barra and Vatersay.

2.2.3 This parallel approach to work in Lewis, Harris, the Uists and Barra will continue throughout all the phases of the project as far as possible, as a way to maintain inclusiveness and also to enhance our prospects for significant archaeological discovery.

2.2.4 Although OHCCMAPP encompasses all periods of cultural heritage, direct experience informs our view that interested individuals are often aware of particular maritime features and potential (i.e. shipwrecks, military remains, etc.). Individuals are more likely to be unaware of the impacts of prehistoric sea-level rise.

2.2.5 It was decided to begin with the least well known topic as a way of beginning the conversation and generating public interest in the previously unknown. Experience also informs our view that people will tend to focus on more recent maritime heritage even when initially presented with the topic of early prehistory in the marine environment. Maritime heritage, it is hoped, will be a major focus of OHCCMAPP Year 2.

2.2.6 During Phase 1, print and web-based campaign toward public awareness was begun. This was designed to elicit feedback from the community through contact information and a web-based portal. Flyers were designed for distribution and posted in public spaces such as Post Offices in Stornoway, Tarbert, Leverburgh, Lochmaddy, Balivanich, Lochboisdale and Castlebay. A website was built and hosted at www.wessexarch.co.uk/alba with community contact through this portal directed to marine@rchams.gov.uk. Major print and web-based community material has been made available in English and Gaelic.

2.2.7 From this initial community engagement, we have aimed to elicit feedback that will directly inform our decisions to refine our study areas. Correspondence has been documented in a database that lists contact names, location, contact details, material and notes (however names and contact details will remain anonymous for the public report in order to protect the personal data of those willing to share local knowledge).



**Outer Hebrides Coastal Community Marine Archaeology Pilot Project (OHCCMAPP)
Project Design 14/12/2011**

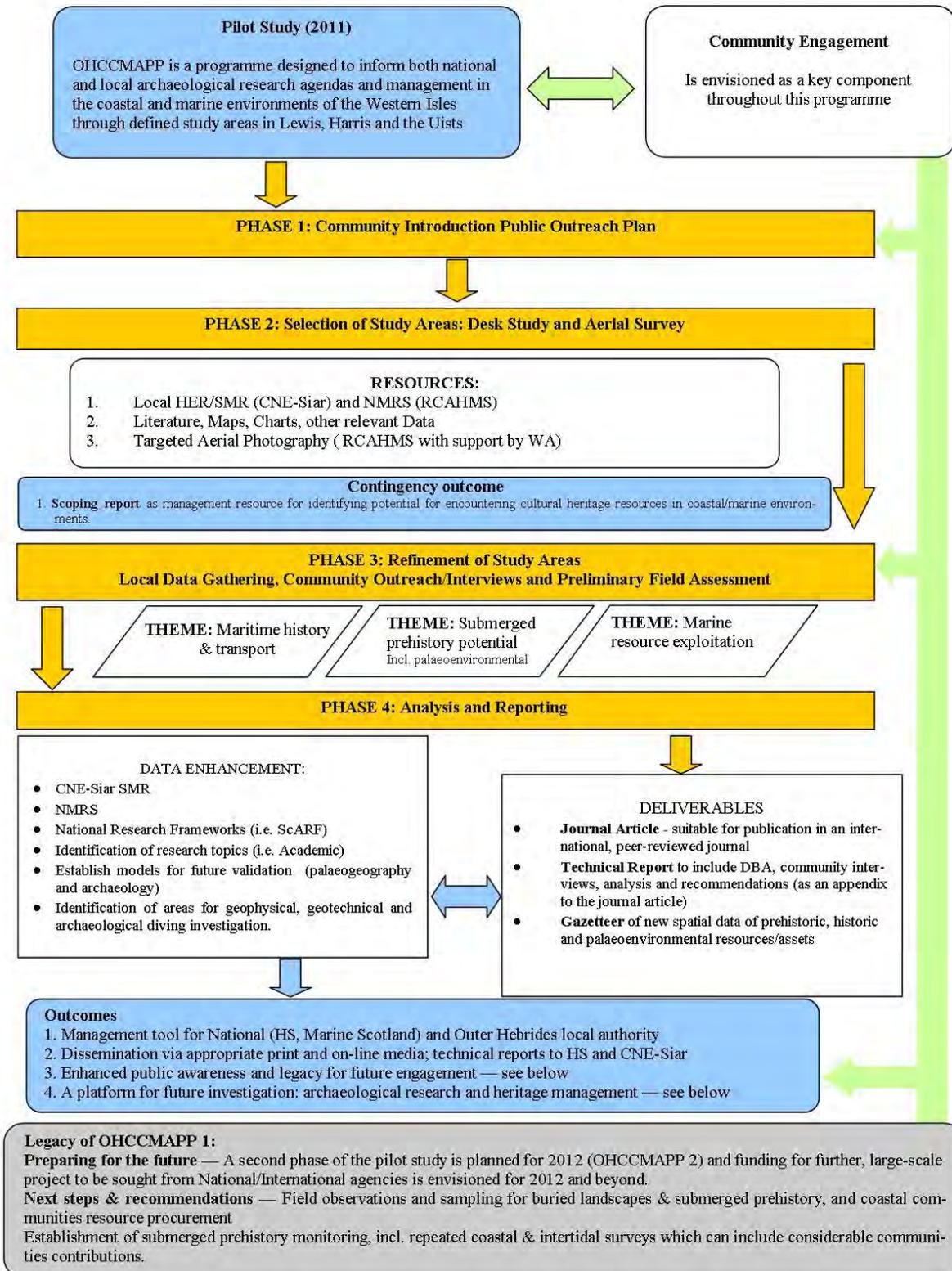


Figure 1: Project structure for OHCCMAPP 1 (2011 Season)



2.3 PHASE 2: SELECTION OF STUDY AREAS

Desk-Based Assessment

- 2.3.1 The Desk-Based Assessment (DBA) was aimed at establishing where archaeological resources are known and where the potential for unknown archaeological resources is greatest. Resources used included the local SMR, the NMRS, relevant published literature and available grey literature and reports, maps and satellite imagery, and bathymetric and other marine data (see Benjamin 2010, Lancaster *et al.* in Press). Further investigation of geographical and geological data will inform palaeoenvironmental study and suitability of locations for future investigation.
- 2.3.2 The methodology employed in the DBA followed the professional guidelines as outlined by the IfA standards for DBA (IfA 2011). In addition, RCAHMS partners have begun a thorough search of the in-house available current and historic maps, current and historic aerial photography, and archive material, including grey literature.
- 2.3.3 The study areas selected for the pilot project are summarised in **Table 1** and illustrated in **Figure 2**. A note on the extent of previous Coastal Zone Assessments (CZA) is also made. The total study area examined by this pilot project consists of just over 1285 km² of land, coast and sea area which is the equivalent of around 40% of the total land area of the Outer Hebrides.
- 2.3.4 The study areas listed in **Table 1** were selected primarily to include the general range of topographic and geomorphological variation within the islands (Connor and Little 1998) (**Figure 2**) We have included areas which have received less attention for coastal and marine archaeology (see **Section 2.3**) as well as more widely studied areas. Although GIS polygons have been used to define each of the study areas these are not rigidly enforced for including or excluding data, rather as a tool for focussing these initial phases of the project towards definable areas.
- 2.3.5 Study areas have been selected in order to represent environments of:
- **Estuarine;**
 - Broad Bay
 - Lochmaddy
 - Bàgh nam Faoileann
 - North Baleshare
 - **Fjord;**
 - Loch Seaforth
 - Loch Sealg
 - Loch Eport
 - The Bays
 - Stornoway Approaches & Loch Erisort
 - **Complex embayment's** (which exhibit several general environments);
 - Loch Boisdale
 - Loch Eynort
 - East Loch Tarbert
 - Bruernish
 - Castlebay
 - Sound of Harris.



Study Area	Location	Island	Coastal Zone Assessment	Area (km ²)
1	Broad Bay	Lewis	Surveyed (Burgess & Church 1997)	127.6
2	Stornoway Approaches & Loch Erisort	Lewis	Coast surveyed except for banks of Erisort (Burgess & Church 1997)	171.2
3	Loch Sealg	Lewis	Not surveyed	31.8
4	Loch Seaforth	Lewis / Harris	Partly surveyed (terrestrial survey Burgess 2004)	46.1
5	East Loch Tarbert	Harris	Not surveyed	47.3
6	The Bays	Harris	Mostly unsurveyed (very minor overlap with Hunter 2004, terrestrial survey)	104.1
7	Sound of Harris	Harris / North Uist	Partly surveyed (terrestrial survey Hunter 2005)	220.9
8	Loch Maddy	North Uist	Mostly surveyed (CFA Archaeology, 2006)	54.0
9	Loch Eport	North Uist	c. half surveyed (CFA Archaeology, 2006)	13.1
10	North Baleshare	North Uist / Benbecula	Mostly Surveyed (CFA Archaeology, 2005)	90.2
11	Bàgh nam Faoileann	Benbecula / South Uist	Mostly Surveyed (CFA Archaeology 2006)	68.9
12	Loch Boisdale	South Uist	Surveyed (CFA Archaeology 2006)	7.2
13	Bruernish	Barra	Barra coast surveyed, not smaller islands (SEARCH 1998)	55.6
14	Castle Bay	Barra	Barra coast surveyed, not smaller islands (SEARCH 1998)	13.9
15*	Loch Eynort	South Uist	Surveyed (EASE 2006)	8.9
16*	Loch Roag	Lewis	Surveyed, incl. Great Bernara (Burgess & Church 1997)	224.2

*Added during Phase 3 (section 2.4)

Table 1: Summary of pilot project study areas

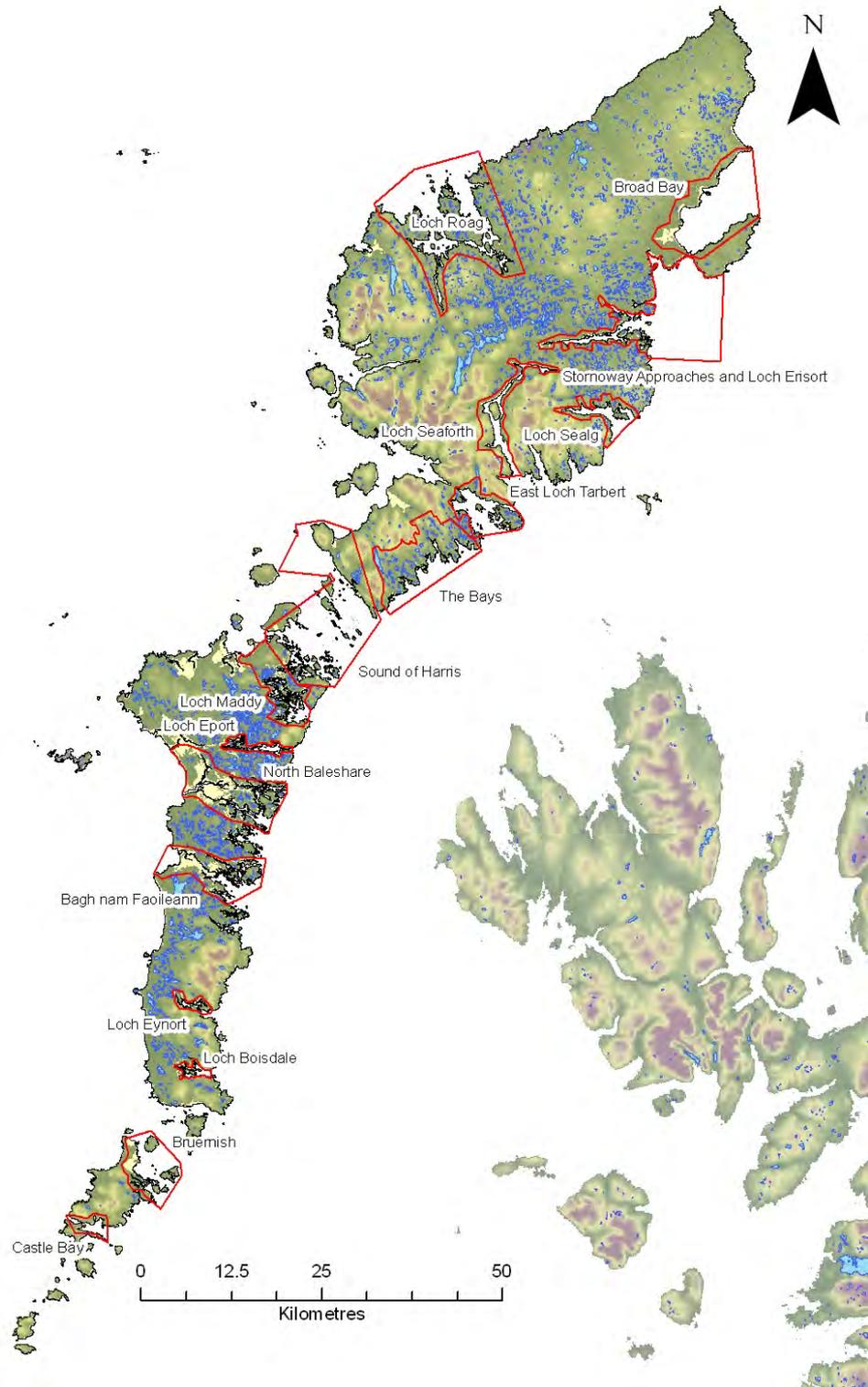


Figure 2: Distribution of Study Areas (outlined in red)



2.4 PHASE 3: REFINEMENT OF STUDY AREAS

Data Gathering

2.4.1 This was conducted by a team of two from RCAHMS (A. Hale) and WA C&M (J. Benjamin) in an effort to inform our understanding of the potential for cultural heritage in the marine environment including:

- intertidal and coastal archaeology of all periods;
- maritime and wreck archaeology of all types and periods;
- submerged prehistoric sites, features and land surfaces (including potential).

Community Engagement

2.4.2 Direct communication with the local community was envisioned, both through informal contacts and through formal interviews, with the aim of learning from the living knowledge-base as a resource of:

- known areas of identified archaeological material;
- known areas of suspected archaeological sites / material;
- known and potential areas of human exploitation based on resources or other indications (e.g. landscape-based) of occupation/use such as;
 - fishing locations,
 - harbour/anchorage locations,
 - other coastal resource exploitation/activity (e.g. raw material procurement).

2.4.3 Indirect approaches to public engagement were considered necessary as the project aims to engage with the widest community possible. Therefore in addition to direct communication through public lectures and one-on-one interviews, the awareness campaign includes the production and distribution of printed flyers. These were distributed and posted strategically at community centres, local shops and areas where they are most likely to be seen and engaged with by residents. By posting this information in central locations, we aimed to engage as many members of the community as possible.

2.4.4 The flyers were also designed to increase awareness of Marine Archaeology and lay the foundations for a longer-term community oriented project beyond Year 1 and this initial feasibility study.

2.4.5 In addition to the public outreach components outlined above, traditional media and public relations sources have also been sought; press interest has been good. It was agreed that sensitive scientific discoveries shall be released to the press only after thoughtful consideration and confirmation of results.

Preliminary Field Assessments

2.4.6 Initial field assessments have included ground-observation and recording of local archaeological potential (by J. Benjamin and A. Hale) on location. No major field surveys or evaluations were planned during 2011 season, although opportunistic observations were made.

2.4.7 The fieldwork methodology included visiting selected study areas, undertaking prospective fieldwalking to identify new, and locate known coastal foreshore and intertidal sites. Sites were recorded photographically and with brief written descriptions (in accordance with RCAHMS methods) and added to the RCAHMS national database (**Appendix II: Gazetteer, p97**).



- 2.4.8 This targeted fieldwork was based on careful consideration of the available desk based data analysis and enabled the pilot team to visit a limited number of study areas with limited resources. However, using both a rapid, broad coverage and a focussed study area approach the results presented here aim to demonstrate a working methodology which would be applicable to future survey and recording programmes.
- 2.4.9 The recording methodology applied is designed to enable information to be easily integrated into the SMR and RCAHMS national database in a way that is consistent with existing structures. The data can therefore be appropriately and efficiently archived and made publicly available through online sources (i.e. CANMORE / CANMORE Mapping / CNE-Siar SMR⁶).
- 2.4.10 A critical part of Phase 3 is the assessment of three themes pertaining to marine and maritime cultural heritage (**Figure 1**). These are:
- **Maritime history & transport**; in conjunction with,
 - **Marine resource exploitation**; which will help to inform,
 - **Submerged prehistory potential** (including archaeological and palaeoenvironmental material).
- 2.4.11 These themes are discussed further by study area in **Section 3.5**.

2.5 PHASE 4: ANALYSIS AND REPORTING

- 2.5.1 This report represents the initial product of Phase 4: Analysis and Reporting, effectively a summary of the work carried out in 2011. The Phase 4 aims were:
- enhancing local and national sites and monuments records;
 - enhancing national and local research frameworks;
 - identifying research topics for scientific/academic study;
 - establishing the foundation toward an Outer Hebridean coastal and marine site prospection model for future validation;
 - identifying areas for future marine geophysical, and archaeological diving survey;
 - establishing a legacy and future steps to secure further funding.
- 2.5.2 These aims will continue to be addressed in Year 2 of OHCCMAPP during 2012.
- 2.5.3 Future outputs will include peer-reviewed publications and a variety of publically available material.

⁶ <http://canmore.rcahms.gov.uk/>; <http://canmoremapping.rcahms.gov.uk/>; <http://www.cne-siar.gov.uk/smr/> (accessed 13/12/2011).



SECTION II: DATA & ANALYSIS



(A.Hale © RCAHMS 2011)



3 ANALYSIS OF DATA SOURCES

3.1 INTRODUCTION

3.1.1 The following resources have underpinned the thematic examination of coastal communities for all periods of archaeology and history which will develop during subsequent years of the project, funding permitted.

3.1.2 The Defining Scotland's Places (DSP) polygons and HS wreck characterisation databases cover the entire archipelago, whereas the SMR and NMRS datasets have been extracted by the individual study areas (see **Appendix III: Study Area Mapping**).

- cultural heritage datasets;
 - SMR (CNE-Siar)
 - NMRS (RCAHMS)
 - DSP land-use polygons (RCAHMS)
 - HS wreck characterisation database (Wessex Archaeology 2011),
- Literature, Maps, Charts, other relevant Data;
- Targeted Aerial Photography of the intertidal zone (RCAHMS/WA C&M).

3.1.3 The principle themes of **Maritime History & Transport** and **Marine Resource Exploitation** can be initially investigated through a variety of means. The main data sources used within this pilot project are discussed below. By assessing these strands of evidence it is hoped that unknown marine and maritime archaeology, can inform a viable field model for the identification of priority areas for future work in the region.

Submerged Prehistory: Archaeological potential & landscape considerations

3.1.4 By incorporating the thematic elements of **Marine Resource Exploitation**, **Maritime History & Transport** with field observations, ethnographic records of land use, resource distribution and reported finds, existing research and the analysis of available geographic datasets the major parameters of a *Hebridean model* for submerged prehistory will be examined below (**Chapter 6**).

3.1.5 A further gauge of whether there is potential for submerged prehistoric material can be initially sought from the distribution of shallow gradients and bathymetry (see **Appendix III: Study Area Mapping**). The purple fringing describes the 5 and 10m bathymetric contours; the 10m bathymetric contour is our current best-estimate for the Mesolithic period sea-level. Exposed sediments at these kinds of depths may have good potential for containing early prehistoric material.

3.1.6 A principal component of developing a "Hebridean model" for site prospection, in conjunction with ethnographic interviews and archived material will be the compilation of a **Marine Resources Register (MRR)** (**Table 16**). Gleaned from the published literature and cultural archive by period, the prevailing marine and coastal species relating to subsistence strategies will provide a baseline for establishing the potential distribution of human activity.

3.2 COASTAL ZONE AERIAL PHOTOGRAPHY ASSESSMENT

3.2.1 Two sources of aerial photography (AP) have been examined during this pilot project in order to assess the general suitability for prospecting for unknown/unrecorded sites of archaeological interest.



- Existing 25cm resolution APs taken in 2005 and housed within RCAHMS (© Getmapping) examined during Phase 2;
- Bespoke APs of target areas undertaken with RCAHMS aerial survey team (D. Cowley) (14-15th November 2011) during Phase 3.

25cm Resolution AP (RCAHMS) (Phase 2)

3.2.2 During Phase 2 (Study Areas 1-14⁷) coastal and intertidal features of archaeological interest were sought from the 25cm resolution APs. These included:

- Intertidal and submerged structures;
 - Fish traps
 - Causeways
 - linear features of possible human origin
- Salt marsh, estuarine environments, infilled isolation basins and other coastal sedimentary features that may preserve cultural heritage resources and/or palaeoenvironmental resources;
- Sheltered environments and natural inlets or embayments.

3.2.3 The major constraint noted during this preliminary assessment was the height of the tide and/or the level of waves obscuring the view of the seabed through shallow water at the time of photography (noted by Harding 2007). Generally these conditions appear to be prohibitive only in the south of Loch Seaforth (Study Area 3) (although the northern part appears more exposed and suitable for assessment); and Loch Erisort (SA2). These APs are generally of very high quality for examining coastal, intertidal and shallow marine areas in the Outer Hebrides and are recommended for future site prospection in the region.

3.2.4 The AP coverage for all of the Study Areas was examined suggesting a similar percentage area of 40% of the total land area of the Islands. Larger, more robust features are likely to be preferentially detected through this kind of assessment, as well as features with contrasting shoreline colour or texture. Where seaweed is dense, and lighting does not provide shadow or textural definition it is likely that features will be missed. Therefore to maximise the effectiveness of Desk-based prospection of intertidal or submerged structures it may be necessary in the future to consult a broader range of AP sources from a range of dates.

3.2.5 It may also be opportune to undertake specific aerial survey using a broader range of survey techniques, such as using infra-red technologies to penetrate water and record differential vegetation cover.

Bespoke APs November 2011 (Phase 3)

3.2.6 Three aerial photography flights were made between (November 14-15th 2011) over Barra to Lewis (**Figure 3**) focussing particularly upon the intertidal zone. Weather conditions were generally very favourable and a series of high-quality photographs were taken, expanding the AP collection of RCAHMS.

3.2.7 A number of intertidal features were identified with several unrecorded in the NMRS. A summary of intertidal features identified during these flights is presented in **Appendix IV: Intertidal Structures (Aerial Survey), p99**.

⁷ Study Areas 15 and 16 were added after community consultations during Phase 3.

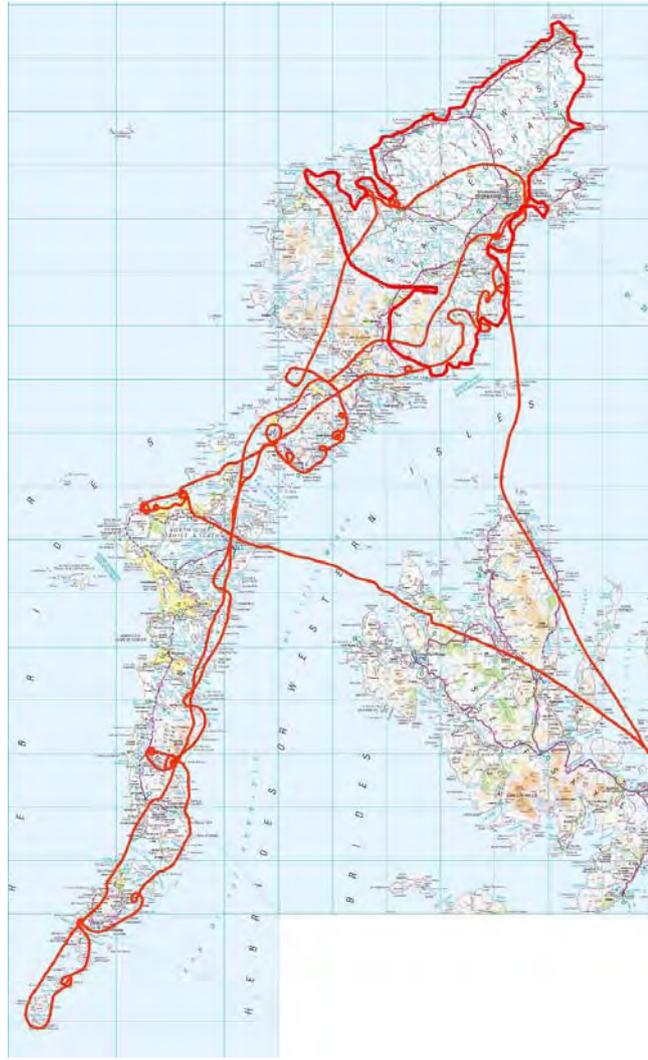


Figure 3: Flight path during November 2011 aerial photography survey (RCAHMS 2011)

- 3.2.8 During the aerial survey it was possible to identify some new intertidal sites and geographic features that appear archaeological relevant (**Figure 4**). These sites were not originally encountered either in the desk-based Aerial Photo review, nor the limited walk over survey conducted in 2011 (WA / RCAHMS). These have been photographed and will be considered for future field investigation.

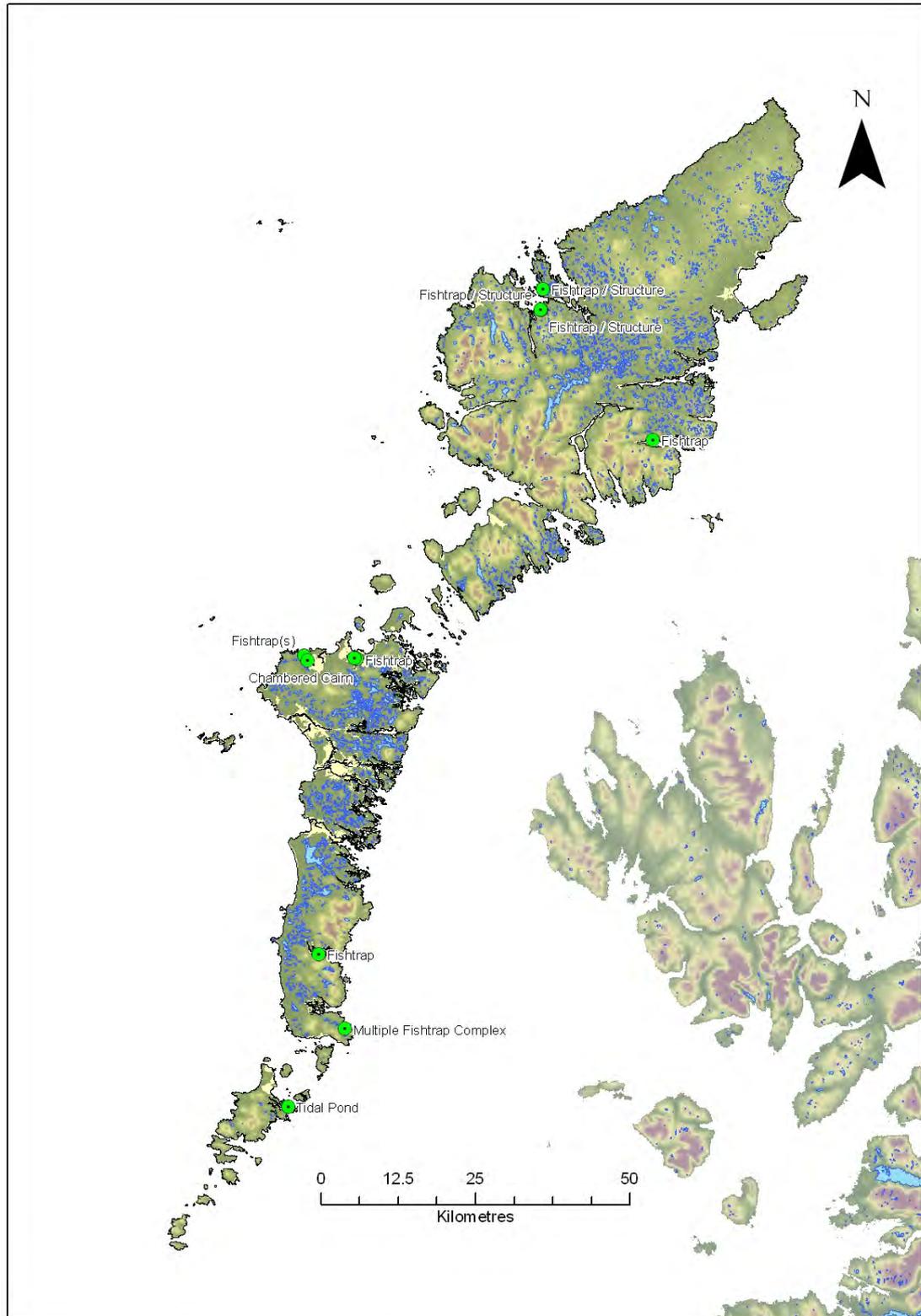


Figure 4: Intertidal features detected from November AP (some previously recorded)

AP 3D Photogrammetry

3.2.9 As an initial attempt to develop some of these AP resources for community outreach and visualisation a selection of sites that had repeated coverage from a number of angles was processed using Autodesk 123D Catch software⁸. The software does

⁸ <http://www.123dapp.com/catch> (accessed 15/12/2011).

not require control points or other measured data and purely constructs the 3D model using the photographs of the feature.

- 3.2.10 Wireframed working versions are shown below for Calanais (**Figure 5**) and the chambered cairn at Geirisclett, North Uist (**Figure 6**). The models can be rotated in 3D space and exported as CAD or YouTube movies for mounting in websites or other media⁹.
- 3.2.11 At Geirisclett the calm surface state of the water and definable break of slope in the seabed has allowed the software to reconstruct the bathymetry as well as the coast suggesting this type of rapid reconstruction is useful for understanding form and construction of intertidal features within the contours of their surroundings.

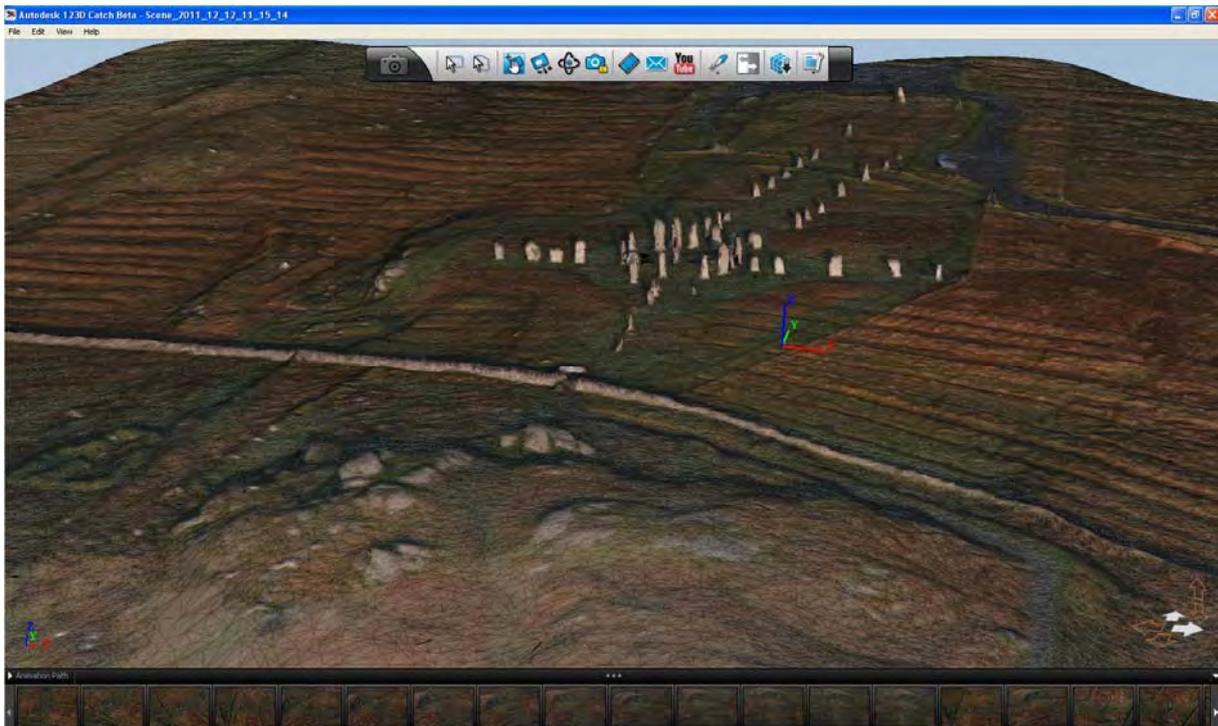


Figure 5: Calanais 3D photogrammetry test

⁹ **Addendum (20/012012):** 3D models of Geirisclett chambered cairn and a previously unrecorded complex of fishtraps in Hartavagh, southeast of Loch Boisdale can be seen here: <http://blogs.wessexarch.co.uk/OHCCMAPP/2011/12/19/geirisclett/> & <http://blogs.wessexarch.co.uk/OHCCMAPP/2011/12/19/hartavagh/>.

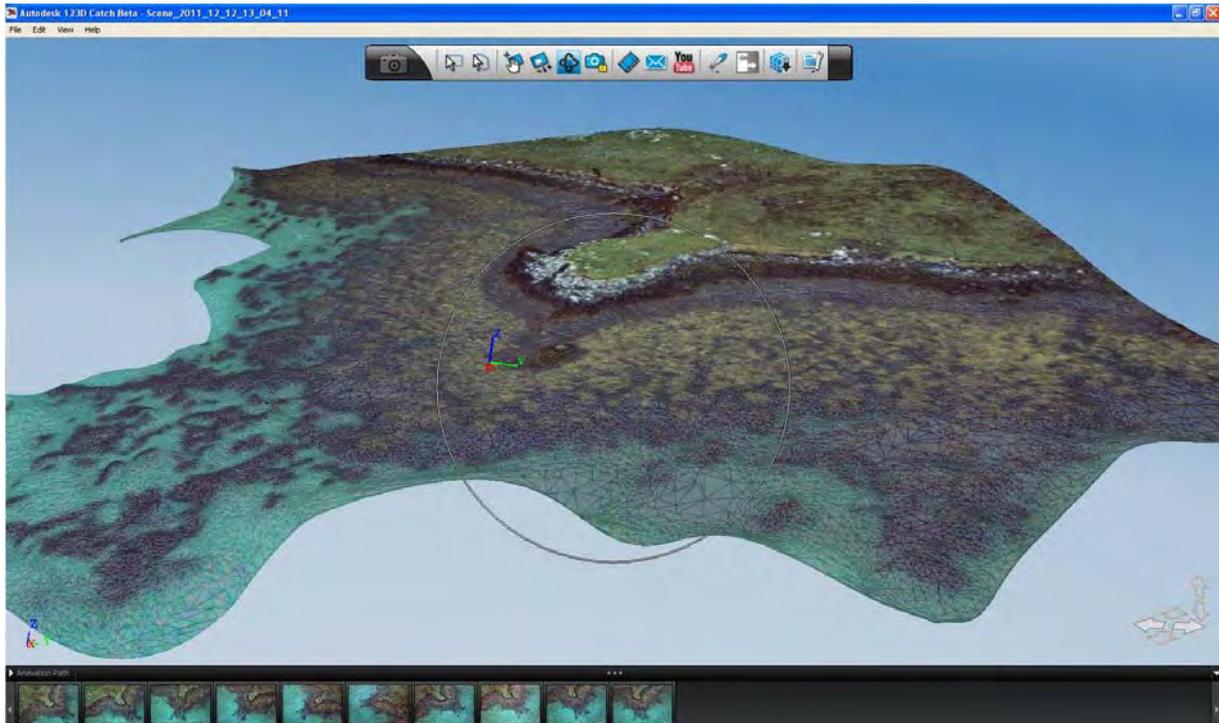


Figure 6: Geirisclett chamber cairn 3D photogrammetry test

3.3 COMMUNITY REPORTED MATERIAL

3.3.1 Through the various community engagement platforms (interviews, public talks, poster campaign and website¹⁰) several new reports of archaeological material have been made to the project. These have a broad distribution originating from Barra, the Uists, Harris and Lewis. Material has ranged from ceramics, worked flints, potentially prehistoric stone-built structures, exposed peats from intertidal locations and historic wrecks. Some of these reports are from previously recorded sites. However, within this initial community response are new discoveries which will contribute towards investigating archaeology and cultural heritage within the intertidal and coastal zone. A selection of the most informative are discussed below.

Flint core (Grimsay, South Uist)



Plate 1: Flint core recovered from intertidal sediments on SE Grimsay, displaying several flake scars (© WA Coastal & Marine 2011, ©Getmapping)

¹⁰ The Poster and Website are documented on **p100**.

- 3.3.2 Following the community engagement lecture in North Uist, several pieces of flint were reported to the project. The core in **Plate 1** was recovered from the intertidal sediments outside the reporter's home whilst walking at very low tide in 2008. The core is patinated but displays several flake scars and a well defined striking platform.
- 3.3.3 The reporter also mentioned a display case of worked flints that used to be held within a local school but which had been removed. There may be various unreported collections of prehistoric lithic material that would be a valuable resource to catalogue.

Intertidal Peats (Arnol, Lewis & Loch Paible, North Uist)



Plate 2: Intertidal peat reported from Arnol, Atlantic coast Lewis

- 3.3.4 Several reports of intertidal peats have been made to the project (e.g. **Plate 2** and **Plate 3**); with several others noted during the October 2011 expedition (see also **Figure 7**). These types of resource have been noted extensively on the western coast of the archipelago (e.g. Ritchie 1985) and within the greater Loch Roag area (e.g. Loch Ceann Hulabhig, **Plate 4**).



Plate 3: Intertidal peat reported from Loch Paible, may be the same exposure noted by Ritchie (1985) and utilised by Shennan and Horton (2002) for RSL modelling



Plate 4: Inundated peat-filled basin in Loch Ceann Hulabhig with exposed stumps and roots at depth, southeast Loch Roag (SA16)

Early Neolithic ceramics Loch an Duna, Lewis (freshwater lochan)



Plate 5: early Neolithic ceramics reported from a freshwater lochan near the coast

- 3.3.5 A local diver reported several large sherds of pottery of early Neolithic type. These originated from a freshwater loch, south of Stornoway, Lewis, called Loch Duna. Although this material is from a freshwater source (and therefore cannot be described as a 'marine' find), it was recovered by a local diver who was in attendance at the community lecture on Submerged Prehistory, in July 2011. Three days later, he reported this material to the Regional Archaeologist. This is a good indication of public engagement and the diving community.

Eroding sites

- 3.3.6 A small number of reports were submitted to the project which originated from eroding unknown sites or scheduled sites. However, the existence of the NMRS and official channels for reporting finds such as Treasure Trove were not known to the reporters. The opportunity was taken to clarify the official structures in place for reporting material of archaeological significance and to highlight the range of



archaeological resources available for private individuals to explore the cultural heritage recorded around them.

- 3.3.7 Submissions relating to eroding coastal sites will be passed onto the SCAPE Trust in their capacity as a charitable company actively championing the conservation of coastal heritage¹¹.
- 3.3.8 Other materials relating to known scheduled sites are in the process of being reported through Treasure Trove and Historic Scotland.

3.4 ETHNOGRAPHIC SOURCES

Oral history: Tobar an Dualchais (Kist o' Riches)

- 3.4.1 The oral history archive Tobar an Dualchais¹² was queried for ethnographic accounts that could enhance and focus the investigation of marine and maritime cultural heritage in the Outer Hebrides.
- 3.4.2 By searching using the general term [FISHING] in conjunction with the names of the major Islands under the *Place* field, a general overview of collected material was compiled under thematic headings relating to technology, locations, species sought and a variety of taboos and folk narratives (**Table 2**). Of particular interest are records such as a toponomic description of the naming of places in Grimsay linked to marine resources¹³, detailed descriptions of fishing techniques and equipment¹⁴ as well as the social aspects of such activities¹⁵
- 3.4.3 There is considerable overlap in species and technology with material evidence of marine resource exploitation which is summarised and discussed in conjunction with the **Marine Resources Register (Section 4.4)**.
- 3.4.4 Excluding several repeated records and erroneous records referring to other geographic areas there are several hundred oral history accounts of direct relevance to the project themes **Marine Resource Exploitation** and **Maritime History & Transport**. These will be a key resource for developing OHCCMAPP in subsequent seasons.

¹¹ <http://www.scapetrust.org/index.html> (accessed 13/12/2011).

¹² <http://www.tobarandualchais.co.uk/> (accessed 21/11/2011).

¹³ <http://www.tobarandualchais.co.uk/en/fullrecord/82900/98> (accessed 21/11/2011).

¹⁴ <http://www.tobarandualchais.co.uk/en/fullrecord/54046/34> (accessed 21/11/2011).

¹⁵ <http://www.tobarandualchais.co.uk/en/fullrecord/14195/9> (accessed 21/11/2011).



Search Term	Location [PLACE]	n	Themes	Notes
[FISHING]	BARRA	79	fishing practice	frame-netting, hand-netting, sieving?, salting of fish catches in Castlebay, drift-netting for herring / no inshore netting or salmon netting, creels, horse-hair lines, great-line fishing, herring curing; working songs; nets for mullet fishing; curing skate, cuddy fishing, spoon-net from shore with several men
			weather	bad weather preventing good catches
			catch quality	lack of fish
			locations	good trout in rivers, fishing in Skye, moving to northeast ports for fishing industry, lobster fishing at places around Berneray & Mingulay, women travelling in fishing season e.g. Shetland, winter fishing in Loch Eynort
			species	trout, lobster, herring, sillocks (young coalfish), halibut (as baitfish, and boats hauled over it to make landing easier), turbot, mullet, seals, skate, flounder, whelks
			boat types	sailed fishing boats, sixareen (six-oared boat), small rowing boats
			humour	bad fishermen with poor boats
			boat building	praised shipwrights, historical boat-building in Barra
			taboo	not eating rabbit or eggs before fishing, bad luck to give water to another boat. Using alternative words for knife (get a beating), bad luck wearing socks dyed with lichen, unlucky to give anything away at sea
			slang words	<i>haf</i> = ocean
			folk narratives	sea monsters (poss. Basking Shark), witches, man crippled for searing an oath to the devil in frustration, water horses; premonitions of drowning; mermaids, dead hands
	agriculture	crofting, seaweed cutting		
	UIST	133	fishing practice	hand-line; girls as herring gutters, horse-hair lines from white or grey horses, fishing rods of red pine, blacksmiths making kit for fishing boats, different nets for loch and for river fishing, rivals fighting over fishing, [various techniques in Jura], rod fishing done in Jura by women - boat fishing by men, South Uist fishing industry
			catch quality	bad fishing nearly forcing someone to join the army
			locations	Ronay, Loch Maddy, Rubha Ghaisinis (herring mackerel & cuddy using hand-lines & -nets, lobster-fishing in Grimsay good, toponomic information on Grimsay place names , Loch Eynort spring fishing community, Eriskay men in local fishing and merchant navy, Stoneybridge
			species	saithe, greylag geese, ducks, whale, winkles for eating, limpets as bait on hooks or cooked with potatoes and thrown in sea - fish appearing over a couple of days - rods from willow
			boat types	sail, rowing boat
			humour	songs about a new fishing rod, songs about curing herring
			taboo	drowning; animals & practices, taboos on meeting women or ministers and rabbits
			slang words	<i>ducar</i> - nickname for Tarbert people
	BENBECULA	4	misc. appear in other searches	
			folk narratives	pet-seal of Clanranald injured in Ireland fishing -returned to Ormaclete to die; Trout-spectre, women in Harris sailing a sieve and stealing herring from boats; fairies, escaping from very large old man; cursed stream - no fish, caught fish from the devil / otter; ghosts appearing whilst fishing, old man killing a whale; ducks as witches thwarting fishermen; cursed fishermen, sharing fish with the devil, fishermen promising son in return for good fishing (saga-esque tale)
	HARRIS	64	fishing practice	line-fishing, different techniques for different fish, cuddy netting & liver oil production, lobster-fishing in Berneray, curing in Scalpay, fishing nets, song on fishing boats down at the weir, animal skin floats especially dogs in NE Scotland (Lossiemouth)
			weather	storms, fishing in fog, skilled skippers, near loss of all Tolsta boats long-lining
			locations	long-distance fishing grounds in Shetland, Norway, Orkney, Berneray, Shiant Islands, Bays of Harris and Loch Snizort
			species	saithe, lythe, bream, ling, tusk, halibut, cuddy, lobster in Berneray
			boat types	boats being transported from east Scotland (e.g. Montrose)
			humour	fishing trip lost in fog, a man from Berneray
			boat building	different types of wood used in boat-building, types of boats, boats of Tolsta, boat types / fishermen's clothing / launching techniques
			taboo	lucky & unlucky things
			agriculture	shielings used for peat cutting & fishing on Berneray, living & maintaining shielings, depth of soil in Scalpay,
	tragedy	capsized fishing boat North Tolsta, drownings at Ness during The Fishing, saving a boy from drowning whilst fishing in St Kilda		



Search Term	Location [PLACE]	<i>n</i>	Themes	Notes
	LEWIS	117	fishing practice	several boats for lobster fishing from different villages but no division of fishing areas, products made from seals/whales/sea, general practice, fishing off Skerries, fishing - gutting - curing process in Bragar for ling
			catch quality	downturn in herring fishing,
			species	eel, lobsters, seals, whales, names for coalfish throughout its development,
			boat building	restoring a boat & fishing off Lewis - rowing up Loch Seaforth
			taboo	
			slang words	<i>Frith-iasg</i> (?) - process of gathering limpets & other shellfish bait for cod catching
			folk narratives	fish too big to catch, swallowed by a whale, huge cod eating a terrier - caught next year again with terrier and pups in stomach, pub at the bottom of the sea, eggs & witchcraft
			agriculture	crofting & tools, cattle rustling in Uig, crofting & fishing in Barvas (crofting in Autumn & Spring), historical crofting in Shadar
	tragedy	<i>lolaire</i> , loss at sea, drowning		

Table 2: Summary of ethnographic accounts of FISHING in the Outer Hebrides from Tobar an Dualchais (Kist o' Riches)



Field Commitment & Community Engagement (October 2011).

- 3.4.5 A week long period of fieldwork was undertaken between 10th – 16th October 2011; consisting of a core team from WA Coastal & Marine, RCAHMS with support from CNE-Siar Archaeology and a variety of local contacts.
- 3.4.6 The main aim of the expedition was to develop **Phase 3: Refinement of Study Areas**. The principal objectives are as follows:
- Ground observation of intertidal structures of possible anthropogenic origin from APs during Phase 2 produced an initial gazetteer of 22 features, 17 of which are previously unrecorded in the SMR/NMRS (Appendix II: Gazetteer).
 - Development of community engagement; including:
 - Public talk in Lochmaddy (Wednesday 12th October 2011);
 - Interviews with local residents on the themes of the project;
 - Fieldwalks of study areas with members of the communities;
 - Assessment of snorkelling as a survey tool in intertidal areas.
- 3.4.7 A brief summary of the expedition structure is presented in **Table 3**. The distribution of sites and locations recorded and visited during the expedition is presented in (**Figure 7**).
- 3.4.8 A series of new contacts were made and productive community interviews undertaken. In particular topics of marine resource exploitation and prehistoric activity on the coast were highly productive. In the case of marine resource exploitation several new fish traps / yairs were recorded from these discussions. These will be entered into the HERs.
- 3.4.9 An expanded summary of the expedition is provided in **Appendix I: Field Notes**.
- 3.4.10 A variety of site types were investigated during the expedition, which relate to all themes of the project. These included:
- stone-cut bait holes and fish traps;
 - hulks on the foreshore; and,
 - submerged and intertidal trees and peats, and Neolithic monuments now partly inundated at high tide.
- 3.4.11 Other features such as caves were noted due to their potential to preserve archaeological deposits.
- 3.4.12 Several of the 'fish trap' features had been identified from APs prior to the expedition and the opportunity was taken to ground-observe them during the trip. Of the 22 intertidal and coastal structures and features only 5 were previously recorded in the SMR or NMRS. The majority of these sites are intertidal structures, probably fish traps and/or causeways. A gazetteer of these features is provided in **Appendix II: Gazetteer**.
- 3.4.13 The 17 newly recorded features have been submitted to RCAHMS and CNE-Siar to enhance the NMRS and SMR, respectively.

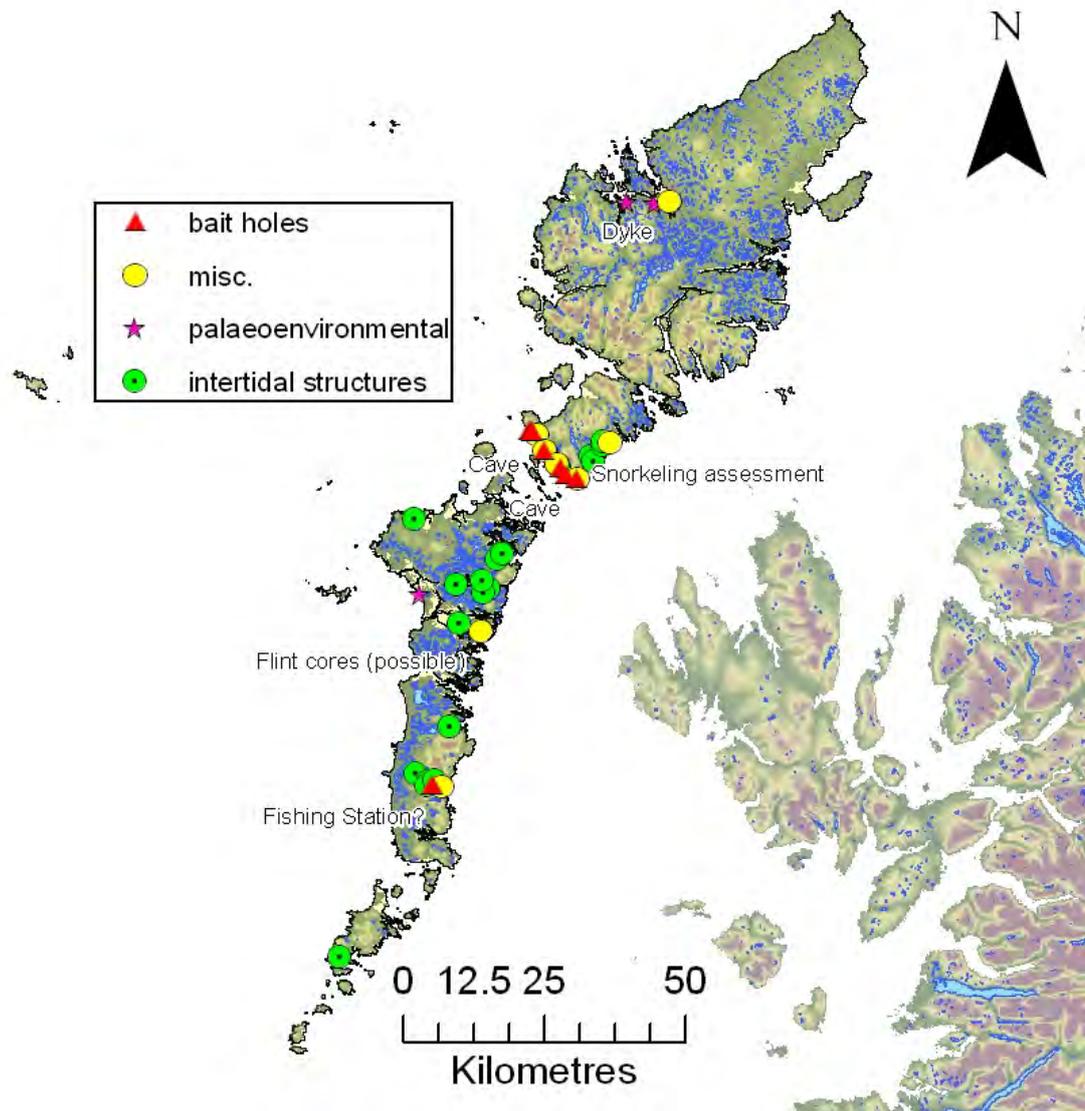


Figure 7: Distribution of the types of features identified or visited during the October field expedition; labels refer to miscellaneous sites and activities.



Date	Main Tasks	Locations	Summary
Monday 10th October	Depart Edinburgh for Oban – Castlebay ferry. Arrive early evening. Open-invitation social in Craighard Hotel, Castlebay.	Barra: Castlebay	Social did not happen as notice was omitted from the Guth Bharraidh.
Tuesday 11th October	Field visit to Castlebay / Vatersay study area. Ferry to Eriskay.	Barra: Castlebay – Vatersay – South Uist: Eriskay	Several previously recorded fish trap at Bagh Chornaig, Vatersay examined. Unrecorded dock and wooden hulk recorded. Discussions with local archaeologists and scallop diver in the evening in S. Uist.
Wednesday 12th October	Field visit to Cille Pheadair and Loch Aineort (Loch Eynort). Visit to North Baleshare and Loch Sgipoint (Skipport). Public talk at Taigh Chearsabhaigh Museum & Arts Centre, Lochmaddy. Social in pub for general discussion.	South Uist: Cille Pheadair - Loch Eynort – North Uist: North Baleshare – Loch Skipport - Lochmaddy	Interview with JJM, retired fisherman at Loch Eynort on fish traps, marine landscapes, bait holes. Photographed intertidal peats at Baleshare beach. Public talk at Taigh Chearsabhaigh filled to capacity (50) w/ positive feedback.
Thursday 13th October	Visit to Geirisclett and Vallay, Ferry to Harris, visit to Northton and coast along Sound of Harris to Carminish with local community members.	North Uist: Geirisclett – Harris: Northton - Carminish	Chambered cairn at Geirisclett partly intertidal at high tide. Baitholes and middens at Northton examined.
Friday 14th October	Visit to The Bays, interview with local community about fish trap building, Snorkelling survey in Loch Fleoideabhaigh, visit to Rodel, departed to Stornoway.	Harris: The Bays – Rodel – Lewis: Stornoway	Interview with CR on the fish trap his Grandfather built in The Bays in 1905. Recording of new fish traps in The Bays from that interview. Snorkelling assessment of technique for investigating seabed. Visit to Rodel church. Met with Lewis & Harris BSAC dive club in Stornoway.
Saturday 15th October	Visit to Loch Roag & Calanais, Visit to Great Bernera, Visit to Cnip.	Lewis: Calanais – Great Bernera - Cnip	Complex structures observed across land-sea boundaries e.g. dykes running offshore at Rubha na Cloiche, Calanais. Fish trap complex visited on Great Bernera. Mesolithic midden previously recorded by Burgess & Church (1997) at Cnip on rock outcrop in sea.
Sunday 16th October	Visit to Garenahein & Dun Carloway. Ferry from Stornoway to Ullapool.	Lewis: Carloway.	Visit to historic and late prehistoric sites.

Table 3: Field Expedition summary of activities (October 2011)



3.5 MARITIME RECORDS

3.5.1 A recent appraisal of maritime records within Scottish waters was undertaken by WA Coastal & Marine (Wessex Archaeology 2011) commissioned by Historic Scotland. The aim of the project was to assess and characterise the known marine archaeological resource of Scotland (Lancaster *et al.* In preparation). The analysis sought to highlight elements of the resource, particularly:

- aspects of the non-shipwreck resource; and,
- wrecks which illustrate the Scottish dimension, for example through place of build, or function.

3.5.2 This research had several objectives, to:

- compare the collated record with relevant published historical and archaeological interpretations and enhance database information where possible;
- interpret the resulting record, drawing out significant aspects by asset type, period, and function; highlighting survival of non-shipwreck related sites, and where shipwrecks are concerned, sites of apparent interest that illustrate the Scottish dimension; and,
- present a report and database setting out the results of the study, suitable for dissemination.

3.5.3 That record-enhancement exercise focussed on the documented wreck records that underpin the maritime component of NMRS in order to establish which records have sufficient information to be classed as a 'located wreck'.

3.5.4 In order to examine a pertinent subset of this national dataset, wrecks located within 12 nautical miles of the Outer Hebrides coast (based upon a polyline outline provided CNE-Siar) were extracted. This resulted in a subset of 71 wrecks within 12nm of the Outer Hebrides coast (**Figure 8**).

3.5.5 Due to the proximity of Skye three wrecks are located on its coast. The coasts of Barra and South Uist, as well as Stornoway harbour approaches are relative hotspots for located wrecks. This is likely due to known navigational hazards as well as a documented array of human error.

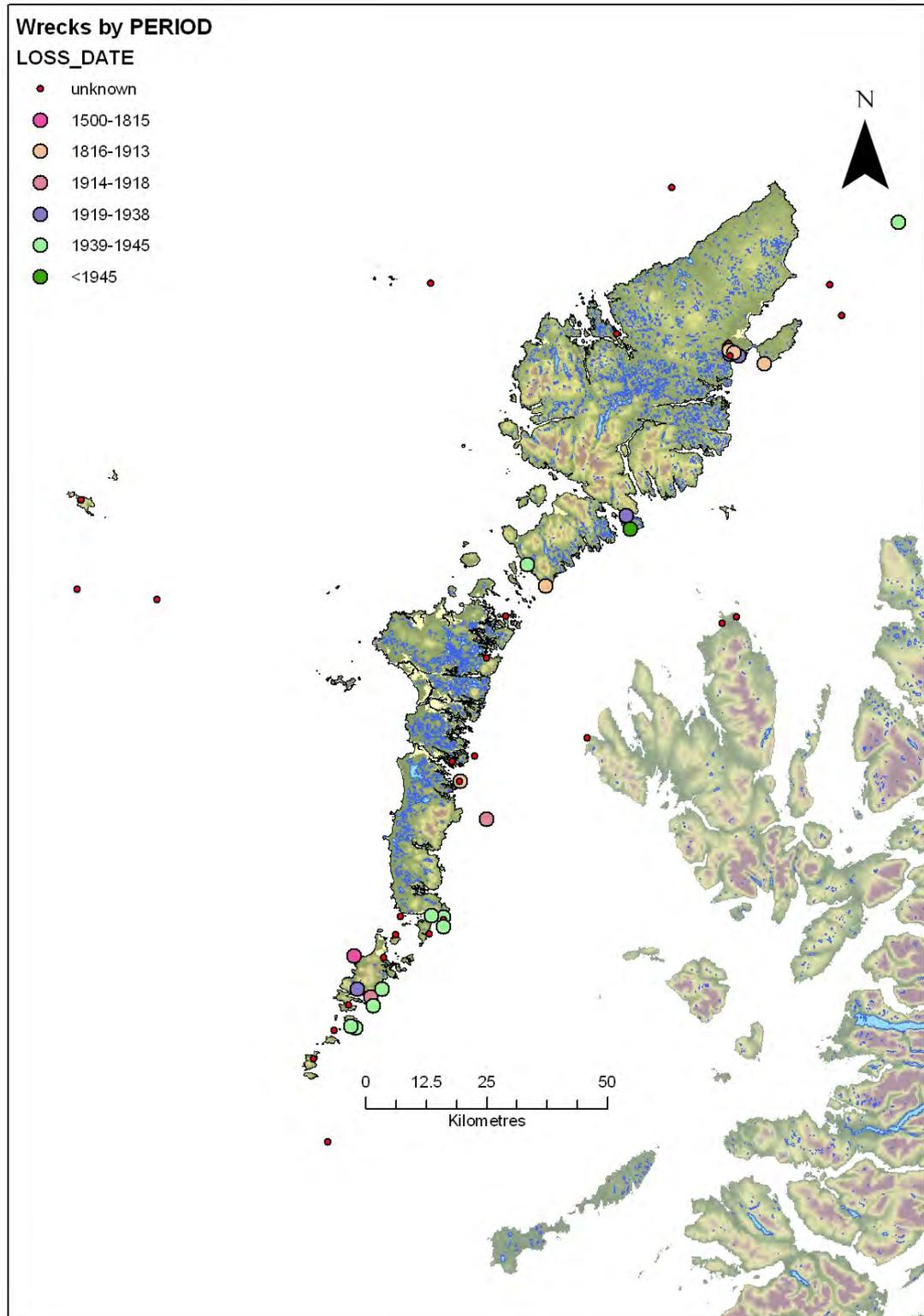


Figure 8: 'Located Wrecks' within 12nm of the Outer Hebrides coast, by period of loss

3.5.6 The dataset consists of a diverse range of vessels lost during 1728 to 1961. There are a significant number of unknown vessels which may be younger or older than this range. Indeed regionally there is likely to be a strong maritime heritage for the islands from early prehistoric times when sea travel provided the only access to the archipelago (Garrow and Sturt 2011). There is also likely to be a concentration of



maritime activity during Norse and Viking periods, of which currently there is scant physical wreck evidence in Scotland, and especially the Outer Hebrides in these wreck records (Rixson 1998, Larn & Larn 1998, Whittaker 1998).

Summary of Wrecks in the Outer Hebrides

- 3.5.7 The period phases outlined in the tables below are derived from Wessex Archaeology (2008). The wreck dataset is summarised below by database field, with the discussion ordered by the sequence of events over the working life of the vessels. The Wessex Archaeology (2011) database used to assess maritime archaeology for this project has been distilled from the NMRS database. Where possible, clear examples of duplicated records have been removed (*ibid.*). Due to the uncertainty in positioning and recording of wrecks there may be some duplicate records that cannot easily be merged – due to different positions used and a lack of other information (geophysical survey or diver inspection for example) – that could further aid the validation of major wreck databases (UKHO/SeaZone, NMRS/NHRE etc and regional SMRs).
- 3.5.8 The database used here does not include ‘recorded losses’/casualties, poorly located or wrecks without a defined position (e.g. relative to a submerged feature such as a named sandbank).
- 3.5.9 Of the 71 records, 47 have unknown build dates (**Table 4**). There is a concentration of build dates between 1816 and 1945 probably representing post-industrial increases in maritime transport but may be due to larger vessels being reported or better surviving. There is also likely to be a bias in which vessels are preferentially reported for insurance purposes and are thus recorded by Lloyd’s of London and thence being incorporated into the NMRS (e.g. Whittaker 1998)
- 3.5.10 The earliest construction date is 1722. Strikingly, the resource remains largely unknown (similarly by the majority of the data fields associated with these wrecks).

Build Date	Total
>1500	0
1500 – 1815	1
1816 – 1913	12
1914 – 45	11
<1945	0
<i>unknown</i>	47
Total	71

Table 4: Build date of ‘located wrecks’ within 12nm of Outer Hebrides

- 3.5.11 The place of construction for these vessels is concentrated mainly in England, predominantly in the north and northeast (e.g. Beverly, South Shields, and Middlesburgh). There are notable vessels built in Scandinavia and Japan. Of the vessels built in Scotland, these originate from Glasgow, Renfrewshire and Stornoway, reflecting the historic shipbuilding on the Clyde as well as local boat building in the Outer Hebrides (**Table 5**).



Country of Construction	Total
England	7
Scotland	4
Norway	1
Sweden	1
Japan	1
<i>unknown</i>	57
Total	71

Table 5: Country of construction of 'located wrecks' within 12nm of Outer Hebrides

- 3.5.12 There is a broad mixture of propulsion methods within the wreck dataset (**Table 6**). Steamships are by far the most frequently occurring, three of which are described as paddle steamers. These types of vessel were key parts of maritime trade and transport between the Islands and the mainland, particularly Glasgow during the 19th century. Passenger routes were established for many of the Islands with tour parties being taken as far as St Kilda; steamships were later used to evacuate the Islands in the 20th century (Meek 2008). Larger steamships like the SS *Hebrides* (not wrecked but decommissioned elsewhere) provided the backbone of the region's ferries for decades. So much so that when routes were altered or cancelled it could impact the island's economy as has been described for St Kilda and Soay; communities evacuated in 1930 and 1953, respectively. Both evacuations involved the SS *Hebrides* (Meek 2008).

Propulsion	Total
Motor	1
Sail	1
Steam (incl. 3 paddle)	27
<i>unknown</i>	42
Total	71

Table 6: Methods of propulsion of located wrecks' within 12nm of Outer Hebrides

- 3.5.13 The materials of construction are also varied and relate to the evolution of boat building technology during the recent centuries (**Table 7**). Steel vessels are by far the most common.

Material of Construction	Total
Composite	1
Iron	4
Steel	24
Wood	11
<i>unknown</i>	31
Total	71

Table 7: Material of construction of 'located wrecks' within 12nm of Outer Hebrides

- 3.5.14 The vessels types are highly diverse reflecting a range of transport, military, trade and fishing uses (**Table 8**) that have been the mainstay of the Islands' economy over recent centuries (Meek 2008) with records more frequent from the 19th century onwards. The 2 oiler type records perhaps a duplicate entry for the *Birchol* (a Royal Fleet Auxiliary oil tanker stranded in 1939) and reflects uncertainty in the positioning and recording of wrecks. There is, however, insufficient evidence to merge the records as their positions are different (Wessex Archaeology 2011).



Vessel Type	Notes	Total
Concrete Barge	-	1
'craft'	Miscellaneous description	34
Drifter	Drift-net fishing vessel	1
Dutch East Indiaman	Armed 17 th century colonial trade vessel	1
'hulk'	Noted as 20 th century wrecks	3
Landing Ship Infantry	Likely WW2	1
Motor Fishing	Describes generic fishing vessels with motor propulsion	2
Oiler	Oil Tanker	2
Paddle Steamer	19 th century examples	3
Puffer	Small cargo steam ship	1
Requisitioned Steam Trawler	Purchased for wartime naval duties	3
Requisitioned Steam Yacht	Purchased for wartime naval duties	1
Steam Lighter	20 th century wreck. Lighter refers to barges without propulsion (Dear & Kemp 2005)	1
Trawler	Trawl-net fishing vessel of varying propulsion type	2
Steamship	Steam propelled vessels of all types. Within an Outer Hebrides context these ranged from large transport ships for ferrying goods and passengers during the 19 th century to small cargo puffers (Meek 2008)	15
Total		71

Table 8: Vessel type of 'located wrecks' within 12nm of Outer Hebrides

- 3.5.15 The registration of the vessels is similarly broad although dominated by British and Scandinavian ports (**Table 9**). Stornoway and Clyde ports are relatively frequent. The major northern English ports of Liverpool and Newcastle-upon-Tyne are also represented, as well as ports in southern England, including London and Cornwall.

Port of Registration	Total
Ardrossan	1
Copenhagen	1
Fleetwood	1
Glasgow	3
Gothenburg	1
Liverpool	2
London	2
Newcastle-upon-Tyne	1
St. Ives	1
St. Johns	1
Stavanger	1
Stornoway	4
unknown	52
Total	71

Table 9: Port of registration of 'located wrecks' within 12nm of Outer Hebrides

- 3.5.16 The cargos of the vessels are also diverse and highlight a range of industry, domestic and luxury materials (**Table 10**); the *gold and silver specie* relates to the historic loss of the *Adelaar*, a Dutch East Indiaman *en route* to Batavia (Jakarta), lost off Barra in 1728 after the vessel was driven onto rocks during a heavy storm.



Coal and general cargo are most frequent. Industrial and fuel cargos are also notable in support of the Islands economy.

Cargo	Total
Ballast	4
Coal	6
Dolomite	1
Fuel oil	1
General	3
General / whisky	1
Gold & silver specie, lead, bricks	1
Ice	1
Oil cake, nuts, pig iron	1
<i>unknown</i>	52
Total	71

Table 10: Cargo of 'located wrecks' within 12nm of Outer Hebrides

3.5.17 The departures and destinations of the vessels also have strong regional and international trends (**Table 11**). The fact that the wrecks are located in the vicinity of the Outer Hebrides may indicate surprising routes for some of these journeys. For example, the Netherlands to Batavia (modern Indonesia) undertaken in 1728, Pepel, Sierra Leone to Tees undertaken in 1928 located off the South Uist coast; or Copenhagen to Baltimore undertaken in 1904 with the given position for the wreck in Stornoway harbour. **Notable wrecks** are discussed briefly below (**p35**).

Departure	Total	Destination
Barry (Wales?)	1	London
Belfast	1	Warkworth (Northumberland)
Copenhagen	1	Baltimore (Maryland)
Kyle of Lochalsh	1	Stornoway
Liverpool	2	New Orleans (Louisiana); Sydney (Australia)
Lochmaddy (North Uist)	1	Portree (Skye)
Ness (Lewis)	1	Stornoway
Netherlands	1	Batavia (Dutch colonial Jakarta c. 1720s)
Pepel (Sierra Leone)	1	Tees
Porsgrunn (Norway)	1	Stornoway
Russia	1	Manchester
<i>unknown</i>	59	
Total	71	

Table 11: Departure and destination ports of 'located wrecks' within 12nm of Outer Hebrides

3.5.18 The dates of loss for these vessels are concentrated most frequently during the years of WWII (**Table 12**). The earliest date of loss is 1728, the most recent being 1961.



Date of Loss	Total
>1500	0
1500 – 1815	1
1816 – 1913	5
1914 – 18	2
1919 – 1938	5
1939 – 1945	9
<1945	2
<i>unknown</i>	47
Total	71

Table 12: Date of loss of 'located wrecks' within 12nm of Outer Hebrides

- 3.5.19 The causes of loss are varied and relate to a variety of collisions and strandings but also to mines and explosions (**Table 13**). The vast majority are listed as strandings which may relate to the complex networks of inter-island channels and shallow coastlines of much of the Islands in on junction with human error and bad weather.

Cause of Loss	Total
Abandoned	1
Broken Up	1
Collision	2
Dispersed	1
Explosion	1
Mined	1
Stranded	18
<i>unknown</i>	46
Total	71

Table 13: Cause of loss of 'located wrecks' within 12nm of Outer Hebrides

- 3.5.20 The recorded state of survival of the vessels is variable ranging from *intact* to *dispersed* (**Table 14**), with 40 wrecks of unknown status.

Survival	Total
Broken Up	14
Dispersed	9
Intact	5
Partially Broken Up	3
<i>unknown</i>	40
Total	71

Table 14: Survival state of wrecks within 12 nm of Outer Hebrides

- 3.5.21 The investigations underpinning these wreck records is also wide-ranging including coastal zone assessment and divers, by the UKHO, RCAHMS and sport divers (**Table 15**).



Investigation	Total
Archaeological Investigation	1
CZA	1
Dived	4
RCAHMS	5
UKHO	39
UKHO, Dived	21
Total	71

Table 15: Sources of investigation of 'located wrecks' within 12 nm of Outer Hebrides

- 3.5.22 **Table 15** highlights the relatively few wrecks primarily identified or investigated by overtly archaeological means. The methods of the UKHO for investigating wrecks not including divers is likely to involve remote sensing such as sidescan sonar or other means and may be very general.
- 3.5.23 There may be significant benefit for archaeological assessments of such wrecks for identifying wrecks of unknown archaeological significance, especially as is noted through these tables, that around two thirds of the documented wrecks in the region are effectively *unknown*. That is with little information other than location and possibly dimensions to allow any assessment of their archaeological value or significance.

3.6 NOTABLE WRECKS

Introduction

- 3.6.1 There is considerable scope for investigating the large numbers of wrecks with unknown characteristics within the Outer Hebrides. The known wrecks with associated useful documentary records show a diverse and international assortment of vessels that would provide a valuable resource for research and public engagement. A few important and interesting wrecks are described below.

Adelaar

- 3.6.2 The scattered remains of the *Adelaar*¹⁶, wrecked in 1728, were found around the exposed reef known locally as Maolach Sgeir (*cursed reef*) in 1972 (Martin 1998).
- 3.6.3 The *Adelaar* (meaning *Eagle*) was a Dutch East Indiaman on the Indies route built in 1722 for the Dutch East Indies Company (VOC). The vessel was 40.2m in length, 10.5m beam and with a laden draught of 4.4m with a laden displacement of about 700 tons. The *Adelaar* had a compliment of 36 muzzle-loading guns mostly of iron. The two nearest the compass were bronze to reduce the magnetic effects on the compass. To further deter pirates, eight light breech-loading were also installed (Martin 1998).
- 3.6.4 On the third round trip to Batavia (modern day Jakarta, Indonesia) the *Adelaar* was carrying the cargo she was wrecked with on the 24th March 1728. After leaving Middleburg on 21st March 1728 the vessel was observed by the minister and chamberlain of North Uist to be close to the west coast on the previous night prior to a heavy storm (Martin 1998).

¹⁶ CANMORE entry for the *Adelaar* (accessed 05/12/2011):
<http://canmore.rcahms.gov.uk/en/site/213275/details/adelaar+ceann+aird+ghrein+barra+atlantic/&biblio=more>



- 3.6.5 The following morning on the Barra coast to the south, a dense tangle of rigging, debris and bodies was discovered. None survived the wrecking and the vessel was completely broken up on the reef.
- 3.6.6 A tense stand-off between the Clan Chief MacNeil of Barra and the Admiralty developed following the wrecking for control of the cargo and other salvage which involved Barra being sealed off by the local chieftain until the wreckage could be pillaged (Martin 1998). Ultimately this led to an innovative salvage scheme by the Admiralty for recovering the valuable cargo of gold and silver formerly secured in 17 chests in the wrecks hold. The Admiralty, with the support of two Wrackmen, Capt Jacob Rowe and William Evans with Captain Rowe's patented diving engine, was able to recover most of the treasure by October 1728.
- 3.6.7 The wreck site was excavated between 1972 and 1974 by the Institute of Maritime Archaeology, based at St Andrews University. Although no structure remained some of the ships guns were found. Five-types of gun were carried by the *Adelaar* and at least one example of each type was recorded. In particular a bronze 6-pounder and a swivel gun bearing the VOC cipher were recovered. Some of the vessels cargo was also discovered and excavated from the seabed. Sixty lead ingots, of four types, were recovered some possibly originating from the Bright smeltery in Sheffield. A significant number of ballast bricks were also recorded; distinctive yellow bricks often carried by East Indiamen across the Dutch colonial world for the construction of colonial houses (Parthesius 2010:108). Further metallic artefacts and materials were preserved in a large concretion which contained shot, iron tools, and nails. Of the few small finds, "a copper pan, pan-lid handles, fishing hooks, small shot of various gauges, copper bars, a pump valve, shoe and belt buckles, part of a pocket watch, a pair of dividers, glass, a single sherd of stoneware pottery, clay pipe fragments, some silver ducats, and four pieces of gold jewellery"¹⁷ were also recorded.

¹⁷ <http://canmore.rcahms.gov.uk/en/site/213275/details/adelaar+ceann+aird+ghrein+barra+atlantic/>
(accessed 20/16/2011)



HMY Iolaire

- 3.6.8 The stranding of HMY *Iolaire* (Gaelic for *Eagle*) is a keenly felt maritime tragedy¹⁸ within the living memory of Lewis and Harris. 174 men were lost from several townships in the north and west of Lewis and 7 Harrismen¹⁹.
- 3.6.9 In the early hours of New Year's Day 1919 the *Iolaire* was transporting nearly 300 Royal Navy Reserves sailors back home following the end of WWI. The requisitioned steam yacht struck the Beasts of Holm; skerries outside the mouth of Stornoway Bay. Over-loaded with passengers and without sufficient life-saving equipment over 200 were lost following the stranding.
- 3.6.10 One man, John F. MacLeod, managed to swim ashore with a line from the vessel which he eventually secured to the rocks. This allowed many of the survivors to reach safety.
- 3.6.11 The wreck is now completely broken up and has been surveyed by Navy divers. The bell and name plate were recovered and were presented to Stornoway Town Council. A memorial stands on the coast above the site²⁰.
- 3.6.12 The disaster is a prominent feature of the Lewis and Harris's modern history and is taught in schools and commemorated in exhibitions²¹.

¹⁸ The disaster has inspired songs (accessed 05/12/2011):

<http://www.tobarandualchais.co.uk/en/fullrecord/90837/3>;

<http://www.tobarandualchais.co.uk/en/fullrecord/31442/1>

¹⁹ Iolaire Disaster, Stornoway Historical Society (access 05/12/2011):

http://www.stornowayhistoricalsociety.org.uk/index.php?option=com_content&view=article&id=74:iolaire&catid=36:features&Itemid=56

²⁰ Iolaire Monument (accessed 05/12/2011):

<http://canmore.rcahms.gov.uk/en/site/268455/details/lewis+holm+iolaire+monument/>

²¹ "The Maritime Heritage of Stornoway project, Stornoway Historical Society (2007)(access 05/12/2011):

http://www.stornowayhistoricalsociety.org.uk/index.php?option=com_content&view=article&id=72:maritimeheritage&catid=36&Itemid=116



3.7 THEMATIC ASSESSMENT OF CULTURAL HERITAGE DATA

Introduction

3.7.1 Within each study area, a variety of cultural heritage data was examined to identify the array of sites with particular coastal, intertidal or maritime properties. These consist of:

- CNE-Siar SMR GIS vector datasets;
 - Point
 - Polyline
 - Polygon, vector data
- RCAHMS/NMRS GIS vector datasets;
 - CANMORE point data
 - DSP polygons for the Outer Hebrides (supplied by RCAHMS).

3.7.2 Available cultural heritage data is mapped by Study Area in **Appendix III: Study Area Mapping**.

Approach

3.7.3 This is a rapid thematic assessment and as such detailed accounts of individual sites are not developed here. The SMR has been chosen as the primary resource here as it has been enhanced by the existing gazetteers of coastal zone assessments (CZAs) including several commissioned by SCAPE and others undertaken by other researchers and offers the most focus for examining coastal and intertidal cultural heritage.

3.7.4 Obviously associated features listed as lighthouses, fish traps, wrecks or promontory forts can be identified as having *some* relation to the marine environment being use or siting exploiting a coastal promontory or islet. However, other features such as middens may lie on the coast but their contents do not necessarily relate to marine resources or activities and *vice versa*. For the purposes of a rapid feasibility study it is clear that a broad range of site types are recorded within the SMR and NMRS datasets in general but the distributions of sites are not comprehensive.

3.7.5 This assessment represents a baseline for gauging existing cultural heritage datasets relating to the project themes of **Marine Resource Exploitation** and **Maritime History & Transport**. In addition, sites and records are noted when they indicate a relationship that may inform the theme of **Submerged Prehistory Potential**.

3.7.6 Wrecks mentioned in this section derive from the SMR and are not the same dataset examined in **Section 3.5**; rather they are retained to summarise the range of thematic data available in the regions cultural heritage databases.

Study Areas

SA 1: Broad Bay, Lewis

3.7.7 **Marine Resource Exploitation** is indicated by several coastal middens which incorporate shells, human remains and artefacts of various periods. A souterrain positioned just above HWM contained shell indicating the storage of marine resources. Place names such as and *Laxdale*²² suggest salmon was a notable feature of the area during the Norse period. Kelp kilns indicate the processing of

²² Laxdale from the Old Norse for 'Salmon (*lax*) dale (*dalr*) (Darton 1996:171).



marine resources for agricultural purposes and as an export industry for many parts of the Highlands and Islands during the Napoleonic Wars.

3.7.8 There are several promontory forts indicating the strategic use of headlands and the sea coastline. Settlements of at least Norse age are recorded associated with coastal middens.

3.7.9 **Maritime History & Transport** is indicated by a number of wreck records, mainly of unknown or 19th / 20th century date. Several piers and slipways are recorded relating to marine resource exploitation and transportation. Lighthouse installations are also prominent.

3.7.10 **Submerged Prehistory Potential** is indicated by the extensive salt marsh and estuarine area of Broad Bay and the relatively strong archaeological record indicating shellfish and marine resources are important in this area (see references in Coull *et al.* 2008). Palaeoenvironmental and palaeogeographical investigations including sea level analysis and Holocene coastal evolution may be particularly productive in Broad Bay.

SA 2: Stornoway Bay, Lewis

3.7.11 **Marine Resource Exploitation** is indicated by coastal middens containing shells associated with a 'possible Broch or Dun'. Place names such as *Laxay*²³ on the north bank of Loch Erisort suggest salmon was a notable feature of the area during Norse times. Kelp kilns indicate the processing of marine resources. Fish traps and causeways are recorded in the area.

3.7.12 There are several promontory forts and fortified islets (duns) indicating the strategic use of headlands and the sea coastline. The Cromwellian island fort at Holm relating to the Fife Colonists and their mercenary force are also recorded. Clearance cairns appear clustered along the coasts (linked to concentration of human activity).

3.7.13 **Maritime History & Transport** of small and large-scale is indicated by boat nausts, piers and harbours relating to subsistence and major herring industry. Several wrecks including clinker-built (early historic to post-medieval age) examples are recorded. The wreck of *HMY lolaire* is a very significant maritime tragedy, off the Beasts of Holm. Coastal defences and batteries are also recorded. A substantial number of unknown, 19th / 20th century wrecks are concentrated around the harbour

3.7.14 **Submerged Prehistory Potential** may be indicated by prehistoric chambered cairns adjacent to the current coast. The richness of the prehistoric record may also be indicated by finds of carved stone balls from the area (one being of very high quality). Stone circles are reported on smaller islets indicating a focus of prehistoric human activity.

SA 3: Loch Sealg, Lewis

3.7.15 There are relatively few cultural heritage entries for Loch Sealg, to date there have been no significant coastal zone survey activity in the area. **Maritime History & Transport** is indicated by a wreck record. There is also a record of a possible dun on an islet.

²³ Laxay from the Old Norse for 'Salmon (*lax*) island (*ey*)' (Darton 1996:171).



SA 4: Loch Seaforth

- 3.7.16 **Marine Resource Exploitation** is indicated by several records of dams / fish traps / causeways. A smokehouse is also recorded indicating processing and storage of marine resources. Kelp kilns are also recorded.
- 3.7.17 **Maritime History & Transport** is highlighted by nausts and piers/slipways and the wreck of the 19th century *Johann Benjamin*²⁴ that collided with Seaforth Island.
- 3.7.18 **Submerged Prehistory Potential** may be indicated by prehistoric activity adjacent to the current shoreline: occupation sites recorded under blanket peat and a porcellanite axe recovered from between the peat / substrate interface, a lithic working site at the head of a stream entering the loch. An exposure of 'petrified tree stumps'²⁵ directly above the high water mark is also reported from the north-east banks of the loch (Burgess 2004).

SA 5: East Loch Tarbert, Harris

- 3.7.19 **Marine Resource Exploitation** is indicated by post-medieval lobster ponds at Scalpay. There are also records of the herring fishing station there.
- 3.7.20 An island dun highlights the use of coastal topography for siting structures.
- 3.7.21 **Maritime History & Transport** is highlighted by nausts, piers and slipways. There is a monument commemorating drownings in the mid-19th century. Several wrecks of varying positional quality and dating evidence are recorded in the loch. There is a post-medieval foghorn recorded at Scalpay.
- 3.7.22 **Submerged Prehistory Potential** may be indicated by flint arrowheads recovered from the north-west embayment of the loch in 1903.

SA 6: "The Bays", Harris

- 3.7.23 **Marine Resource Exploitation** is indicated by piers. A cliff top dun and possible crannog on an islet near Rodel highlights the use of coastal topography for siting structures.
- 3.7.24 **Maritime History & Transport** is highlighted by five wreck records.
- 3.7.25 Again, there has been little in the way of data enhancement to the HERs from coastal zone assessments in this study area highlighted by the low numbers of records from a relatively large spatial area: i.e. 50 records (of all kinds) in just over 100 km² in the CNE-Siar SMR.

SA 7: Sound of Harris

- 3.7.26 **Marine Resource Exploitation** is strongly indicated in this area. At least 10 bait holes (cup-marked stones) cut into coastal rocks near high tide are recorded along the Harris coast of the Sound. The historical herring industry at Leverburgh is highly significant. Fish traps and middens indicate fishing and processing of a range of species during a range of periods including early prehistory.
- 3.7.27 Viking burials reported on islets (and possibly cists located on cliff tops and several burial cairns at the coast) and promontory enclosures indicated coastal topography

²⁴ <http://www.cne-siar.gov.uk/smr/SingleResult.aspx?uid=MWE147611>;
<http://canmore.rcahms.gov.uk/en/site/217565/details/johann+benjamin+eilean+shiphoir+loch+shiphoirt+lewis+north+minch/> (access 13/12/2011).

²⁵ <http://www.cne-siar.gov.uk/smr/SingleResult.aspx?uid=MWE144643> (accessed 13/12/2011).



as being significant for siting of structures. Several duns also appear to be sited in proximity to the coast.

3.7.28 **Maritime History & Transport** is highlighted by piers and harbours, and several boat nausts. Several wrecks are reported from the area of varying positional quality. The area is of fairly complex bathymetry and the potential for unknown/un-located wrecks may be quite high.

3.7.29 **Submerged Prehistory Potential** may be indicated by the considerable time-depth of human occupation in the area, especially around Northton which appears to have evidence of most periods of activity since the Mesolithic onwards. The substantial range and number of immediately coastal sites such as bait holes may indicate the area as a hotspot for prehistoric activity – however the preservation of cultural material and Holocene sediments is less certain in submerged coastal contexts.

SA 8: Lochmaddy, North Uist

3.7.30 **Marine Resource Exploitation** evidence from the SMR is relatively scarce in this area, perhaps only indicated by abandoned townships with harbours or dykes that extend into the intertidal zone which may relate to fishing activities.

3.7.31 There are several prehistoric sites situated within the context of coastal topography including several duns on small islets or promontories.

3.7.32 **Maritime History & Transport** is indicated by only two wreck records and the abandoned township with harbour. Indirectly the reporting of Roman coins may suggest wider links outside the islands which must have included the crossing of the sea in some respect.

3.7.33 **Submerged Prehistory Potential** may be indicated records of a long cist and a possible chambered cairn close to or within the intertidal zone; indicating that early prehistoric structures have become inundated by rising sea levels. The highly complex and shallow network of waterways in Lochmaddy may provide pockets of preservation of *in situ* submerged terrestrial deposits. Their contemporary coastlines being submerged in the shallow nearshore²⁶.

SA 9: Loch Eport, North Uist

3.7.34 **Marine Resource Exploitation** may be indicated by a dished rock / cup-marked stone near the loch side used for pounding, crushing and storing bait.

3.7.35 A dun is also situated on a promontory indicating coastal topography may be a consideration for siting structures.

3.7.36 **Maritime History & Transport** is indicated by 3 wreck records of 19th – 20th century date.

SA 10: North Baleshare, North Uist

3.7.37 **Marine Resource Exploitation** may be indicated by cup marked stones which may actually be bait holes relating to shore-based fishing practices and various intertidal structures which may be fish traps. Several fish traps both individual and complexes of them are recorded in the area around Carnach and Samala. A kiln possibly for kelp is also recorded. Several middens with a variety of artefacts and materials from a range of periods from at least Norse (possibly Iron Age) times are recorded.

²⁶ The region is illustrated by Comann na mara: <http://www.comann-na-mara.org.uk/lochmaddy-bay/> (accessed 6/12/2011).



- 3.7.38 Roman coins are also reported indicating links out with the islands in some form (a direct link is not assumed). Some duns and forts are situated on islets and promontories.
- 3.7.39 **Maritime History & Transport** is clearly shown by a boat yard for the construction of 'Grimsay boats' (19th century). There are numerous nausts, harbours, slipways and piers perhaps reflecting the expansive estuarine and islets environment of the area. Seven wrecks of varying positional quality are recorded.
- 3.7.40 **Submerged Prehistory Potential** is indicated by a reported find to OHCCMAPP from Grimsay of two flint pebbles recovered from a very low tide in the intertidal zone. There are possible flake scars on both pieces; with one in particular exhibiting a striking platform and at least three distinctive flake scars (**Plate 1**).
- 3.7.41 As noted during the October expedition, the peats exposed on the beach at Paible (**Figure 7, Plate 3**) indicate the preservation of old terrestrial sediments – in the case of this peat it has been used as an indicator of past sea level (Ritchie 1985, Shennan and Horton 2002) which is an important research question for the future. The proximity to the coast begs the question whether further peat is preserved within the intertidal zone or further offshore, and whether they contain artefacts, structures and deposits of archaeological interest. Certainly adjacent to the peat exposures were the remains of a cist which had been destabilised by erosion leaving only the large stones in a loosely associated pile on the foreshore²⁷.
- SA 11: Bàgh nam Feoilainn, North Uist**
- 3.7.42 **Marine Resource Exploitation** may be indicated by coastal middens although there are few details on their contents. These structures are associated with historical farmsteads and Iron Age wheelhouses. There is also a soutterain on the coast.
- 3.7.43 Several later prehistoric structures are positioned at the coast with a variety of undated walls and enclosures similarly located defining the coast.
- 3.7.44 **Maritime History & Transport** is represented by nausts, slipways, piers and jetties around the study area indicating historical and modern importance of seaways in this complex network of islets and shallow marine environments. There are at least 5 wreck records in the area including one suggestion of a *birlinn* or west highland galley; clinker-built vessels developing from medieval times of which there are only pictorial representations and written descriptions, but presently no confirmed physical remains (Rixson 1998).
- 3.7.45 **Submerged Prehistory Potential** is highlighted by a chambered cairn near to the coast perhaps denoting the Neolithic as the transitional period for submerged and non-submerged prehistoric archaeology.
- SA 12: Loch Boisdale, South Uist**
- 3.7.46 **Marine Resource Exploitation** records are absent specifically however from APs of the area indicate good potential for a possible fish trap associated with the cleared township of Beinn Ruigh Choinnich in the intertidal zone in the northernmost embayment to the north of the modern town.
- 3.7.47 Additionally the AP reconnaissance flights undertaken as part of this project in early November 2011 have clearly located a complex of at least 5 intertidal structures

²⁷ <http://www.cne-siar.gov.uk/smr/SingleResult.aspx?uid=MWE148312> (accessed 14/12/2011).



radially constructed in a smaller inlet to the southeast of Loch Boisdale, centred on a small islet within the marine embayment of Hartavagh to the north of the Township²⁸ (Plate 7).

3.7.48 **Maritime History & Transport** is more clearly recorded in a parted anchor and wrecks of at least 3 vessels in the harbour approaches of post-medieval, 19th century and 20th century date as well as the modern pier.

3.7.49 **Submerged Prehistory Potential** no SMR records indicate a specific submerged prehistoric potential however the variable and shallow bathymetry and sedimentary environments within the loch may have the potential to preserve material of archaeological interest.

SA 13: Bruernish, Barra

3.7.50 **Marine Resource Exploitation** is indicated by several kelp kilns, the remains of kelp factory and an oven possibly for processing kelp. At least 5 middens are recorded containing shells; one includes a fossil of Jurassic age which is likely to have originated in Skye. Some of these middens are directly associated with later prehistoric wheelhouses. Causeways are also recorded; features which may have multiple purposes including as fish traps.

3.7.51 Several later prehistoric structures appear to have been positioned on promontories or islets, utilising the coastal topography.

3.7.52 **Maritime History & Transport** is indicated by a slipway and a naust. Five wrecks are recorded of unknown, post-medieval, 19th century and 20th century date. There are several references to Viking cultural material and structures such as coins and a church reminding us of the theme of cultural influx to the islands by sea over the millennia. The likely post-medieval wreck of probable Dutch origin (c.1500 - 1650) discovered in the north beach at Fuday and preliminarily examined on behalf of Historic Scotland (Headland Archaeology 2008) indicate the potential for hulks to be well preserved within coastal sediments for considerable periods of time.

3.7.53 **Submerged Prehistory Potential** is not specifically indicated by existing SMR data. However, reports to OHCCMAPP from the community of exposed peats at beaches around north Barra as well as possibly prehistoric cists exposed on eroding beaches may indicate potential for deposits of archaeological interest and future research priorities.

SA 14: Castle Bay, Barra

3.7.54 **Marine Resource Exploitation** is highlighted by several kelp kilns in the area indicating the collection and processing of marine resources. A substantial fish trap in Cornaig Bay is recorded, and was recently photographed during the October 2011 expedition for OHCCMAPP.

3.7.55 Several later prehistoric structures appear positioned overlooking seaways or on the coast. Additionally there are several glacial erratics that seem to have been used as rock shelters in the area, these kinds of structures appear to have been used until relatively recently as shelters for shepherds but may have been used earlier periods.

3.7.56 Cup-marked stones within the Sound of Harris study area appear to have a stronger connection to bait holes than being decorative. A cup-marked stone recorded in

²⁸ <http://canmore.rcahms.gov.uk/en/site/126023/details/south+uist+hartavagh/>; <http://www.cne-siar.gov.uk/smr/SingleResult.aspx?uid=MWE126023> (accessed 13/12/2011).



Castle Bay is described as probably being natural erosion; however a general theme of data enhancement for these kinds of site-types could usefully involve identifying 'cup-marked stones' that are related to bait preparation and fishing practices.

3.7.57 **Maritime History & Transport** is clearly highlighted by the two 19th and 20th century herring industry docks at the west and east sides of Castlebay. Unrecorded nausts and a hulk were noted by AH on the beach at Cornaig. At least 10 wrecks are recorded in the SMR dating to at least the 19th century with several of unknown date.

3.7.58 **Submerged Prehistory Potential** may be indicated by a chambered cairn overlooking Cornaig Bay reinforcing the missing coastal context of Neolithic archaeology in the region. There are also cists preserved on the modern coast.

Additional Study Area - SA 15: Loch Eynort, South Uist

3.7.59 Loch Eynort has had coastal zone assessment within it, with most SMR records clustered on the north banks around the modern settlements. Few of them are related to the themes of this project; however local contacts have provided additional information on marine resources and history within the loch area. These include several fish traps and potentially an unrecorded fishing station of post-medieval date. There are several isolated basins within the study area that may prove to be valuable locations for palaeoenvironmental sampling.

Additional Study Area - SA 16: Loch Roag, Lewis

3.7.60 The Loch Roag area and associated network of marine lochs is a primary region for early prehistory in the Islands. Substantial research has also taken place throughout the 20th century and the region is well-served by a variety of landscape and coastal surveys which have enhanced the SMR (**Table 1**). As such there are well over 1500 SMR entries within the SMR in proximity to the coasts around East and West and Little Loch Roag and associated smaller sea lochs.

3.7.61 **Marine Resource Exploitation** is indicated by numerous intertidal structures with a variety of purposes such as stepping stones, causeways, several fish traps and breakwaters; these features may have more than one use. An interesting feature of the scheduled yair at Dun Barraglom is that it is a continuation of the boundary dyke which extends on land potentially indicating multiple uses as resource exploitation and boundary delineation although it is not certain whether the yair is contemporary with the other land-based structures adjacent to it.

3.7.62 There are fish processing sites at Valtos and great Bernera. Lobster ponds are recorded in several locations and are well-preserved with fish traps within the interior lagoons on Pabbay Mhor, remembered by a local contact now working in the fishing community. Kelp kilns are recorded from Bostadh.

3.7.63 Several middens are recorded along the coast at Valtos at the back of the modern beach which have been investigated for their contents. A Mesolithic-aged midden deposit is also being examined by Durham University (**Plate 15**).

3.7.64 Cup-marked stones are recorded around Great Bernera and the east of the study area – examining these as possible baiting places would be useful data enhancement.

3.7.65 Caves are a notable feature of the island Pabbay Mhor of which are recorded as having a significant depth of deposit within them and potential for Early Prehistory.



- 3.7.66 **Maritime History & Transport** is clearly highlighted by numerous slipways, harbours, piers and landing stages in the area. Lighthouses and cottages at Laimishader and Breasclete. Wartime coastal defences, radar station and pillboxes are recorded. Nausts are also frequently recorded. There are seven wrecks dating from the post-medieval period to more recent times, from barques to luggers.
- 3.7.67 **Submerged Prehistory Potential** is partly suggested by the substantial early prehistoric record in the area but also the by preservation of considerable peat deposits preserved within intertidal areas such as Loch Ceann Hulabhigh and reports of submerged trees in some of the smaller inlets on the south coast (**Figure 7, Plate 4**).
- 3.7.68 A notable concentration of quarries is reported in this area, recorded by the various coastal zone surveys that have occurred in recent years. Modern and post-medieval quarries are present however two prehistoric quarries are noted; at Rubh'a Scarp and Cnoc Dubh. The latter is located in the south-east of the area slightly inland from the coast and has been investigated by Ballin (2004). This particularly quarry is a broad vein of quartz within a larger outcrop and is important as a source of local prehistoric lithic raw material for the Islands. Other worked veins have also been located, some as thin as 10-20 cm (Ballin pers.comm. 2011). Generally under-represented in the archaeological record due to difficulties of identification of work pieces (Ballin 2008), there is considerable scope for future work into establishing prehistoric economy including marine resources and associated technology which must include both natural resources such as wood and other plant material, animal resources and lithic technology and sources.

Further themes

- 3.7.69 One theme not developed here but which is related to the use of the wider landscape surrounding the sea lochs is the relationship between the numerous later prehistoric island dwellings within freshwater lochs and the adjacent marine environment (Lenfert 2011).
- 3.7.70 For example, in the Bàgh nam Feoilainn, study area there is a dun at Loch an Daill, Ardmore in an adjacent freshwater loch, the causeway is noted to be in particularly deep water. One question related to climate change is the relationship with these island dwellings and their causeways to lake level (Harding 2007). Is the water depth over the causeway a result of rising lake levels driven by climate and/or anthropogenic modification to the catchment? In this case the freshwater catchment of this loch would appear to be modified perhaps recently a narrow connection to the tidal flats at Ardmore being cut off with the building of the road damming the loch behind and raising the water level.
- 3.7.71 There are other examples of freshwater lochs and lochans that may have been marine environments in the past but have been cut off by anthropogenic or natural processes such as damming or silting up of narrow confluences.
- 3.7.72 For the purposes of locating submerged prehistoric sites the cessation of tidal influence and associated erosion may not be as severe in these now isolated locations. Investigating the distribution of these isolated basins would be a priority for future research seeking to maximise the preservation of prehistoric material in submerged contexts.
- 3.7.73 These kinds of questions are important for fully contextualising the marine and terrestrial watery environments so dominant in the landscape and utilised by people throughout all archaeological periods in the Islands.



SECTION III: RESEARCH THEMES



4 MARINE RESOURCE EXPLOITATION

4.1 INTRODUCTION

4.1.1 Within the range of cultural heritage database features with a thematic link to marine resource exploitation, middens and soutterains offer the greatest potential palaeoenvironmental resource. Across the islands many of these types of palaeoenvironmental repositories have been analysed for their fish and shellfish contents (Cerón-Carrasco, Bonsall, Stone 2006²⁹). Key species from these sites are also summarised in the MRR (**Section 4.4**).

4.2 COMMUNITY REPORTS OF 'FISH TRAPS'

4.2.1 Interviews during the October expedition contained significant details on marine resource exploitation. *JJM* and *CR* recalled memories of their relatives as far back as 1905 who lived and worked as fishermen tied closely into the community. For example, *CR*'s grandfather built and worked an intertidal wall designed for multiple purposes in 'The Bays', Harris that was not previously recorded in the cultural heritage databases (**Plate 6**). The wall was designed for gathering lobsters from between the gaps in the boulders and mussels from the rocks themselves. The sturdiness of the structure also meant it was used as a causeway at high tide.

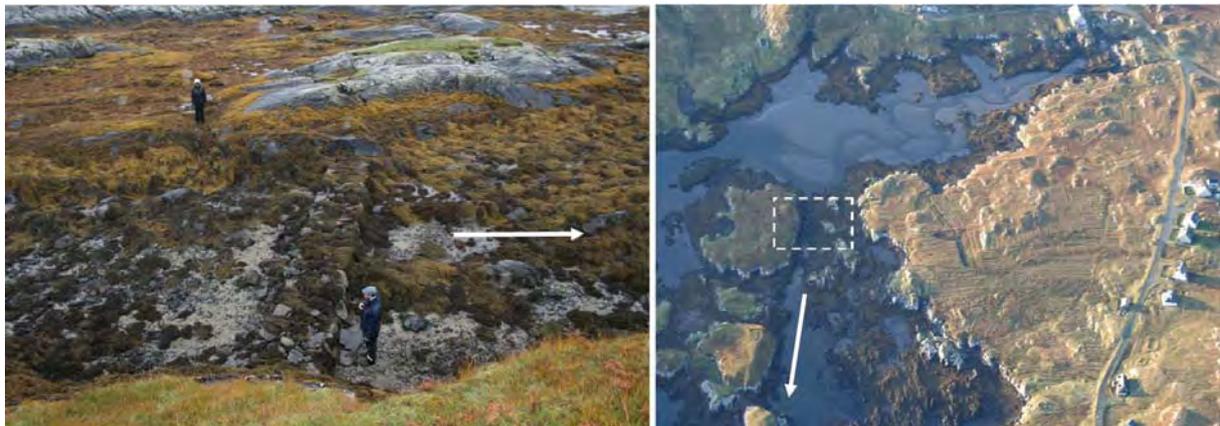


Plate 6: A multi-purpose wall constructed between two islets in 1905 by the grandfather of an interviewee in the south of the Bays area of Harris (SA 6) (**WA_1014**); the direction of the ebbing tide is shown by the arrow, perpendicular to the construction of the wall (© A. Hale RCAHMS 2011, AP by J. Benjamin © WA C&M 2011)

4.2.2 This kind of local knowledge is a key resource for enriching relatively sterile cultural heritage vector data, and anomalies identified from APs and should be developed as a key component of enhancing the investigation of intertidal structures and marine resource exploitation.

4.3 TYPOLOGY OF INTERTIDAL STRUCTURES

4.3.1 Before a consideration of the various typologies is undertaken, it should be noted that like the majority of vernacular structures, fish traps are no different inasmuch that they are constructed out of the available resources, designed to be fit-for purpose, 'organically' built and developed, regularly maintained and re-built, and

²⁹ 32 sites are collated from the Outer Hebrides [Search by location = 'Western Isles'] by Cerón-Carrasco, R., Bonsall, C., and Stone, D.J.W. (2006) 'MARES - an archaeological database of Marine Resource Exploitation in Scotland', <http://webdb.ucl.ac.uk/mares/> (accessed 06/12/2011).

positioned where familial knowledge has defined an appropriate position. This leads them to be different from site to site, undeniably unique, widespread and a clear indication of the procurement of marine resources, potentially over a long period of time.

4.3.2 During this initial stage of the project 11 sites identified as fish traps have been documented with at least 15 features between them (the site at Eiean na Cairidh, on Loch Eport appears to have at least 5 features visible in the RCAHMS 25cm resolution AP collection (**p97**).

4.3.3 Identifying yairs or fish traps (Bathgate 1949) structures in Scotland have been discussed by SCAPE (Dawson 2004) using a typology developed from Bannerman and Jones (1999). At first glance it would appear that many of the intertidal structures observed from APs and investigated on the ground around the Islands are similar to a range of types outlined these studies. As an initial means of grounding the form of identified intertidal structures within the existing literature the typology of Bannerman and Jones (1999) has been used below. This typology is not fully representative of intertidal features in the Outer Hebrides which is highlighted in the discussion below.

Type 1: natural feature adapted as a trap

4.3.4 The features radially constructed around a small islet at the head of Hartavagh³⁰, South Uist (**Plate 7**) from the November 2011 AP flights have been noted as a priority for subsequent field expeditions (**Appendix II: Gazetteer, p97**).

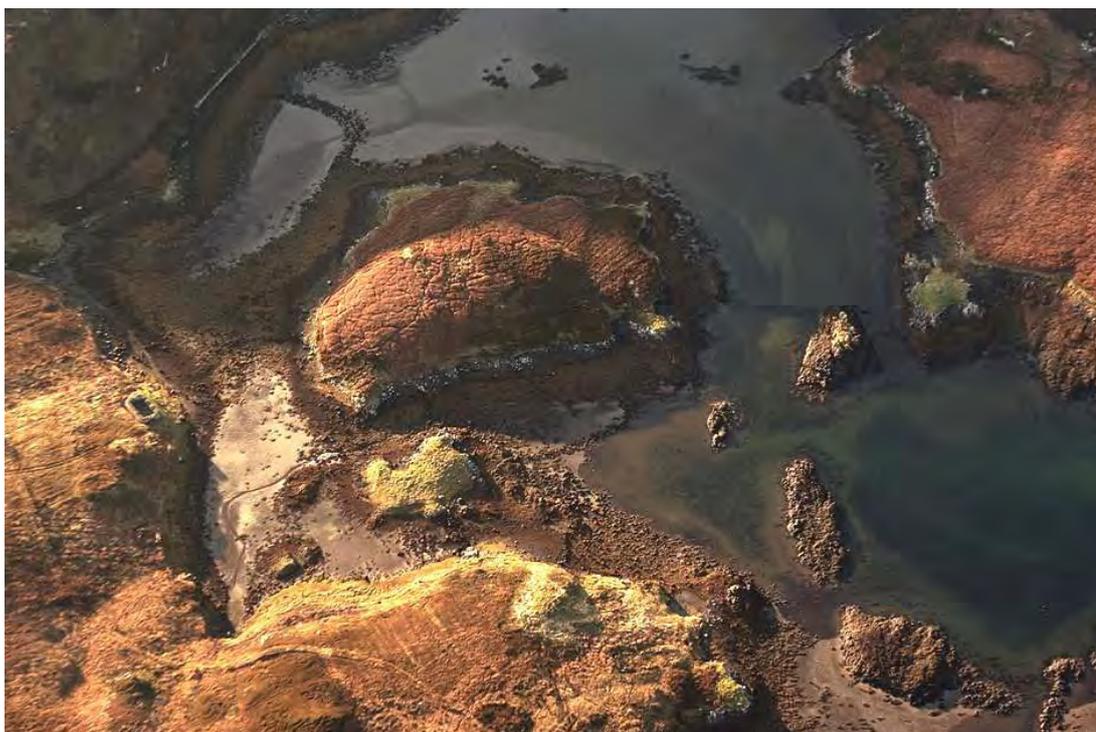


Plate 7: A complex of intertidal structures south east of Loch Boisdale at the head of Hartavagh utilising the variation in the intertidal topography to full advantage

³⁰ See the site in 3D here: <http://blogs.wessexarch.co.uk/OHCCMAPP/2011/12/19/hartavagh/> (accessed 20/12/2011).

Type 2: semi-permanent wattle and wood trap

- 4.3.5 Types 2 (or any wooden elements of any form of fish trap) have not been observed through the limited field visits are less likely to be observed from aerial photography unless very well preserved above the seabed. These kinds of structures are likely to be present and should form a component of any future study.

Type 3: modified natural feature trap

- 4.3.6 Type 3 features are similar to Type 1, utilising the topography of channels and inlets but are distinguished by more solid, permanent construction (Dawson 2004).

- 4.3.7 The 'yairs' within the scheduled area of Dun Barraglom, Great Bernera, could be categorised as a Type 3 feature (as opposed to Type 1) on the basis of their enduring stone structure (Dawson 2004).

- 4.3.8 However, it is notable that the 'yairs' are a structural continuation of the land-based dyke. A compelling hypothesis is that these are not intertidal fish trap structures at all but have become inundated perhaps by rising sea level or a change in the nearshore coast or some other process. Although the RSL data is scant, there is some suggestion that RSL has risen around 0.5 m during the last 2000 years (Jordan *et al.* 2011)³¹. Were these yairs/dykes just delineating the mouth of the stream?



Plate 8: The scheduled yairs (Type 3) at Dun Barraglom, Great Bernera; possibly Iron Age; the intertidal structures appear to be continuations of the land-based dyke

- 4.3.9 Extended dykes which may have not have a primary function as a fish trap (although mussels growing on the stones may be a useful resource) are noted from other locations in the Islands (**Plate 9**).

³¹ See Figure 12, p73.



Plate 9: Dyke extending around the coast and intertidal area at in North Uist (RCAHMS AP taken during OHCCMAPP flights November 2011, RCAHMS ID: DP109589)

Type 4: crescent-shaped

- 4.3.10 Features resembling this type are also notable on APs; however, this form may be due to the contours of the inlets and basins some are constructed in, rather than being aligned on open coasts with relatively shallow gradients as in the diagrammatic representations (Dawson 2004, Bannerman and Jones 1999).
- 4.3.11 Types 1,3 and 4 appear to utilise a common feature which is to use the structure of the trap to define a pool of water, contained during the ebbing tide within which the fish collect and can be removed by nets or other means.

“Hebridean Type 4”: a distinctive type

- 4.3.12 A notable type of intertidal structure perhaps not covered fully in this typology (Bannerman & Jones 1999; Dawson 2004) are the crescent-type walls, ponding the heads of inlets or channels (e.g. Cornaig Bay, Vatersay³²) (**Plate 10**) that abuts both banks with the apex of the curvilinear wall extending seaward of the landward ends (**Plate 11**).
- 4.3.13 These “Hebridean Type 4”, coined here, do not appear to have an opening at one end³³, although some examples appear to have a gap or sluice at the apex e.g. the Cornaig Bay example. These structures may have been designed to be overtopped by the rising tide or have a wattled or netted upper that had apertures for fish to enter but that were contained at the low-tide by the stone wall, or they are designed more for crustaceans and shellfish and are ‘ponds’ rather than tidal fish traps.

³² <http://www.cne-siar.gov.uk/smr/SingleResult.aspx?uid=MWE143027>

³³ See Bannerman and Jones 1999, Figure 10.



- 4.3.14 From local sources, at least some intertidal structures are purposefully designed to be multi-purpose; both in terms of the species sought (various shellfish, crustaceans and fish species) as well as serving as causeways (**Plate 6**). In the Great Bernera area in Loch Roag, the term 'lobster pond' is often used, with ethnographic reports of such features from Pabbay Mhor (clearly visible from the air), and from recorded in the HERs in Great Bernera itself (**paragraph 3.7.62**), and structures specifically described as 'salmon traps' have also been noted.



Plate 10: Fish trap at the head of Cornaig Bay, Vatersay (RCAHMS AP taken during OHCCMAPP flights November 2011, RCAHMS ID: DP109554. A smaller curvilinear feature may be seen inside the larger 'Hebridean' Type 4 feature



Plate 11: 'Hebridean' Type 4 feature in East Loch Roag, near Calanais

Type 5: rectilinear trap

- 4.3.15 Rectilinear structures of Type 5 (Bannerman and Jones 1999) have been observed from the air at Northton on the Atlantic coast of Harris within the head of the estuary, fringed by the salt marsh cored by Jordan *et al.* (2010) (**Plate 12**). These types of structures are also clearly illustrated by Bathgate in an early discussion on Scottish yairs espousing their lack of study (1949).



Plate 12: Rectilinear fish trap (Type 5: Bannerman and Jones 1999) at Northton, Harris



Landscape Context

- 4.3.16 Given the predominantly rocky, indented nature of the Outer Hebrides coastline and intertidal zone, the fish traps found along the coast comprise certain features dictated by their physical setting. For example, they are invariably found at the mouths of freshwater rivers and streams, perhaps to take advantage of the enhanced environmental conditions that the mixing of fresh and saltwater sources generates. The stone remains comprise worn, beach boulders that are piled up to create 'walls' within the intertidal zone. Clearly, over time these have collapsed (and in some case been re-built) and in at least one example (Cornaig Bay, Vatersay) there appears to be more than one phase of trap (see **Plate 10**). Fish traps are built on relatively level intertidal surfaces, comprising predominantly sandy sediments. As tidal change occurs the traps fill and empty, relatively slowly and hence recording their presence and form can be studied over a significant periods of tide-level.
- 4.3.17 Their proximity to habitation sites, and hence their landscape setting is of interest, when it comes to connecting fish traps to a wider socio-economic function. They are situated within close proximity of recent habitation sites and can often be found associated with pre-Improvement and later period settlements. This relationship suggests that they were built within easy reach of habitation sites, to provide a ready supply of marine resources, primarily designed to trap fish on ebbing and flowing tides, they also provide habitats for mussel colonisation and in some cases lobsters and crabs inhabit the interstices, within the structures. Finally, recent aerial photography survey across the Highlands of Scotland has suggested that some fish traps are positioned specifically dependent on land-holding divisions. For example, fish traps recently recorded on Skye are built to mirror the land divisions of crofting townships around Loch Snizort (A. Hale pers comm)

Further work

- 4.3.18 There is clearly a range of intertidal structures preserved within the Islands that can be categorised and that would benefit from concentrated study. Ethnographic accounts are invaluable for enhancing the investigation of these features, especially within the last century and perhaps beyond from folk narratives.
- 4.3.19 Other types of fish trap such as the 'S' and the 'V' types³⁴ and various basket and wattle types of traps have not been identified from the air which is likely to be better suited to picking up the more robust stone-built structure. Type 2 features with a largely wooden construction are also likely to have a different signature if they are visible on APs and none have been clearly identified from this preliminary survey. Wooden features especially driven stakes may still be preserved in coastal silts or are more visible at low-tides.
- 4.3.20 There is then significant value for combining extensive AP assessments with CZA surveys incorporating significant time in the intertidal zone. This may be especially valuable in east coast areas yet to be examined in detail.
- 4.3.21 A number of questions arise for understanding these intertidal structures, including:
- How old are yairs?
 - Are they contemporary with their surrounding archaeology or built heritage?
 - Are they a major component of subsistence strategies?
 - What is the working relationship between the yair and relative sea level / tidal range?

³⁴ V-shaped yairs are prevalent in other areas of Scotland (Dawson 2004), late medieval Ireland (Sullivan & Breen 2007:173-179) and Wales (Bannerman & Jones 1999).



4.4 MARINE RESOURCES REGISTER (MRR)

- 4.4.1 Summarised, published inventories of marine and coastal species in the Outer Hebrides (and Scotland where required) are compiled below by period (**Table 16**). The list is not exhaustive and is aimed at being updated and expanded over time.
- 4.4.2 A key issue for interpreting sources of marine resource exploitation (middens, souterrains etc) are the technological connotations of how human groups obtained their food. This is especially so for marine resources from early prehistory which may imply fishing in deep water or offshore location (Pickard and Bonsall 2004). It is therefore feasible that species that have been sought in more recent times using boats and long lines and nets could in the past also be retrieved occasionally from shallow water requiring less advanced methods (*ibid.*). Therefore the presence of offshore species in the Mesolithic midden deposits at Northton such as Cod may not be surprising.
- 4.4.3 Technology and practices are also summarised in the MRR (**Table 16**).
- 4.4.4 Other sources of food and raw materials such as marine mammals (cetaceans & seals), birds, rodents and plants are discussed. The hunting of whales is unlikely in early prehistory but as recent events highlight, there is a relatively frequent occasion of strandings of individual large whales on the beaches of the archipelago³⁵.
- 4.4.5 Seals are a significant element of the marine wildlife of the region with Grey seals apparently concentrated on the open Atlantic west coasts and smaller Harbour seals preferring the more sheltered inlets of the east coast³⁶. There are distinctive patterns of behaviour between the two species and times when one or other species is more concentrated on the coasts; which may have connotations for human exploitation in the past.
- 4.4.6 Grey seals breed during the autumn, from September on rocky and sandy remote locations. The females moult in late winter (January/February), whilst males moult later during late-winter/early spring (mid-February – early April (*ibid.*)).
- 4.4.7 Harbour seals are a more inshore species with a more limited feeding range than Grey seals. They breed in summer (June). During the moult in late summer (August/September) they spend a lot of time on land as their new coats develop.
- 4.4.8 Such seasonal patterns may provide parameters for modelling when these species may be more accessible to early hunters (**Section 6**). The presence of Grey seals during the winter months could be argued to provide a high-calorie resource for hunter-gatherer-fisher groups during the Mesolithic period permitting a year round presence.
- 4.4.9 Although a marine focus is maintained here the abundant distribution of freshwater lochs, lochans, rivers, streams, springs and brackish estuaries adjacent to the marine environment across the Islands are critically important features of the landscape and human record. More extensive literature review of these links is envisaged for the second stage feasibility study in 2012.

³⁵ 'Whale stranded on South Uist beach dies' (BBC 5th October 2011: <http://www.bbc.co.uk/news/uk-scotland-highlands-islands-15181431>) (accessed 06/12/2011).

³⁶ SNH: <http://www.snh.gov.uk/about-scotlands-nature/species/mammals/marine-mammals/seals/> (accessed 06/12/2011).



- 4.4.10 Boats are clearly a key element of marine resource exploitation increasingly from prehistory towards medieval time. This is discussed in **Section 5**.
- 4.4.11 Historically, kelp kilns for processing seaweed into fertiliser (structures fairly commonly recorded in the cultural heritage data), boat building, fishing and supporting industries dominated the coastal landscape of the Islands, peaking in the 19th and declining through the 20th centuries, respectively (Coull *et al.* 2008).
- 4.4.12 Ethnographic sources highlight fishing as an industry, but also as a community activity. Shielings, for example, take on a particularly fishing angle, being used in the summer for community fishing expeditions that brought people from different areas together³⁷, the materials for maintaining the shielings being brought with them³⁸.
- 4.4.13 Subsistence fishing technology is recorded as using horse hair for fishing line and willow or pine for the fishing rod³⁹; the wider land-based economy providing raw materials for coastal subsistence activity.
- 4.4.14 These elements are summarised in **Table 16**. Further sources are being sought for 'medieval' marine resource exploitation for the medieval period not specifically outwith the Norse period.

³⁷ <http://www.tobarandualchais.co.uk/en/fullrecord/196/1> (accessed 14/12/2011).

³⁸ <http://www.tobarandualchais.co.uk/en/fullrecord/7633/16> (accessed 14/12/2011).

³⁹ <http://www.tobarandualchais.co.uk/en/fullrecord/37406/1> (accessed 14/12/2011).



Period	Fin fish	Shell fish	Mammals	Birds	Other species	Technology / Notes	Sources
Mesolithic	Herring, Cod, Whiting, three-bearded rockling, Mackerel, Corkwing Wrasse. Salmon (Carding Mill Bay II, Oban)	Molluscs??? Limpet, periwinkle , scallop, razorshell, dogwhelk , topshell, oyster, mussel , otter shell, carpet shell, barnacle, crab/lobster (Sand, Applecross; An Corran, Staffin)	?Otter, ?Seals	Great Auk,	Hare, Otter, Vole (Northton). Hazelnut (roasted). [Lesser Celandine , Crab Apple, < cleavers, vetch, dock, ribwort, plantain, sedge, bur-reed, bluebell, knotted sea wrack (Colonsay)]	Shallow & nearshore (within 200m? of coast) fishing, shellfish collection from intertidal zone, fowling and hunting/scavenging of small terrestrial mammals. Hazelnut scrub forest key plant resource w/tubors, vitamin C-rich plants important too. Pickard & Bonsall (2004) argue that all these fish species could be caught from the shore or shallows on occasion and does not require deeper water technology	Gregory <i>et al.</i> 2005; Hamilton Dyer <i>et al.</i> 2005; Hardy & Wickham-Jones 2002, 2008; Milner (2008a&b), Pickard & Bonsall (2009). Bartozweiski <i>et al.</i> 2010. Pickard & Bonsall 2004
Neolithic	Congor Eel, Shark, Ray, Eel, Saithe, Ling, Rockling, Ballen Wrasse, Flounder, Turbot, Halibut	Some evidence of shellfish in Megalithic tombs in W. Scotland. Some isotopic evidence on skeletons suggesting some marine diet but rapid uptake of mainly agricultural foods dominates.		Gannet, Shag, ?Herring Gull, Guillemot, Puffin, ?Blackbird, [Northton]	?Seaweed for manuring?		McCormick & Buckland, In Ralston & Edwards 2003; Schulting 2002,
Bronze Age	EBA (Northton) Conger Eel, Cod, Ling, Ballen Wrasse LBA & EIA (Baleshare): Conger Eel, Cod, Ling, Shark, Tope, Angel Shark, Cod , Saithe, Ling, Pollack, <i>Gadoid</i> . Hake , Ballen Wrasse, Mackerel, Flatfish/Plaice/Flounder.		Red deer introduced – developed to be upto 50% smaller.	EBA: Gannet, Cormorant, Shag, ?Stork , Redshank, ?Little Auk, Great Auk, Guillemot, Puffin, Fieldfare, ?Raven [Northton].	EBA (Northton) Red deer as prevalent as domesticated species in middens.	Parker Pearson, “ <i>despite the quantities of limpets and winkles, little marine-derived protein was being consumed by Bronze Age individuals.</i> ” SAIR 48: 71.	McCormick & Buckland, In Ralston & Edwards 2003; Mulville <i>et al.</i> , (2009). Griffiths & Ashmore (SAIR 48, 2011)
Iron Age	Cod, Gadoid , Hake (Howe), Conger Eel, <i>Salmonid</i> , Whiting, Norway pout, Saithe , Rockling, Garfish, Stickleback, Sea Scorpion , Bullhead, Scad, Corkwing Wrasse , Wrasse, Plaice/Flounder, Sole, Crab.		Red deer	Fulmar , Manx Shearwater, Gannet, Cormorant, Common scoter, ?Wigeon, Mallard, Greylag Goose, Whooper Swan, Crane, Dunlin, ?Redshank, ?Greenshank, ?Herring Gull, Great Auk, Puffin, Song Thrush/Redwing, <i>Thrush</i> , Starling (Baleshare) Gannet, Cormorant, Golden Plover, Great Auk, Red Grouse (@ Howe in LIA)		Nearshore and deep-water fishing. Fowling and egg collection. In Orkney, Barrett & Richards suggest from stable isotopes that marine foods were not dominant until end of 1 st millennium AD most in Norse period & 14 th century.	McCormick & Buckland, In Ralston & Edwards 2003; Barrett & Richards 2004;
Pictish	Cod, Ballan Wrasse, Conger Eel, Saithe, Pollack, Ling, Hake. Shark, Ray, Thornback Ray, Conger Eel, Eel, <i>Salmonid</i> , Whiting, Norway Pout, Saithe , Ling, Gadoid , Garfish, Stickleback, Sea Scorpion , Bull-rout, Bullhead, Scad, Sea Bream, Corkwing Wrasse, Wrasse , Black Gobey, Mackerel, Flatfish, Plaice/Flounder, Sole,	Common Limpet, Winkle, common European oyster,	Red deer	Fulmar (at Freswick). Red-throated Diver, Fulmar, Manx Shearwater, Gannet , Cormorant, Shag, Mallard, <i>Goose</i> , White-tailed Eagle, Black Grouse, <i>Grouse</i> , ?Golden Plover, Redshank, Curlew, Green Sandpiper, Great black-backed gull, <i>Gulls</i> , Razorbill, Kittiwake, Little Auk, Great Auk, Guillemot, Puffin, Domestic Fowl (Udal XI- XIII).		First “incomers” from stable isotope evidence, SAIR 48: 71. Line and net fishing in nearshore and offshore zones using boats. Smaller shellfish as bait.	Graham-Campbell & Batey 2001, McCormick & Buckland, In Ralston & Edwards 2003; SAIR 48
Norse / Viking	Salmon (Lax in place names suggest some significance e.g. Laxadale), Cod , Ling , Saithe , Conger Eel, Haddock, Red Seabream, Ballan Wrasse. Mackerel, Ray, Pollack. Shark, <i>Salmonid</i> , Angler Fish, Trout, Torsk, <i>Gadoid</i> , Hake, Grey gurnard, Sea Scorpion, Bull-rout, Flatfish.	Limpets (<i>Patella vulgata</i>), Winkles (<i>Littorina littorea</i>),	Seal, whale, Red deer	Guillemot, Razorbill, Kittiwake, Gannet, Puffin, Shag, Gulls, Eider Duck, Great Skua, Manx Shearwater	Seaweed (for manuring), incl. Bladderwrack @ Brough of Birsay, Buckquoy, Orphir, Beachview sites.	Line and net fishing using boats (shellfish as bait), also possibly spear-fishing. Increase in resource gathering (commercial-scale) in Norse period. Drying & transport required for trade. E.g. Saithe caught at Beachview may have been shoaling inshore in late autumn/winter. Whalebone (from strandings unlikely to be hunted) for structures. Seals hunted.	Graham-Campbell & Batey 1998, McCormick & Buckland, In Ralston & Edwards 2003; Ritchie 1993
Medieval						13 th -14 th century increase in commercial sea fishing for European demand.	Barrett et al (In Press)
Post-medieval	Herring?, Cod?		Sheep, cattle,	Seabirds for meat, feathers and oil (for rent), eggs	St. Kilda: Greater Celandine (medicinal?), barley, oats, potatoes (>1750s)	Fisheries developed during 1700s to provide skilled seaman for the navy. Short-lived expansion of fisheries for export before Royal orders to conserve inshore reserves enforced	Graham (2002), Donaldson <i>et al.</i> , (2009),



Period	Fin fish	Shell fish	Mammals	Birds	Other species	Technology / Notes	Sources
Crofting	Herring?, Cod?, Saithe,			Gannets? Etc...		<p>Bait: Mussel>Clam>Lugworm>Limpet (preference of baits in Scotland; Fenton 2008).</p> <p>Mussels (not seasonal) most popular shellfish bait (Fenton 2008) & apparently most successful over limpets and lugworms / sand eels for whitefish especially. Regional presence of these species also dictated what was used. Some fish said to prefer certain baits; e.g. cockles in Sutherland preferred for Haddock-but seasonal.</p> <p>Boats: Generally in Scotland, Clinker technology key for fishing boats for long history.</p> <p>Craig fishing (from rocks) (w/Rods nets, lines & floats) w/limpet bait mashed in cup-shaped hollows (or chewed).</p> <p>Fish traps: woven baskets integrated with stone and wicker superstructures. Situated in tidal reaches where fresh and salt water mix.</p>	Fenton in Coull, Fenton & Veitch 2008;
Modern	Saithe [Pollock/Coalfish (Coley)], Salmon Trawled cod, haddock and other money fish by quota.					<p>Craig fishing (from rocks) (w/Rods nets, lines & floats) w/limpet bait mashed in cup-shaped hollows (or chewed).</p> <p>Trawling, creeling, fish farming.</p>	Fenton in Coull, Fenton & Veitch (2008); Robinson, (1996)

Table 16: Marine Resources Register, species by type and period, **bold = major/preferred species**



4.5 OPPORTUNITIES FOR FURTHER RESEARCH

- 4.5.1 This assessment has identified a range of marine resources available or used in the Islands as well as coastal and intertidal structures of direct relevance for expanding the examination of research into marine resource exploitation in the Outer Hebrides. Some fish trap structures may be designed for particular species or groups of species. Bait holes for example may be used to enable fishing for a variety of species using a variety of species for baits. In support of marine resource exploitation, the broader economy provides materials indicating that a holistic approach is required i.e. a focus purely on the coast is unlikely to provide a comprehensive picture of past human activity on the coast (vice versa by concentrating on the island interior or Machair).
- 4.5.2 Salmon may provide an example of this dichotomy. Although mainly a marine species⁴⁰, the annual breeding of salmon in freshwater streams and rivers is a critical phase in their lifecycle; when substantial numbers of fish are increasingly likely to come into contact with human populations. Salmon are present in some coastal middens but perhaps not in quantities indicative of a glut in exploitation during the breeding season. If salmon exploitation during the breeding season was an important element of early prehistory for example should we expect to see salmon middens in the archaeological record in the region? Are these middens located on the coast or on the salmon rivers? Technological and geomorphological issues also become an important consideration; where in the river would the fish be caught? At the river mouths? At the rapids and falls? Or in the slow-moving pools? If so, how are the fish caught and processed?
- 4.5.3 In conjunction with erosion of archaeological material on the coasts a main limitation for investigating the human activity coast is the distribution of coastal surveys which provide important baseline information for developing research programs. This is also a primary source of variation in the cultural heritage databases is data enhancement proffered by a variety of CZAs undertaken in the last 20 years. The coverage of major campaigns such as SCAPE has so far reached around half of the Outer Hebrides largest island coasts and additional smaller survey campaigns have occurred in relation to specific archaeological research projects or areas of interest (e.g. Burgess & Church 1997, 2003; SEARCH etc). These records have been incorporated into the SMR which currently is the largest resource for archaeologically recorded coastal and intertidal archaeology.
- 4.5.4 For much of the east coast of the Outer Hebrides and for many of the smaller islands and islets there has been little or no archaeological survey, this provides an opportunity for the archaeological community in the future. Within individual survey campaigns this may be partly due to the restrictions of working within the tidal regime; with a substantial portion of the surveys area potentially being underwater for much of the working day (Dawson 2004).
- 4.5.5 An example of the relative scale of data enhancement would be to compare a region that has had considerable archaeological survey including CZA and one that has not. The Loch Roag study area is a major archaeological region with a long history of research and a series of CZA and other landscape surveys incorporating the coast. The study area is 224.2 km² and contains 1626 SMR point vector records of all types within it.

⁴⁰ The majority of their life is spent at sea and salmon protein contributes to the 'marine' signal in stable isotope palaeodiet studies (Schulging 2002).



- 4.5.6 Another large study area is 'The Bays' (SA 6) region of Harris. The Bays study area polygon contains 50 SMR records and the area has not undergone CZA data enhancement. The study area polygon constrains a good proportion of the coastal hinterland in both cases. The density of SMR records per km² is about 7.26 for Loch Roag SA and 0.48 for The Bays, or roughly 15 times more between areas. There is clear value for data enhancement of cultural heritage databases following CZA in the coastal and intertidal areas.
- 4.5.7 It is notable that Loch Boisdale has undergone a SCAPE commissioned survey but contains only 15 records, the area is quite small so the ratio does not appear unduly low (**Table 17**); it may be that some areas may just have low numbers of archaeological or historical features at the coast or conditions where not suitable for a comprehensive assessment of the full intertidal range.
- 4.5.8 **Table 17** and **Figure 9** highlight the variation in density of SMR records per km². Non-CZA study areas tend towards lower densities, with surveyed areas tending towards higher densities of sites in the study area. This issue of data enhancement is complex for simple assessments such as this. There have been field surveys entered into the SMR which incorporate sites on the coast but may not have a full focus on Coastal Zone Assessment over a large area such as Hunter (2004) in the Rodel area (mostly outwith the study areas here) and Burgess (2004) both appear to have most of the study areas extending inland rather than laterally along the coast but do contribute valuable gazetteers containing coastal and intertidal features in the absence of a full CZA of large regions of the eastern Outer Hebrides. However, in the areas with little CZA or other field surveys there is a lower density of SMR records, which is not necessarily related to smaller spatial areas (i.e. in the case of SA 6: The Bays)⁴¹. However this does not take into account some of the study areas containing large expanses of open water within them, such as the Sound of Harris. However, the study areas with the lowest feature densities consist largely of coastal land that can be surveyed.

⁴¹ A linear trend line of n vs. area for all data has $R^2 = 0.47$ (not shown in **Figure 9**). The correlation of density to area gives an $R^2 = 0.0071$ suggesting that larger study areas do not always have the greatest density of records.



Study Area	Location	SMR (n)	Area (km ²)	Density (n/km ²)	CZA
1	Broad Bay	192	127.6	1.50	Surveyed (Burgess & Church 1997)
2	Stornoway Approaches & Loch Erisort	441	171.2	2.58	Coast surveyed except for banks of Erisort (Burgess & Church 1997)
3	Loch Sealg	27	31.8	0.85	Not surveyed
4	Loch Seaforth	206	46.1	4.47	Partly surveyed (terrestrial survey Burgess 2004)
5	East Loch Tarbert	70	47.3	1.48	Not surveyed
6	'The Bays'	50	104.1	0.48	Mostly unsurveyed (very minor overlap with Hunter 2004, terrestrial survey)
7	Sound of Harris	273	220.9	1.24	Partly surveyed (terrestrial survey Hunter 2005)
8	Loch Maddy	107	54.0	1.98	Mostly surveyed (CFA Archaeology, 2006)
9	Loch Eport	28	13.1	2.14	c. half surveyed (CFA Archaeology, 2006)
10	North Baleshare	407	90.2	4.51	Mostly Surveyed (CFA Archaeology, 2005)
11	Bagh nam Faoileann	120	68.9	1.74	Mostly Surveyed (CFA Archaeology 2006)
12	Loch Boisdale	15	7.2	2.08	Surveyed (CFA Archaeology 2006)
13	Bruernish	206	55.6	3.71	Barra coast surveyed, not smaller islands (SEARCH 2000)
14	Castle Bay	233	13.9	16.76	Barra coast surveyed, not smaller islands (SEARCH 2000)
15	Loch Eynort	15	8.9	1.69	Surveyed (EASE 2006)
16	Loch Roag	1626	224.2	7.25	Surveyed, incl. Great Bernara (Burgess & Church 1997)

Table 17: Density of SMR records per km² (CZA unsurveyed areas are shaded grey)

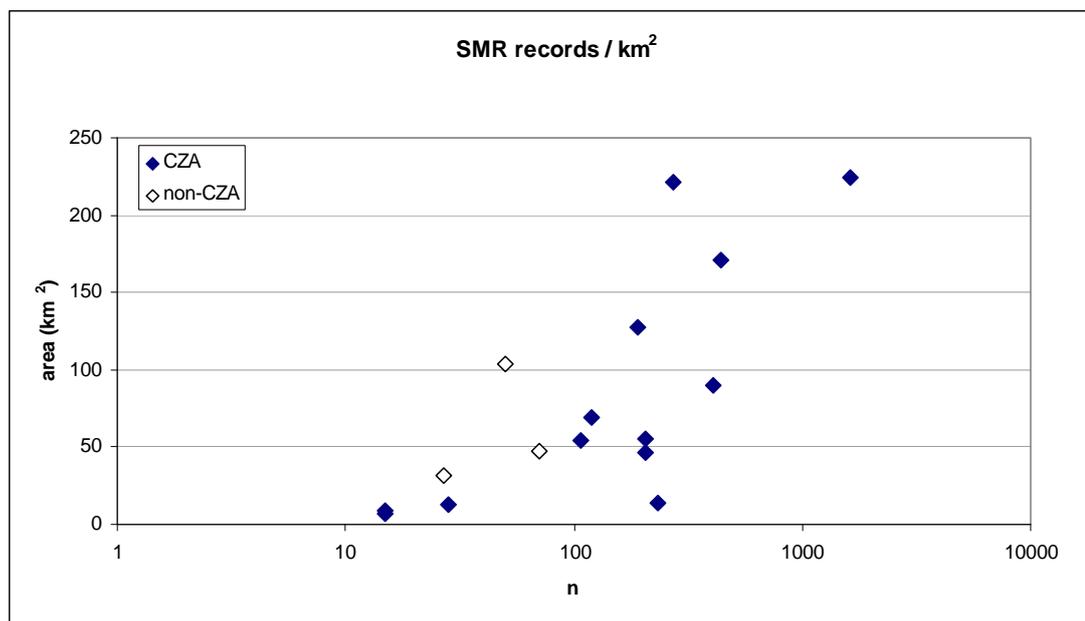


Figure 9: SMR records vs. area of study area with and without some form of CZA; note the logarithmic scale on the x-axis

Intertidal Structures

4.5.9 Rapid assessments of aerial photography, SMR and NMRS databases, and focused ground-observation have highlighted the considerable unrecorded resource of intertidal structures in locations across the archipelago (**Section 4.3** and on **p98**).



4.5.10 Many of these structures are likely to be used as fish traps, causeways, stepping stones, dams (and other structures) or used for several purposes.

4.5.11 In other areas of Scotland, including the Moray and Forth Firths aerial photography has been shown to be a valuable tool for identifying such structures (Dawson 2004). Due to the difficulties of intertidal working it is not always possible to fully record the entire intertidal range of the coast within a finite period of time in the field. There is therefore significant research potential in national, regional and local surveys of intertidal areas in order to:

- ground-observe features discovered from APs; and,
- survey them in the field in conjunction with precise OD benchmarks and relative sea level information; and thereby,
- create a spatially meaningful database of intertidal features relative to a meaningful sea level datum.

4.5.12 In future fieldwork through OHCCMAPP and more generally these kinds of surveys should seek to:

- identify the type and function of the features (e.g. species sought, technology used to recover fish/crustaceans);
- identify the range of building materials (including wood and stone types and any preparation) preserved in association with the features;
- identify the preserved depth and foundation of the features;
- identify whether the form of the structure is designed relative to seabed morphology and/or prey sought or other human or environmental factors.

4.5.13 Such detailed information would be useful for a variety of purposes, including:

- investigating historic marine resource exploitation;
- constructing a proxy reference database for relative dating of other intertidal structures in reference to their specific relationship with past sea levels and associated tidal range;
- providing benchmarks for long-term monitoring of the structures' condition, and monitoring change in local relative sea level for the future.

4.5.14 The latter point provides an added objective for justifying long-term periodic CZA in conjunction with broader national and international objectives for coastal impacts deriving from climate change, relative sea-level change, and erosion (Hansom and McGlashan 2010, Rennie and Hansom 2010, Hansom 1995).

Coastal Features

4.5.15 In addition, certain features within the cultural heritage databases such as 'cup-marked stones' have been observed to have concentrations in coastal locations. For example, the Harris coast of the Sound of Harris has several examples which may in fact be related to bait preparation and coastal fishing practices. The term 'cup-marked stone' also has particular cultural / ritual connotations within archaeological parlance which may not be appropriate if these features are specifically used for fishing practices. Dating them is a problematic issue and some may be prehistoric; many may be historic and relatively modern (**Table 16**). Detailed examinations of coastal rock outcrops would also be a valuable objective for future coastal and intertidal survey work in conjunction with identifying other geological features of archaeological interest such as quarried quartz veins (**Section 6.7**).



5 MARITIME HISTORY & TRANSPORT

5.1 INTRODUCTION

5.1.1 There is a very rich vein of maritime history running through the Outer Hebrides as highlighted by significant ethnographic archives such as the Alexander Carmichael Watson archive⁴², Tobar an Dualchais⁴³, the *Scottish Life and Society* compendium (e.g. Veitch 2008, Coull *et al.* 2008) and the physical remains of various coastal activities, fishing, trade and industry recorded in the cultural heritage records. Many of the people interviewed and met during the community engagements in the project described having a strong connection to the land, the lochs and the sea. Boats and industry related to the coasts and sea were and still are fundamental to their livelihoods (Hunter 2000).

5.1.2 During the preparation of this feasibility study it was clear that a dedicated study of maritime history and transport in conjunction with up-to-date wreck sources such as UKHO / SeaZone was necessary along with considerable archive research. It is envisioned that this will take place within Year 2 of the feasibility study in 2012.

5.2 OPPORTUNITIES FOR COASTAL & MARINE ARCHAEOLOGY

5.2.1 The investigation of hulks and other related maritime material located on the many beaches of the islands (Ritchie and Mather (1970) buried in the foreshore or in intertidal areas could be enriched by integrating knowledge from the local community into wreck and CZA databases. There are many wrecks with little information attached to them (**Section 3.5**). In some cases it may be possible to enhance these databases with local knowledge, especially within living memory and perhaps further back in relation to folk narratives (i.e. songs and stories)(**Table 2**).

5.2.2 Due to the partial coverage of CZA and other field surveys that incorporate coastal elements on the eastern coast of the archipelago there is likely to be significant number of unrecorded hulks or wreckage in and around the intertidal zone. For example the portions of hull discovered on the beach at Vialish, North Uist (pers comm. DA 2011) (**Plate 13**).

⁴² <http://www.carmichaelwatson.lib.ed.ac.uk/cwatson/en>; for example there are 149 records for [FISHING] and myriad antiquarian and other resources for study, but without all being currently accessible online (accessed 14/12/2011).

⁴³ <http://www.tobarandualchais.co.uk> (accessed 14/12/2011).



Plate 13: Hull fragments of a wooden vessel at Vialish, North Uist (D. Anderson 2011)

- 5.2.3 Known sites such as the early post-Medieval Fuday boat (Headland Archaeology 2008) were also reported to the project (**Plate 14**). The initial research into the vessel was not known about by the reporter, rather the wreck was known to the reported by an acquaintance who had visited the site by canoe several years ago.



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Plate 14: 'The Fuday boat', buried within the north beach on the island of Fuday, near Barra (Image credit: Headland Archaeology)



- 5.2.4 It is advantageous that CZA occurs on remaining main islands and smaller island coasts to obtain a record of other such wrecks that are currently unrecorded. The potential for medieval and other early post-medieval vessels in the region is significant but currently no examples have been located – this should be viewed as a priority task.
- 5.2.5 Local divers and clubs are likely to possess valuable information on potential wreck sites, but are perhaps unwilling to divulge this information openly. A significant element of future community engagement will be to develop good working relationships with this group. Similarly, preliminary discussions with the fishing community in Stornoway and individuals throughout the Islands will form an important element of our strategy for future work

6 SUBMERGED PREHISTORY POTENTIAL

6.1 INTRODUCTION

6.1.1 In order to assess the significance of the intertidal and nearshore zones for archaeological potential (including reconstructing palaeo-shorelines) several parameters are required to underpin a baseline assessment. The first is a Holocene relative sea-level model necessarily based upon coastal and intertidal sediments (and perhaps other markers such as human structures with stratigraphic relationship to relative sea level). These combine a broad suite of geomorphological and palaeoenvironmental investigations of well-dated sedimentary deposits that can be used to investigate the evolution of coastal systems during the Holocene. Palaeogeographical reconstructions of past coastlines may then be developed (**Section 6.2**) and populated with the contemporary archaeology and palaeoecology of the chosen periods of interest (cf. Benjamin 2010) (**Sections 6.3 – 6.7**).

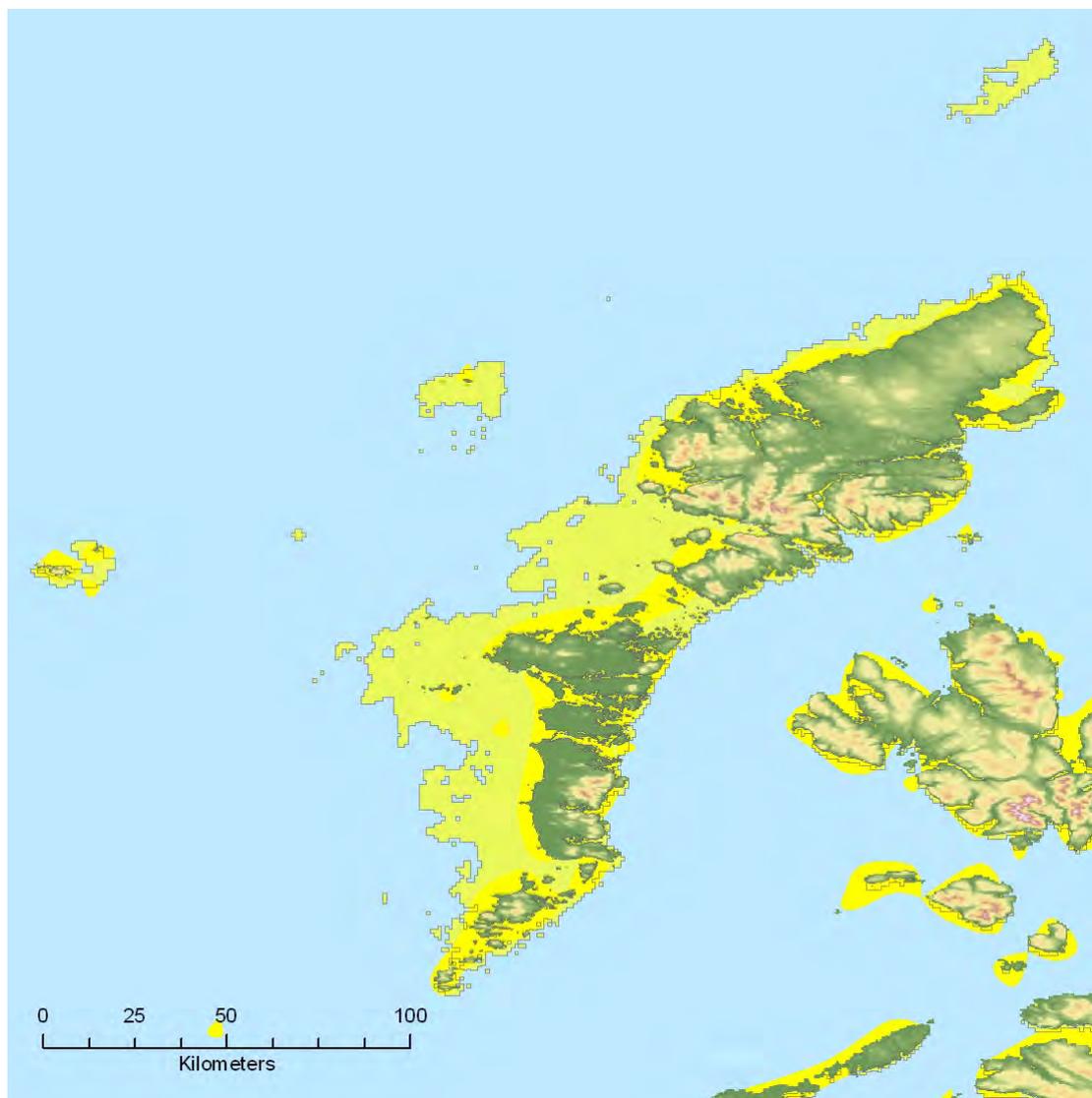


Figure 10: Palaeogeographical potential based on the bathymetry of the continental shelf (after Goodwyn *et al.* /ABPMer, 2010).



6.2 PALAEOGEOGRAPHICAL MODELLING

6.2.1 Recent palaeogeographical modelling⁴⁴ (Bradley *et al.* (2008, Milne *et al.*, 2008, Shennan *et al.* 2006), suggests that the exposed continental shelf of the Outer Hebrides has been significantly inundated by Eustatic sea-level rise since the last ice age (**Figure 10**). The majority of this area lies off the western, Atlantic coasts is reflected in the more gently sloping and extensive continental shelf. The eastern coasts, the focus of this project, have a much narrower continental shelf constrained by the deep water of The Minch. At c. 120 m deep, this channel has been an open water body for the duration of the Holocene and is likely to have been an enduring and important seaway during early prehistory (Garrow & Sturt 2011).

Existing Datasets

6.2.2 Within the sea lochs and estuaries (e.g. Broad Bay) and intertidal sand flats (North Baleshare, Bàgh nam Feoilainn) of the Islands there is much shallower bathymetry (depth of water) suggesting that large areas of the coastal waters were dry land during the earlier Holocene and available for human exploitation (see **Appendix III figures A1-8** for bathymetry charts of all study areas). Two major and freely available datasets have the potential to underpin reconstructions the potential palaeogeography of the Islands; the Shuttle Radar Topography Mission (SRTM) digital elevation model (DEM) which provides a 3D model of the land.

6.2.3 It is proposed that during OHCCMAPP Year 2 this will be interlaced with available offshore bathymetry digital datasets (**Table 18**). Together with the available Holocene sea level models from the Islands (Shennan & Horton 2002, Jordan *et al.* 2010) an estimation of the potential Holocene palaeo-shorelines of archaeological significance can be made. With future resources these models can be refined to incorporate sub-bottom geophysical profiling to identify palaeochannels and submerged landsurfaces.

6.2.4 There are several new bathymetric survey datasets that are recently or imminently available at the time of writing that are useful for a preliminary investigation of submerged prehistoric landscapes. Various undertaken by the BGS, CHP and Marine Scotland datasets exist for three study areas (**Table 18**). The Sound of Harris dataset has been ordered from the UKHO. The other 2 datasets will be acquired in due course.

⁴⁴ This research partly underpins the UKs scenario modelling for climate change during the next 100 years <http://www.ukcip.org.uk/>; http://www.ukcip.org.uk/wordpress/wp-content/PDFs/UKCIP_sea-level.pdf (accessed 13/12/2011).



Study Area	Sensor	Description
Sound of Harris	Bathymetric LiDAR	Shallow marine survey extending to coast.
Loch Roag	Multibeam bathymetry	Mainly concentrated within <20m of water abutting East Loch Roag coast.
Stornoway Approaches & Loch Erisort	Multibeam bathymetry	Limited to >500m offshore.

Table 18: Summary of recent inshore bathymetry datasets within the Outer Hebrides

Prospection tools for submerged prehistoric archaeology

- 6.2.5 In addition to RSL change the fundamental factor for the preservation of submerged prehistoric material is tidal erosion. It is very quickly apparent throughout much of the coastline of the archipelago that tidal scour is ruthlessly efficient at removing finer-grained sediments from the intertidal zone. This suggests that sheltered or estuarine areas may have more potential for preserving deposits of interest.
- 6.2.6 New research into developing tidal models in conjunction with the fish farm industry that can highlight areas of high currents (as well as a variety of other factors such as stratification, mixing of nutrients), and seabed stress (erosion potential) are being developed by Heriot Watt University (Navas, Telfer, Ross 2011) (**Figure 11**).
- 6.2.7 Using readily available tidal information it is possible to model the impact of tidal scour emanating along sea lochs (pers comm. J.M. Navas 2011). Presently this may help to identify areas which are less prone to tidal erosion as focus for field surveys. In the future, if sub-bottom geophysical datasets are available and assessed to map buried Holocene landscape features, effectively approximating the palaeo-bathymetry of a sea loch, scenarios could be examined varying archaeological, environmental and RSL parameters in order to hypothesise past dynamics within a given study area.
- 6.2.8 This type of collaborative work would represent a novel and cutting edge approach to prospecting for submerged prehistoric archaeology, one which may provide invaluable baseline information in order to maximise the resources (Engen and Spikins 2007) of any fieldwork in the future.

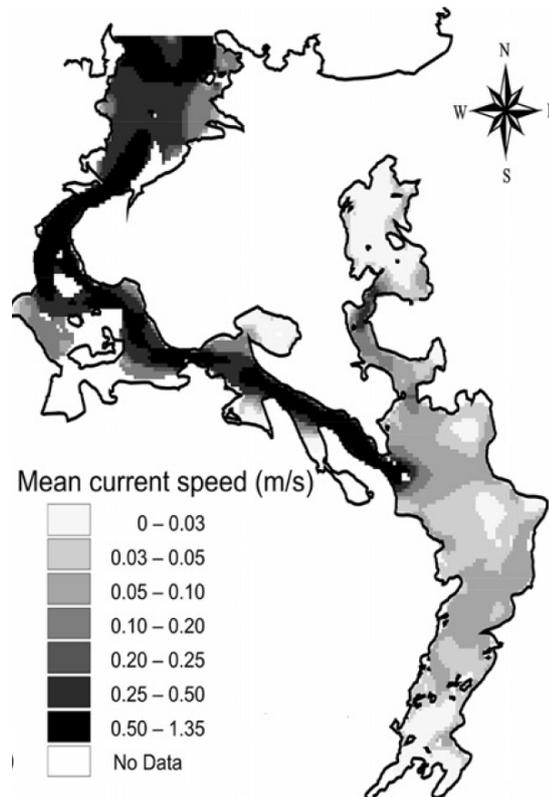


Figure 11: Tide-based modelling of mean current speed within a sea loch (Navas *et al.* 2011)

6.3 LANDSCAPE CONTEXT

Geology of the Western Isles

- 6.3.1 The dominant bedrock across the Outer Hebrides is the Lewisian Gneiss formed around 2.9 billion years ago; metamorphic basement rocks of grey quartz and feldspar (Fettes *et al.* 1992). Locally, the bedrock is cut by dykes, and faults (Tertiary or Quaternary activity) have created scarps, which are notable features of the landscape. There are also significant areas of acid and basic igneous rocks in Harris.
- 6.3.2 Younger rocks are restricted to the Stornoway basin; red-brown Permo-Triassic sandstone and dykes of igneous intrusions of Permo-carboniferous and early Tertiary age (Hall *et al.* 1996). There is evidence of these quartz intrusions being quarried during prehistory, such as on the southern banks of Loch Roag, at Cnoc Dubh near Callanais, to provide raw material for stone tools of various types (Ballin 2004).
- 6.3.3 There is considerable local variation in the form and mineralogy of the Gneiss, particularly in the degree of folding (Angus 1997) which imbues quartz lithic raw materials with very variable qualities for stone tool production (Ballin 2008).
- 6.3.4 Caves, which may have archaeological significance, are notable within the Stornoway basin sandstone and have also been recorded in various states of erosion along the Sound of Harris during the October field expedition of this project,



e.g. Gress Seal Cave, Stornoway basin (Angus 1997) or the cave on Pabbay Mhor, Lewis which is noted to contain thick deposits⁴⁵.

Quaternary Environmental History

- 6.3.5 The surface of the Island's landscape is heavily modified by glacial activity. A radial pattern of glacial action is recorded in the landscape indicating the development of a local ice cap that developed during the Devensian over South Lewis / North Harris mountains (with several corries preserved here) (Fettes *et al.* 1992).
- 6.3.6 There is some evidence of previous glacial / inter-glacial cycles. Organic sediments found at Toa Galson, Lewis indicate acid heath and grassland during Marine Isotope Stage (MIS) 5 dating up to 130 k BP. The deposit is overlain by peri-glacial and glacial sediments suggesting these later deposits relate to the Devensian glaciation (Hall *et al.* 1996). At Tolsta Head, Lewis dating to c. 27.3 k BP is organic sediment containing sedge and grass which are then buried by a complex of drift sediments of likely Devensian glacial age.
- 6.3.7 Last glacial ice limits are suggested by seabed moraines west of St. Kilda dating to c. 22 kyr BP. It does not appear that St. Kilda was overrun by the glacial ice, suggesting a relatively thin ice sheet at the western periphery. The St. Kilda basin was ice-free after 15.3 kyr BP with arctic, periglacial environmental conditions until the short, warmer Windermere interglacial between 13.5 – 11 kyr BP (Hall *et al.* 1996).
- 6.3.8 In the area of Uig on western Lewis, there are preserved kames, eskers and other glacial sedimentary features; some preserved in multiple phases the most recent may relate to the glacial Loch Lomond Readvance of c. 11 – 10 kyr BP, preserved as patterned ground. This oscillation in glacial conditions is recorded in the vegetation history of the islands which are dominated by *Rumex*, *Empetrum*, *Poaceae* and tundra grassland species (Hall *et al.* 1996).
- 6.3.9 During the Loch Lomond Readvance (11 – 10 kyr BP) the rapid return to very cold conditions and the expansion of West Highland mountain glaciers is likely to have prevented or at least heavily restricted human activity in Scotland. Refuges such as the southern North Sea palaeolandscape, e.g. Doggerland may have been an important region for human activity during this time of lower sea levels (Gaffney *et al.* 2007, Fitch *et al.* 2009).
- #### **Palaeolithic Potential (>12,000 BP)**
- 6.3.10 The current archaeological record in Scotland extends until c. 12,000 BP during the Upper Palaeolithic. Lithics recovered from South Lanarkshire are of a type related to Late Glacial hunters, probably tracking herds of reindeer south of the downwasting Devensian glacial ice. Upper Palaeolithic remains in Scotland are so far restricted to this single site near Biggar in southern Scotland. At this time in the Western Isles the main body of the glacier is likely to have melted, leaving the islands ice free but ice streams flowing into the Minch from the west coast fjords may have restricted access of human groups between c. 15 – 11 kyr BP (Stoker *et al.* 2009) across the seaway directly between Lewis and north Skye. Although there is the possibility of further Upper Palaeolithic archaeology associated with raised beaches in the Shildaig area near Skye (Ballin & Saville 2003).

⁴⁵ <http://www.cne-siar.gov.uk/smr/SingleResult.aspx?uid=MWE142901> (accessed 07/12/2011).

Mesolithic (7050 – 4000 BC)

- 6.3.11 The first direct evidence of human activity in the Western Isles is found on the Harris coast on the northern tip of the Sound of Harris at Northton. Organic and burnt deposits eroding from Aeolian sands were identified by Simpson *et al.* (2005) and have continued to be examined (Gregory *et al.* 2005). Radiocarbon dating of hazelnut shells stratified in the dark, sandy layers returned early Holocene, Mesolithic-aged dates, in two phases of activity (c. 7060-6650 cal. BC and c.6510-6090 ca. BC). The deposits are interpreted as middens. They contain the remains of a variety of terrestrial and marine species indicating a varied diet. A mixture of finfish and molluscs were identified from the faunal assemblages (**Table 16**). A variety of technology would be required to hunt these species, unless scavenging was a major source of animal products.
- 6.3.12 The deposits from Northton, rich in ash, charcoal and burnt organics also coincide with the increases in microcharcoal exhibited in the regional pollen assemblages (Edwards 1996, 2004; Tipping 1996). At various locations across South Uist to Lewis, from around 9000 BP, and certainly during 8000–7500 BP there are significant increases in microcharcoal; a proxy for burning within the catchment of the pollen site. Some sites display a prolonged increase, whereas others indicate an oscillating pattern. It is unclear whether this is due to taphonomic effects or represents a real pattern of varying human activity.
- 6.3.13 Further midden deposits have also been located at Riof near Valtos, Lewis on a small outcrop just offshore, dating to the Mesolithic (potentially more recent than at Northton pers comm, D. Anderson 2011) (**Plate 15**).



Plate 15: Shell midden deposit at Riof, Lewis dated to the Mesolithic period (D. Anderson 2011)

Mesolithic Environment

- 6.3.14 During the early Holocene tree cover began to colonise the Islands from refugia further south; developing first in South Uist then northwards (Edwards 2004). The dominant tree species were birch and hazel, developing open, scrubby woodlands



from around 10,000 and 9500 BP, respectively. Elm and Oak reached the Islands around 8500 – 8000 BP (c. 9500 cal. BP) once climatic conditions had ameliorated sufficiently. Pollen records from the Islands indicate large increases in arboreal (tree) pollen around 8500 BP (9500 cal. BP) (Edwards, 1996, 2004; Tipping 1996).

- 6.3.15 At various locations around the Outer Hebrides; from South Uist to Lewis, palaeoenvironmental analyses of sediment cores indicate high concentrations of microcharcoal fragments from c. 8000 BP (c. 7000 cal. BC) onwards (*ibid.*). Microcharcoal is used as a proxy indicator for levels of burning within the catchment of the sampling site and is often referred to human activity flux in the landscape. This relationship has not yet been confirmed by research in the Outer Hebrides and may relate to increased cover of heath and grassland (easily ignited fuel) and warmer environmental conditions during the first half of the Holocene. However, the effect of forest management by Mesolithic groups by burning would also lead to an increase in open grass and heath cover giving similar indications in the pollen rain. The similar dates retrieved from Northton of up to 7050 cal BC (Gregory *et al.* 2005) and the marked increase in microcharcoal concentrations around the same time is compelling and clarification of this relationship is an important research objective for the Islands.
- 6.3.16 By the mid-Holocene a mixture of Oak, Elm, Hazel, Birch, Pine and Alder was present across the islands likely as patchy woodland (Edwards 2004). Grasses were also a major component of the landscape. Trees reached their maximum development around 6000 cal. BP whence Oak, Alder, Elm and Pine become scarce, then absent from the pollen record (*ibid.*). Several authors note the development of increased storminess or deterioration in the climate around this time (Tipping 2010, Schulting 2010). At around this time (6000 cal. BP / 4000 BC) across Scotland in general Neolithic sedentism and farming technology is adopted / developed.
- 6.3.17 It appears in the palaeoenvironmental records of the Outer Hebrides that the initial period of significant forest clearance in association with human activity and land management occurs later at around 4000 BP (c. 4500 cal. BP) and is associated with late Neolithic / early Bronze Age archaeology. Cereal and heathland pollen increases and forests decrease. This trend occurs again around 2000 years ago during the Iron Age (Edwards 2004, Tipping 1996).
- 6.3.18 Machair has been argued to have developed from around 7580 cal. BP with increased sand supply (the extensive shelf off the west coast providing a large supply to the west-coast beaches) during mid-Holocene within the background of changing RSL and coastal geomorphology development (Edwards *et al.* 2005). Sandy landscapes are an important aspect of early prehistoric landscape exploitation (Griffiths and Ashmore 2011, Angus 2001); the spread of Machair may be partly due to human disturbance and the removal of scrub forest cover for subsistence or fuel (e.g. hazel). With increased and sustained anthropogenic activity and the agricultural exploitation of the Machair in the Neolithic there is also a spread in heather heathland (*ibid.*).
- 6.3.19 A consideration for reconstructing a Mesolithic model of subsistence is provided by the palaeoenvironmental records cited by Garrow & Sturt (2011); the temperature anomaly during the early Mesolithic suggests that average winter temperatures may have been several degrees colder, with average summer temperatures similar to today. By the late Mesolithic / early Neolithic (c.4500 BC) mean winter and summer temperatures appear to converge at similar temperatures to the present day.



Mesolithic Population

- 6.3.20 The middens at Northton containing hazelnuts shells of Mesolithic age they also contain a variety of plant, mammal and fish remains indicating a varied hunter-fisher-gatherer subsistence strategy (Gregory *et al.* 2005). Research estimating the carrying capacity of hunter-gatherer cultures by Gamble (1999) and developed for Scotland during the Mesolithic period by Saville (2004) suggests in an area the size of Scotland (c. 78,000 km²) the human population may be in the order of 1560 – 7020 incorporating a sparse to high population density (**Table 19**).

Area	Scotland	Outer Hebrides
Est. Population	c. 78,000 km ²	c. 3000 km ²
High	7020	270
“Moderate”	5460	210
Low	3900	150
Sparse	1560	60

Table 19: Estimated Mesolithic period population density in Scotland and the Outer Hebrides (After Saville 2004)

- 6.3.21 For the purposes of discussion, the mean of the High and Low estimates, “Moderate” has been calculated. For Scotland, this would estimate a Mesolithic population of around 5460. When extended to the area of the Outer Hebrides, c. 3000 km² which provides a moderate estimate of around 210 individuals. Clearly there are numerous caveats and factors that would affect the actual population that were active on the Islands during the Mesolithic or at any given time. The seasonal, annual and decadal population flux is also likely to be highly variable; which the available data cannot resolve. As a general basis for discussion, it is assumed that the Mesolithic human influence is likely to be very spatially and temporally variable and subtle with respect to prospecting for, and identifying, the potential for unknown sites in the future.

Neolithic (4000 – 2500 BC)

- 6.3.22 Neolithic archaeology is encountered on the transition zone between submerged prehistory and terrestrial prehistory (**Plate 16**). Available relative sea level reconstructions suggest an average sea level of c. -1 m OD (-3 m Stornoway MHS) (Jordan *et al.* 2010) (**Figure 12**). This suggests that locally there is around 3m relative sea-level change at the coast since the Neolithic. Isostatic effects are an issue, and may be reflected in the inflection point in the sea level trend between 5000 – 6000 cal. BP. Depending upon the gradient of the seabed and/or infilled palaeo-topography (i.e. Holocene sedimentation and shifting marine deposits) beneath this may equate to Neolithic palaeo-shorelines being located several tens of metres offshore of the current coastline (c. 50 - 100m on more shallow gradients).

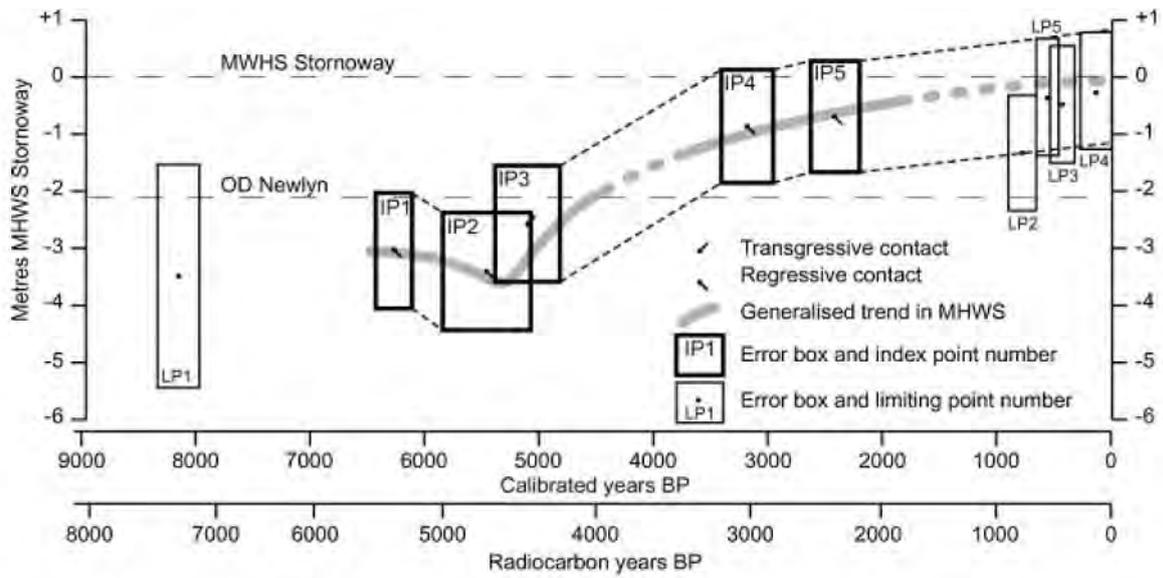


Figure 12: Mid-Holocene relative sea level reconstruction from Harris (Jordan *et al.* 2010)
The Neolithic period equates to c.6000 – 4500 cal. BP on the timescales shown here



Plate 16: The inundated Neolithic chambered cairn at Geirisclett, North Uist from the air and from the coast, the chamber floods at high tide making this site at least ‘partially intertidal’⁴⁶

- 6.3.23 By c. 4000 BC, the contemporary environment was deteriorating with an increase in storminess around the transition towards agricultural subsistence (Schulting 2010). On the Islands, oak, alder, elm and pine had markedly declined or become extinct, with birch and hazel the major tree species. Deforestation signatures in

⁴⁶ See this site in context at <http://blogs.wessexarch.co.uk/OHCCMAPP/2011/12/19/geirisclett/> (20/12/2011)



palaeoenvironmental records near to major Neolithic centres such as Callanais occur at around 2500 BC (Edwards 1996, 2004; Tipping 1996).

- 6.3.24 Machair developed significantly during 4800 to 2800 BC on the west coasts (Gilbertson 1999), with blanket peats expanding in the interior. Significant sand drifting events in the Islands have been linked to climatic changes in the North Atlantic (Dawson et al 2004). It has been argued that the Neolithic period was one of dynamic climatic conditions and to a certain extent, deterioration (Schulting 2010).
- 6.3.25 Recently the open network of islands and seaways on the west coast of the British Isles was a key seascape for Neolithic open-water transport, marine resources and diaspora (Garrow & Sturt 2011).
- 6.3.26 Neolithic diets in the Outer Hebrides are problematic. There is stable isotope evidence that Neolithic diets were particularly terrestrial influenced strongly by cereals (Bonsall *et al.* 2002, Bartosiewicz *et al.* 2010). However, the datasets cited does not appear to include any examples of analysed human bone from the Western Isles. Henley (2005) has recently argued for a kind of *un-sedentary pastoralism* [our term] within the Neolithic period due to the short-lived nature of the settlement sites when compared to the monumental architecture of other kinds of sites in the Islands, except perhaps at Eilean Domhnuill, North Uist or Alt Chrisal, Barra which are artefact and resource-rich, and planned sites. The lifestyle may have consisted of various strategies such as transhumant pastoralism on a seasonal basis, in conjunction with the occasional, small-scale cultivation of barley. Wild resources may have been used but are not preserved (Jones 2000).
- 6.3.27 Henley (2005) has argued that the sea may still have been an important source of protein in Neolithic but evidence is not preserved or scarce. Was Neolithic subsistence partly seasonal and Hunter/Gatherer/Fisher (Jones 2000)? Henley (2005) discusses the distribution of evidence for Neolithic subsistence strategies. A partly mobile Neolithic is argued for with maintenance/procurement of key elements of subsistence strategies requiring mobility such as flint lithic raw materials which derive from Skye and elsewhere, and includes some marine with and terrestrial, domesticated and wild food resources.
- Spring: Crop planting, moving cattle & sheep in upland summer pastures, lambing and calving.
 - Summer: hunting coastal birds, seals maybe red deer, gathering wild fruits & shellfish.
 - Autumn: harvesting & processing of crops, movement of livestock to coastal lowlands, selected slaughter,
 - Winter: hunting migratory wildfowl and seabirds, perhaps the hunting of moulting seals, culling of young domesticates, supplemented by harvested, stored grain.
- 6.3.28 With a broader and more detailed assessment, these kinds of information may provide parameters that could influence the prospection of unknown, submerged prehistoric sites and materials.

6.4 LATER PREHISTORY

- 6.4.1 Due to the substantial tidal range experienced across the Islands (c. 5m), and the errors associated with reconstructing past sea levels from sedimentary markers and subsequent models, there is also potential for RSL rise since the Neolithic of a few metres. The Harris RSL reconstruction (Jordan *et al.* 2010) suggests sea level during the Bronze Age was around 1-2 m lower; during the Iron Age, up to 1m lower.



MHWS at Stornoway is around 2m higher than the Ordnance Datum measured at Newlyn (and the common benchmark for RSL models e.g. Shennan and Horton 2002).

- 6.4.2 This phenomenon may drive the partial submergence of the intertidal structures at Iron Age sites such as Dun Barraglom on Great Bernera, (assuming the partly submerged walls / yairs are contemporary with the Iron Age structures on land) (see **Plate 8**).
- 6.4.3 Isostasy that has acted to offset sea-level rise is poorly constrained around the Islands in relation to the sparse resource of sea level index points and associated high resolution palaeoenvironmental reconstructions. Complex behaviour such as 'Neolithic' RSL inflection point observed by Jordan *et al.* (2010) suggest that the regional-scale isostatic process in conjunction with local-scale geomorphology makes prospecting for submerged prehistoric sites and material more complex than reading off an altitude where sites of a given period may reside. The sites and material if preserved are likely to sit within a broad vertical range or be more or less obscured by post-depositional sedimentation.

6.5 COMMUNITY REPORTS

- 6.5.1 So far, from the reported finds a broad range of features contain material that might be seen as marginal in the minds of the public such as exposed archaeological deposits in the intertidal zone which have considerable palaeoenvironmental potential.
- 6.5.2 In addition, several personal communications of submerged peats and trees in the Loch Roag area (**Figure 7**) by academic colleagues in conjunction with observed intertidal peat deposits nearby at Loch Ceann Ludabhigh, others at Paiblesgarry, North Baleshare, and unverified deposits community reported from beach locations around Harris, suggest at broad geographic range of sites exist of significant archaeological interest for investigating inundated prehistoric coastlines.
- 6.5.3 Maintaining and developing the reporting protocol for OHCCMAPP through the flyers and community engagements would be an invaluable objective for the future. It may also be another avenue for educating the public on the range of archaeological and cultural heritage resources that are available.

6.6 PALAEOENVIRONMENTAL RESOURCES

- 6.6.1 Relative sea level (RSL) models and reconstructions in the Outer Hebrides are sparsely constrained in both timescale and location. Prior to the Neolithic period, sediment-based palaeoenvironmental reconstructions are supplanted by models which are national or continental in scale leaving significant uncertainty at a loch or site-specific 'archaeological' scale. The range of modelled values for c.7000 BC and the early Mesolithic period are wide indeed from around 0 to -30m RSL (summarised neatly by Jordan *et al.* 2010, **Figure 12**). A working value of around -10m RSL may be a realistic estimate for contextualising the earliest Mesolithic activity in the Islands; but, there is significant scope for expanding the corpus of Holocene relative sea-level reconstructions. Partly as an exercise for testing these RSL models but also to reconstruct the Holocene evolution of areas such as Broad Bay; substantial estuarine systems fringed by extensive salt marsh deposits that may have been important landscapes from the Mesolithic period onwards.



- 6.6.2 These programs would ideally be carried out at a number of sites across the Islands. They are however, relatively costly, require inter-disciplinary research teams and take several years of laboratory analysis to produce comprehensive results. They are however well-suited to research programs that include doctoral and post-doctoral roles or collaborative programs.
- 6.6.3 Isostatic influences are also poorly constrained but influences can be observed within existing datasets (Jordan *et al.* 2010).
- 6.6.4 For future study–area-specific assessments a significant body of existing sites have been examined across the Islands to provide a variety of Holocene datasets relating to past sea-level index points, and palaeoenvironmental reconstructions. For example 96 records exist in the Scottish Palaeoecological Archive Database (SPAD) for the Western Isles region; a primary archive for future study area specific research⁴⁷. A broad distribution of wetlands sites have also been compiled under the Scottish Wetlands Archaeological Database (SWAD)⁴⁸ with 174 records (some are duplicates from SPAD) for the Islands. This potential palaeoenvironmental resource is highlighted in (**Figure 13**). It is likely that further resources exist within Barra, the east coasts of the Uists, Harris and Lewis. Sites of interest noted from AP assessments of such areas that should be assessed in the field have begun to be compiled in this first stage feasibility study. It is envisaged that this be developed and validated in subsequent years of the project.

⁴⁷ Coles, G.M., Gittings, B.M., Milburn, P. and Newton, A.J. (1998) 'Scottish Palaeoecological Archive Database', <http://www.geo.ed.ac.uk/spad/>. At the time of writing GIS downloads were not possible from the website due to a script error (last accessed 07/12/2011).

⁴⁸ Clarke, C.M., Ellis, C., Gittings, B.M. and Newton, A.J. (2001) *Scottish Wetlands Archaeological Database*, <http://www.geo.ed.ac.uk/swad/> (last accessed 07/12/2011).

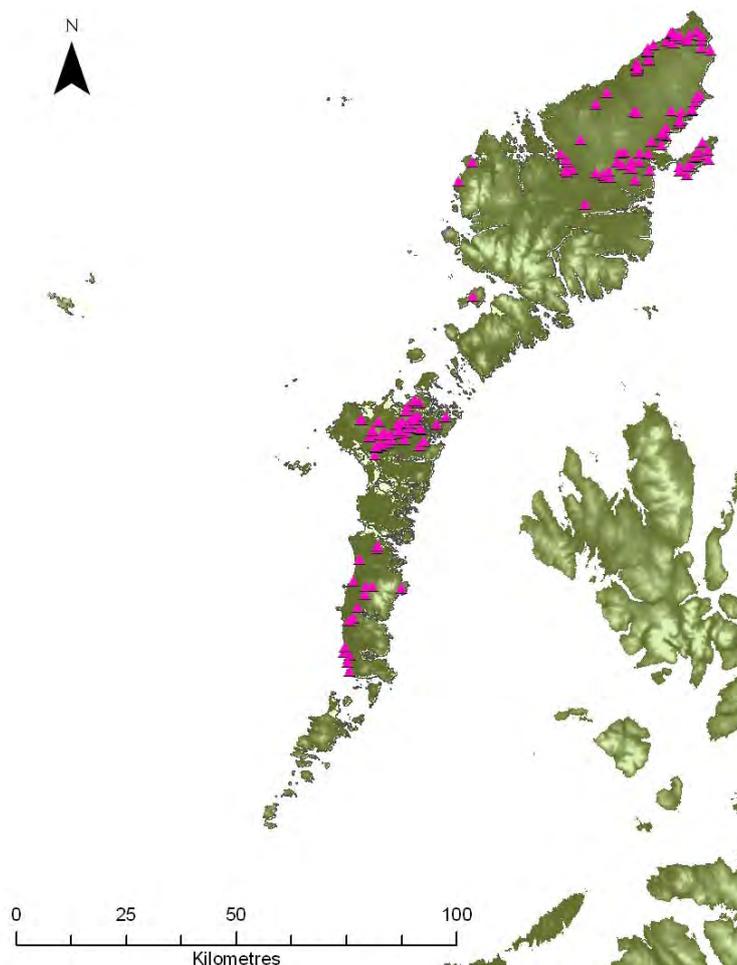


Figure 13: Wetlands sites as archived by SWAD for the [Western Isles]

6.7 LITHIC RESOURCES

6.7.1 In relation to early prehistory the quarried quartz vein at Cnoc Dubh is located in the southeast of the Loch Roag study area slightly inland from the coast and has been investigated by Ballin (2004). This particularly quarry is a broad vein of quartz within a larger outcrop. Quartz is the most important local mineral used in prehistory as lithic tool raw material. Other worked veins have also been located, some as thin as 10-20 cm (Ballin pers.comm. 2011). Generally under-represented in the archaeological record due to difficulties of identification of work pieces (Ballin 2008), there is considerable scope for future work into establishing prehistoric economy including marine resources and associated technology which must include both natural resources such as wood and other plant material, animal resources and lithic technology and sources, the latter including:

- Quartz lithics & quarries;
- Mylonite lithic raw material;
- Regional lithic materials & sources.



SECTION IV: SUMMARY & RECOMMENDATIONS





7 SUMMARY

7.1 THE 2011 SEASON

7.1.1 2011 saw the beginning of the OHCCMAPP and can be seen as the first step toward establishing feasibility for the enhancement and improved understanding of the archaeological resource in the intertidal and marine environments of the Outer Hebrides within future projects. This could eventually be seen as a testable methodology to apply to the whole of the western seaboard of Scotland.

7.1.2 The feasibility study has already yielded results: new sites and site types have been identified. A second year, to conclude the feasibility study, is planned for 2012, which will aim to refine study locations and begin to test specific techniques and methods for the investigation of sites.

7.1.3 With respect to our stated objectives (**Section 1.3**) we have successfully initiated community engagement which has positively informed our field investigation and study area selections. This has partly allowed a focus in under-represented areas, especially the east coasts but has not dominated the current areas of interest. We have begun to enhance cultural heritage databases with new and updated information. We have also begun a process for establishing parameters that can underpin a model for site prospection in the region.

7.1.4 Resources have been compiled to allow study area-specific research priorities to be developed in Year 2 of OHCCMAPP. Similarly elements of the work have begun to highlight management issues of the Outer Hebrides marine environment which will continue to be developed in Year 2.

2011 Achievements

7.1.5 2011 has specifically achieved:

- 17 new sites recorded (and logged in the SMR/NMRS) (Figure 14);
- 22 sites visited in the field (some previously or partly recorded);
- At least 7 unrecorded features identified by aerial photography survey;
- The study areas were defined, re-defined and queried as a result of assessments and analysis of the available disparate datasets;
- The preliminary methodological approach was tested through field investigation.

7.1.6 Building on this initial yield we aim to develop study area specific research agendas by the end of Year 2; the Identification of specific study area priorities and the expansion of the baseline of **marine resource exploitation** and **maritime transport & history** will be central goals.

7.1.7 It is planned that elements of this feasibility study will be reworked into a peer-reviewed publication.

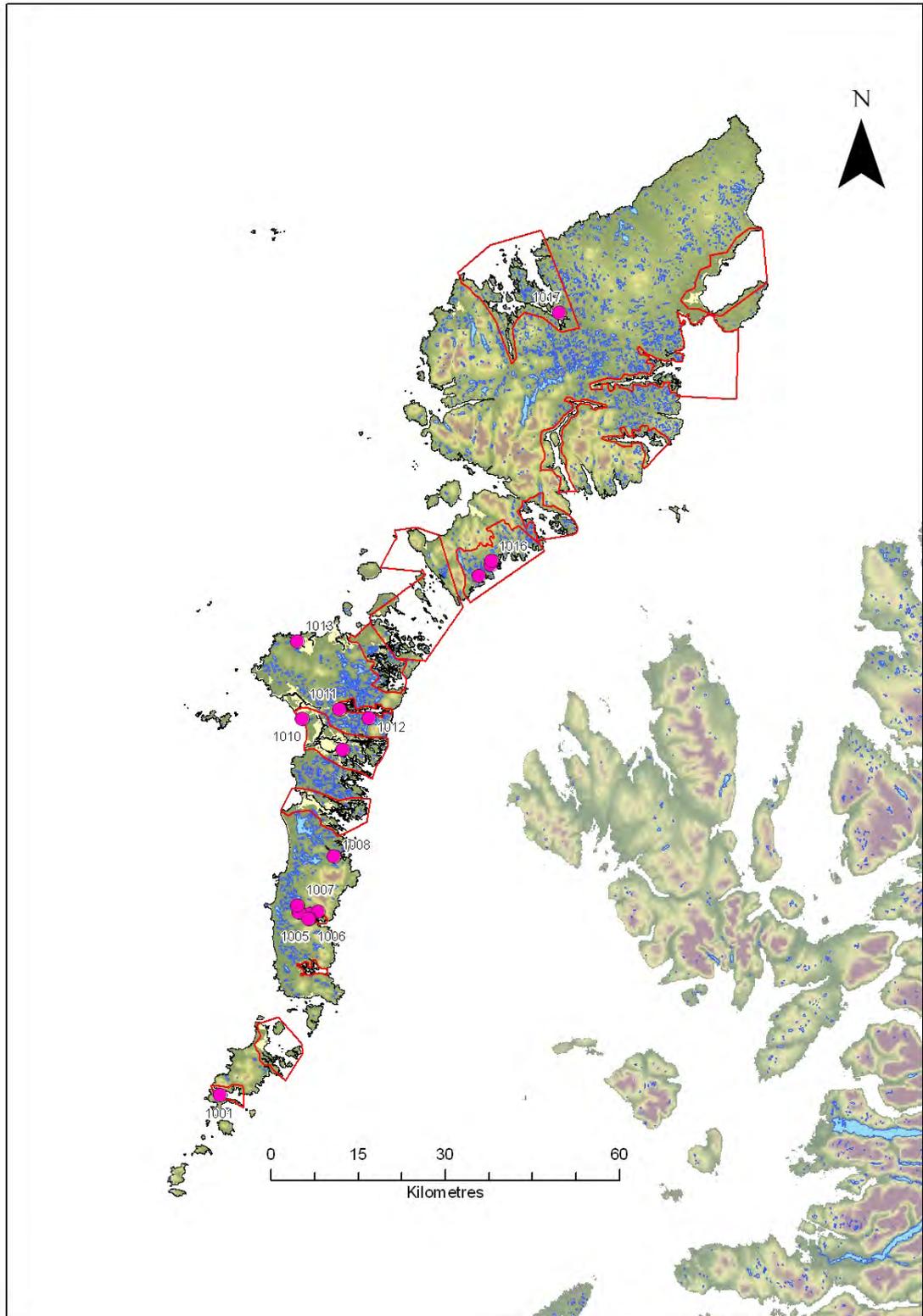


Figure 14: Reported sites from OHCCMAPP activities in 2011 (see **Appendix II: Gazetteer**)



Summary of Community Reports & Interviews

- 7.1.8 In general, there has been a good range of reported material, mostly previously unrecorded through direct reporting to the project by the website or during the fieldwork components. The reports consist of a range of artefacts and deposits of direct value for defining submerged prehistory potential which is not solely distributed on the western coast of the archipelago.
- 7.1.9 Interviews have also provided new intertidal sites relating to marine resource exploitation. Reports of wreck material were also made but for known sites, i.e. the Fuday boat (Headland Archaeology 2008).
- 7.1.10 The reported flint core from Grimsay highlights the value of applying concerted efforts in surveying the full intertidal range. Future exploration of this and other shallow sediment-rich intertidal locations is recommended for locating scatters of lithic material as well as intertidal peats, particularly on the unsurveyed east coasts.

7.2 QUESTIONS ARISING

- 7.2.1 By undertaking this study several research questions and themes have developed as key considerations for subsequent work, these include:
- Is there a realistic possibility for the discovery of more Mesolithic sites in the Outer Hebrides on the coasts (e.g. Northton), as well as in intertidal and fully submerged environments?
 - If so, could such sites be used to discuss important questions about Mesolithic arrival to the islands, their subsistence patterns and settlement types (i.e. year round occupation of the Outer Hebrides)?
 - Where were the Mesolithic and Neolithic shorelines? Given the inundation of the chambered cairn at Geiriscllett, the question must be asked as to where the contemporary shorelines were when this cairn was built and used?
 - What physical and chemical changes have happened to the Mesolithic and Neolithic intertidal zones, where resource procurement would have taken place?
 - This point is designed to address the taphonomic issues that will arise when intertidal and sub-tidal early prehistoric remains are discovered.
 - Was the Neolithic diet on the Outer Hebrides fully terrestrial? And are key materials lost or submerged by Holocene RSL change?
 - What is the extent of the impact of Holocene RSL on later prehistory from the Bronze – Iron Ages?



8 RECOMMENDATIONS FOR FUTURE WORK

8.1 INTRODUCTION

8.1.1 The OHCCMAPP was funded as a short-term feasibility study, with multi-year ambitions and appropriate contingencies (in the case that funding is not extended beyond 2011). Grant applications have been submitted to Historic Scotland, the National Geographic Society, the Society of Antiquaries of Scotland and European Research Council to continue the work begun in 2011.

8.1.2 If successful, 2012 will see the conclusion of the feasibility study. A future, large-scale research proposal will be sought in 2012 to expand the project beyond its Pilot Phase: the *OHCCMAPP* with a single 'p'.

8.1.3 Several major research elements are envisaged including:

- Further development of parameters for a 'Hebridean model' for site prospection;
- Detailed assessment of historic coastal maps (e.g. http://maps.nls.uk/coasts/admiralty_charts_list.html);
- Detailed analysis of archive material, ranging from map evidence, charts and rentals, landownership and ethnographic archive sources;
- Palaeogeographic, bathymetry and energy modelling in sea lochs;
- Bespoke wreck assessment & maritime history study, including:
 - 20th century wartime history including social, aviation and maritime aspects;
 - Post-medieval maritime history, trade and politics;
 - Medieval maritime history (Norse technology, clinker-built boats and 'the West Highland galley')(Rixson 1998);
 - Roman aspects;
 - Maritime trade networks,
 - The whaling industry (IBT 2008);
 - Smaller islands and groups;
 - Shiant,
 - Flannan,
 - Monnach,
 - St Kilda.

8.1.4 Moving forward there are several avenues where progress can be made for OHCCMAPP. Elements of which are suitable for community engagement (**Section 8.2**) others elements will require specialist investigations (**Section 8.3**). However, all elements can subsequently be synthesised and developed for both audiences.

8.2 COMMUNITY INVOLVEMENT

Community Engagement

8.2.1 Maintaining and developing the reporting of material for OHCCMAPP through the flyers and community engagements would be an invaluable objective for the future. It may also be another avenue for educating the public on the range of archaeological and cultural heritage resources that are available.

8.2.2 This kind of local knowledge is a key resource for enriching relatively sterile cultural heritage vector data, and anomalies identified from APs and should be developed as a key component of enhancing the investigation of intertidal structures and marine resource exploitation.



- 8.2.3 Local divers and clubs are likely to possess valuable information on potential wreck sites, perhaps underwater exposures of interest for submerged prehistory but are perhaps unwilling to divulge this information openly. A significant element of future community engagement will be to develop good working relationships with this group. Similarly, preliminary discussions with the fishing community in Stornoway and individuals throughout the Islands will form an important element of our strategy for future work.
- 8.2.4 Initial tests of inexpensive photogrammetry and 3D modelling of intertidal features have provided additional tools for presenting coastal and marine archaeology in its landscape context to a broad audience⁴⁹. Other techniques for presenting our work will be investigated in the future.
- Bespoke wreck assessment & maritime history study**
- 8.2.5 During the preparation of this feasibility study it was clear that a dedicated study of maritime history and transport in conjunction with up-to-date wreck sources such as UKHO / SeaZone is necessary along with considerable archive research. It is envisioned that this will take place within Year 2 of the feasibility study in 2012.
- Comprehensive assessment of 25cm APs for site prospection**
- 8.2.6 These APs are generally of very high quality for examining coastal, intertidal and shallow marine areas in the Outer Hebrides and are recommended for future site prospection in the region and more widely within Scotland.
- 8.2.7 Other photography techniques incorporated into bespoke aerial surveys such as using infra-red technologies, to penetrate water and record differential vegetation cover may also be investigate as a tool for site prospection.
- 8.2.8 The Gaelic term *cairidh* means fish weir and is often seen on the historic and current maps for the Outer Hebrides. This place name depiction will enable further focussing of the OHCCMAPP study areas.
- CZA of full intertidal range within study areas**
- 8.2.9 Elements of CZA are suitable for community projects i.e. above the high tide. Working within the intertidal zone has risks associated with it and legal and insurance requirements are likely to be prohibitive unless individuals possess specific training. Combining specialist intertidal zone survey with a beach-based community element may however be highly productive in terms of increasing man-hours and coverage in the field.
- 8.2.10 The reported flint from Grimsay is of primary importance and highlights the potential value in applying concerted effort for surveying the full intertidal range. Future exploration of this and other shallow sediment-rich intertidal locations is recommended.
- 8.2.11 Wooden structures or elements of fish traps have not been observed through the limited field visits are less likely to be observed from aerial photography unless very well preserved above the seabed. These kinds of structures are likely to be present and should form a component of any future study.

⁴⁹ <http://blogs.wessexarch.co.uk/OHCCMAPP/2011/12/19/hartavagh/>;
<http://blogs.wessexarch.co.uk/OHCCMAPP/2011/12/19/geirislcett/> (accessed 20/12/2011)



Lithic raw materials survey elements

- 8.2.12 Prehistoric quarries are noted by coastal zone assessments and research projects at Rubh'a Scarp and Cnoc Dubh. The latter is located in the south-east of the area slightly inland from the coast and has been investigated by Ballin (2004, 2008). This particularly quarry is a broad vein of quartz within a larger outcrop and is important as a source of local prehistoric lithic raw material for the Islands. Other worked veins have also been located, some as thin as 10-20 cm (Ballin pers.comm. 2011). Generally under-represented in the archaeological record due to difficulties of identification of work pieces (Ballin 2008), there is considerable scope for future work into establishing prehistoric economy including marine resources and associated technology which must include both natural resources such as wood and other plant material, animal resources and lithic technology and sources.
- 8.2.13 Within coastal and intertidal survey understanding the full range of lithic materials is key to establishing a baseline for prehistoric activity around the coasts as well as increasing attention of the archaeological examination of quartz veins and dykes that may have been quarried in prehistory. In rockier coasts that may appear to have less potential for CZA, identifying lithic material sources, quarrying, production and transport is a valuable goal for understanding the broader prehistoric economy in the region.

Investigation of Cup-marked stones

- 8.2.14 Within the Sound of Harris study area for example, these features appear to have a stronger connection to bait holes than being decorative. A cup-marked stone recorded in Castle Bay is described as probably being natural erosion; however a general theme of data enhancement for these kinds of site-types could usefully involve identifying 'cup-marked stones' that are related to bait preparation and fishing practices.

Intertidal structures surveys

- 8.2.15 Establishing a program or methodology for precise recording of intertidal structures which have a specific tidal or RSL relationship such as fish traps against meaningful and a comparative national benchmark will provide a valuable database of historic sea-level change, community subsistence strategies and a variety of other research themes.

8.3 SPECIALIST INVESTIGATIONS

Palaeo-tide energy and palaeogeography modelling

- 8.3.1 In order to provide an evidence-led prospection for coastal and marine archaeology (including wrecks) methods that can focus limited field resources are invaluable. Palaeo-tide energy modelling of sea lochs which highlight areas where scour and erosion may be less, and where archaeological materials may survive, has the potential to aid in this endeavour. This type of collaborative work would represent a novel and cutting edge approach to prospecting for Submerged Prehistoric Archaeology, one which may provide invaluable baseline information in order to maximise the resources of any fieldwork in the future.
- 8.3.2 It is proposed that during OHCCMAPP Year 2 this will be interlaced with available offshore bathymetry digital datasets (**Table 18**). Together with the available Holocene sea level models from the Islands (Shennan & Horton 2002, Jordan *et al.* 2010) an estimation of the potential Holocene palaeo-shorelines of archaeological significance can be made. With future resources these models can be refined to incorporate sub-bottom geophysical profiling to identify palaeochannels and submerged landsurfaces.



Defining the relationship between freshwater loch dwellings and coasts

- 8.3.3 Furthermore the sheer number of loch dwellings in the Islands and the dominance of water in the landscape/seascape suggest a fully terrestrial focus on the archaeology would be less productive (equally nor would a fully coastal or marine). The sea or the coast, or a marine loch is rarely far from a site (of all periods), especially during later prehistory (Lenfert (2010)). Invoking a source to sea approach as being developed through ScARF for example is likely to highlight a number of research avenues that links all aspects of the Islands archaeology in a holistic narrative.
- 8.3.4 There are other examples of freshwater lochs and lochans that may have been marine environments in the past but have been cut off by anthropogenic or natural processes such as damming or silting up of narrow confluences and isostatic uplift (perhaps more likely on the east coasts).
- 8.3.5 For the purposes of locating submerged prehistoric sites the cessation of tidal influence and associated erosion may not be as severe now-isolated basins. Investigating the distribution of these isolated basins would be a priority for future research seeking to maximise the preservation of prehistoric material in submerged contexts. These kinds of questions are important for fully contextualising the marine and terrestrial watery environments so dominant in the landscape and utilised by people throughout all archaeological periods in the Islands.

RSL / Palaeoenvironmental investigations

- 8.3.6 Research programs aimed at recovering and analysing RSL index points and their palaeoenvironmental context would ideally be carried out at a number of sites across the Islands. They are however, relatively costly, require inter-disciplinary research teams and take several years of laboratory analysis to produce comprehensive results. They are well-suited to research programs that include doctoral and post-doctoral roles or collaborative programs.



8.4 CONNOTATIONS FOR SCOTLAND

- 8.4.1 Many of the elements highlighted in **Section 8** could be applicable more widely across Scotland, especially prospection for intertidal structures using existing high resolution AP collections.
- 8.4.2 For example, CZA has so far not been undertaken for c. 50% of Scotland's coasts. These suggests that potentially large numbers of coastal and intertidal sites are unrecognised, including:
- Hulks and wrecks of all periods, medieval and early-post-medieval wrecks are notably absent from the cultural heritage databases;
 - Intertidal structures and coastal features linked to marine resource exploitation, e.g. fish traps, bait holes which may relate to all periods of fishing activity;
 - Intertidal or submerged peats, tress and other palaeoenvironmental resources significant for investigating the potential for submerged prehistoric archaeology.
- 8.4.3 In order to fully develop marine and maritime archaeology in Scotland, a baseline incorporating these elements for all coasts is a priority. Where resources exist a priority for full intertidal zone survey should be made. This may increase the potential for locating prehistoric and wreck material only exposed at low tides. This is especially important for the parts of Scotland with the largest tidal ranges.
- 8.4.4 Similarly, for underpinning palaeogeographical investigations existing sea level and datasets and derived models are based on spatially and temporally limited sites around Scotland. Where opportunities to expand these datasets occur, through purely research or commercial interventions, the recovering of sediment cores and recording of exposures that contain sea level index points would contribute to not only archaeological studies of sea-level rise but provide a better baseline for developing future models of change and their potential impacts on coastal communities.
- 8.4.5 These sedimentary records, especially cored sediments will also provide invaluable palaeoenvironmental records that can expand Holocene landscape context in conjunction with the archaeological record.



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APPENDIX I: FIELD NOTES

FIELD EXPEDITION & COMMUNITY ENGAGEMENT (OCTOBER 2011)

10/10/2011

Arrive in Barra at 20:30 via Oban ferry. Stayed the night in Castlebay.

11/10/2011

Low tide c. 13:30pm

Visited Vatersay to view the first feature identified during AP review. Identified as a fish-trap, the feature was fully submerged at high-to-mid tide, and became exposed during the drop to mid-low and low tide. We photographed the feature at high and low tide.

In the same bay we observed two boat nausts and a wooden hulk of a fishing boat named the *Boy David* on the north side of the bay. There was a clear path to the boat nausts. The boat itself was mostly above the HWM and exposed near a large wall which was probably used as more than a simple naust – possible space for maintenance, etc; likely dated to the mid-20th century or earlier.

A meeting and lunch took place at the Barra Heritage centre, just south of Castle Bay, with Alex Hales's contact, *MC*, who's grandfather (and great grandparents) lived on Mingulay and who is very connected to the islands as a significant part of her identity. She was joined by two of her friends who also identified with the islands on a personal level.

Flyers were placed in the Vatersay post office, the Barra (Castle Bay) Post Office, the general store on Barra and the Ferry Terminal (Barra – Eriskay).

Ferry from Barra to Eriskay for a meeting with Regional Archaeologist Debrorah Anderson and *HF*. *HF* was able to inform us of a fishtrap location which we decided to visit the following day.

Following dinner, we met with *B* who is a Scallop Diver, in Borrodale. *B* said that Scallop divers were, without question, the most experienced underwater community in the Western Isles, however they are focused on one activity and may not be looking out for anything other than scallops. There was a general feeling from *B* that the tidal channels would be very cleaned by strong tidal currents, while the banks or sheltered areas would be very silty with soft sediments. It is difficult to tell whether those sediments would be tens of metres deep, or thin layers covering either Holocene sediments, or very likely, cleaned bedrock.

Stayed the night at the Polchar Inn, south coast of S. Uist.

12/10/2011

Low tide c. 14:15

During the higher-tide in the morning, we visited the west coast of S.Uist to see the machair and eroding cliffs.

Then visited Loch Euport, where we met with *JJM*, serindipidously. *JJM* is a very experienced fisherman, and gave us time out of his day. He is a partially retired fisherman who now creel fishes for lobster for his family. We spoke for nearly an hour about locations



around his sea loch where there was old settlement (he claimed Norse settlement just across the loch from his home) as well as bait holes on the islands. *JJM* also mentioned an area of 'better land' just outside the sea loch, on the minch side, to the south – an area of a freshwater valley (which he called a mini 'oasis') that is also sheltered by a small (though substantial) island. *JJM* informed us of a fishtrap in this location as well, and reported some trees growing in the valley, which he said was inhabited at least 500 years ago and probably since the beginning of the time when people first came to the islands. *JJM* gave us his contact details, including phone number and was given our business cards and a flyer.

At low tide, we moved to Coalas Mor, to view a fishtrap that *HF* had mentioned the previous day. The fishtrap, a very clear feature to be seen at low tide, was located near at least two structures. One which has been destroyed so that only its foundation is preserved amongst vegetation; and a second white house. An abandoned modern house is also located on the hill, just above the fishtrap. The fishtrap itself consists of a row of stones, several stones thick, and remains in good condition, despite the middle having been broken away – or perhaps deliberately removed (but likely broken over time due to currents from the incoming river. This looks very much like a mechanism for catching migratory fish at the inlet of the river, but well below HWM. Seaweed covers the feature and creeps up the river valley at least 100m upstream.

Evening took us to North Uist where we gave a public lecture in Lochmaddy at the Taigh Chearsabhaigh Museum & Arts Centre.

The public lecture was very well attended, at 40 people and full capacity. The lecture was divided into two parts, Jonathan Benjamin spoke about submerged prehistory in Europe and its potential in Scotland, and AH spoke about RCAHMS role, aerial photographs and features you can identify, such as fish traps, in the modern landscape.

After the talk, we were approached by a number of keen locals, including *MS* and her sister *CM*, originally from South Harris, but now of Grimsay, North Uist. They told us of eroding flints from the sands of Grimsay, found during an exceptionally low tide and now in the possession of *MS* at her home. The sisters gave us their phone numbers and also the number of *GSF* and *GM*. We were also approached by *CE*.

Stayed the night in Lochmaddy.

13/10/11

Low tide c. 14:45

Went to visit the Neolithic Chambered Cairn now partly submerged at the HWM at Geirislitt just opposite Vallay, near Sollas with Deborah Anderson and her colleague *C* from the Museum in North Uist. The portal stone, or perhaps cap stone in front of the feature is no longer in its original position. This feature was originally discovered and photographed by Erskine Beverage in 1911 and excavated in the 1960's and is well known within the SMR/NMRS.

The team then surveyed around the headland where there was a dyke that ran from the headland to the intertidal zone.

Ferry to Harris

At the ferry we met *GSF* and *GM* who are local to Northton. *GSF* is a local of 17 years in Northton who is very familiar with the landscape and has a keen interest in archaeology. *GM* is a local of several generations to south Harris. From there, we visited the Northton



Mesolithic sites and saw a rock-carved bait hole on the edge of the sheer cliff, which drops a few metres down to the sea at low tide and is submerged during the high tide.

We also spotted a large fish trap, similar in shape to the Vattersay fishtrap, near the salt marsh of Northton, not far from the coring locations of Jordan *et al.* (2009).

Stayed the night in Tarbert

14/10/11

Low Tide c. 15:20

From Tarbert, we left by noon for 'the Bays'. We had lunch at the 'Butty Bus' near the ferry terminal at Leverburgh, where we met the owner, Chris, who told us about a fish trap that his grandfather had built and used according. We left to investigate the fish trap that was said to have been built in the early 1900s. Though both Chris and his father did not work the trap. Chris said his grandfather used this for lobster (**Plate 6**).

The fishtrap, near Manish was linear and intact, piled several stones high and wide, the feature looked undisturbed in comparison with the fishtraps encountered at rivermouths. Knowing the age of its last usage, in the first half of the 20th century, can possibly be useful in determining age of other fishtraps which have collapsed. Also in this bay was a hulk of a small wooden rowboat, *Robin*, which is out of use, but probably mid or late 20th century.

Driving through the bays we noticed at least two more fishtraps – likely undocumented in the record – near Ob Liath. These were different than Chris' grandfather in that they were located at the mouths of rivers.

AH and JB snorkelled the narrow inlet - the channel section near Aird Shleibhe. Observed strong tidal currents through the narrows, where the seabed comprised clean shelly sand, and bedrock. On the sides of the channel, there was a build up of fine silt. No archaeological remains were identified, though the main bay and inner channels were not surveyed. There were a considerable amount of bottles and ceramic jars, mid-late 20th century, in the channel (including several white jars that had the inscription 'Oban' and 'Portobello' which may also provide indications of resources for further historical research. The snorkel was useful to assess visibility, seabed conditions and the currents in the narrows of the channel. During the low tide, the channel emptied out to about 1m depth in the middle, which would make the high tide c. 5m depth.

Drove to Stornoway to meet the Lewis and Harris BSAC club for a social evening and discussion about dive spots, potential, etc. Mark Beanland, president of the LHBSAC club had brought with him 4 other sport divers. They suggested investigations in Loch Roag, though they said that the diving community would likely not be diving in locations where we would want to be looking (i.e. where palaeosols could potentially be identified). They said similar about Scallop divers, which spend a lot of time underwater, but are more likely to be looking for scallops in the muds and therefore may not be looking in areas where both preservation and visibility of sites/finds could occur.

15/10/11

Lewis. Low tide c. 15:45

Placed flyers in the Stornoway fishermen's coop and Charlie Macleod's butcher shop before heading across the island to Loch Roag. Visited Calanais standing stones and photographed the stones in their setting next to Loch Roag. This was followed by a trip to Lundaal to see the



intertidal peat bog / forest on the south west side of the tidal pond. Observed a significant intertidal peat layer containing substantial amount of preserved, water logged wood in the lower layers of the 1.5m (approx) peat bank at the edge of the tidal pool.

There is also a sheep wash station, including a modern concrete sheep dip and a stone enclosure which is partly intertidal.

We then visited three fishtraps at the inlet near Barraglom, which is visible from APs. It is also a scheduled monument. Canmore ID 72851

16/10/11

Ferry back to the mainland following debrief with DA and photography of ceramics from freshwater Loch an Duna.



APPENDIX II: GAZETTEER

GAZETTEER OF PREVIOUSLY UNRECORDED SITES

Site ID	Date	Place / Site	NGR E	NGR N	Site Type	Description	Photo / Visit	Source
1001	11/10/2011	Bagh Chornaig, Vatersay	63301	796876	Dock and Hulk	20 th century boat: <i>Boy David</i>	Y	RCAHMS/ OHCCMAPP
1002	12/10/2011	Loch Aineort, South Uist	78849	828226	Fishtrap	Removed to footings by JJMs brother	N	RCAHMS/ OHCCMAPP. See AP, JJM
1003	12/10/2011	Loch Aineort, South Uist	76939	828490	Fishtrap	Fishtrap wall shown on modern AP	N	RCAHMS/ OHCCMAPP. See AP
1004	12/10/2011	Loch Aineort, South Uist	80096	828636	Fishtrap	Fishtrap wall shown on modern AP	N	RCAHMS/ OHCCMAPP. See AP
1005	12/10/2011	Loch Aineort, South Uist	78620	827455	Fishtrap	Fishtrap wall shown on modern AP	N	RCAHMS/ OHCCMAPP. See AP
1006	12/10/2011	Loch Aineort, South Uist	78569	827462	Building	Footing of a rectangular building on modern AP	N	RCAHMS/ OHCCMAPP. See AP
1007	12/10/2011	Loch Aineort, South Uist	76648	829794	Fishtrap	Salmon Fishtrap wall shown on modern AP	N	RCAHMS/ OHCCMAPP. SEARCH, See AP
1008	12/10/2011	Loch Sgiopoint, South Uist	82871	838187	Fishtrap	Fishtrap wall shown on modern AP	Y	RCAHMS/ OHCCMAPP. AP
1009	12/10/2011	Oitir Mhor, Eilean na Dairbe, Grimsay, North Uist	84355	856805	Fish pond	Fishtrap wall shown on modern AP	N	RCAHMS/ OHCCMAPP. AP
1010	12/10/2011	Teanamachar, Illeray, North Uist	77382	862077	Intertidal peats	Two laterals of exposed intertidal peat	Y	RCAHMS/ OHCCMAPP. D. Anderson
1011	12/10/2011	Eiean na Cairidh, Loch Eport, North Uist	83916	863742	Fishtraps	At least 5 fishtraps shown on modern AP	N	RCAHMS/ OHCCMAPP. MODERN AP.
1012	12/10/2011	Loch Obasaraigh, Loch Eport, North Uist	88890	862149	Fishtrap	Fishtrap wall shown on modern AP	N	RCAHMS/ OHCCMAPP. MODERN AP.
1013	13/10/2011	Geiriscllett, North Uist	76551	875543	Wall	Wall runs into intertidal zone form peat foreshore	Y	RCAHMS/ OHCCMAPP. D. Anderson, C. MacCuish
1014	14/10/2011	Fhionnsbhaigh, Harris	107760	886800	Fishtrap	Fishtrap wall shown on modern AP, built by Angus Ross in 1905	Y	RCAHMS/ OHCCMAPP. C. Ross.
1015	14/10/2011	Fleoidiabhaigh, Harris	109866	888732	Fishtrap	Fishtrap wall shown on modern AP	Y	RCAHMS/ OHCCMAPP.
1016	14/10/2011	Manais, Harris	110014	889394	Fishtrap	Fishtrap wall shown on modern AP	Y	RCAHMS/ OHCCMAPP.
1017	15/10/2011	Rubha na Cloiche, Calanais, Lewis	121695	932511	Dyke	Dyke shown on modern AP	Y	RCAHMS/ OHCCMAPP.

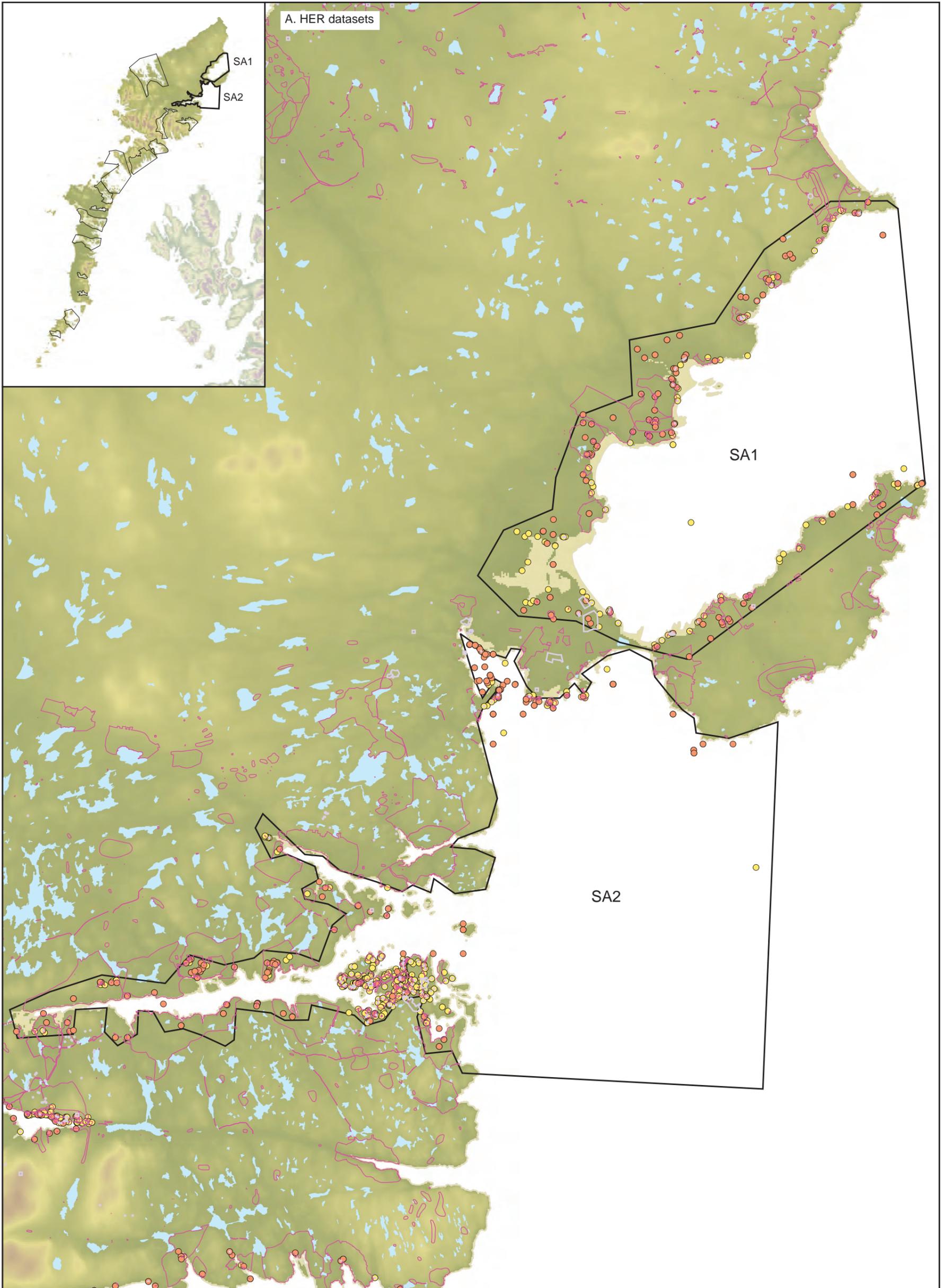


APPENDIX III: STUDY AREA MAPPING

INTRODUCTION

Available cultural heritage datasets are mapped by study area. Datasets consist of:

- SMR (CNE-Siar),
- NMRS (RCAHMS),
- DSP polygons (RCAHMS),
- 'Located wrecks' by date,
- Admiralty Bathymetry charts have been annotated to highlight the -10m bathymetric contour as a preliminary means of establishing potential for shallow inundated palaeo-coastlines of up to Mesolithic age within the study areas.



A. HER datasets

SA1
SA2

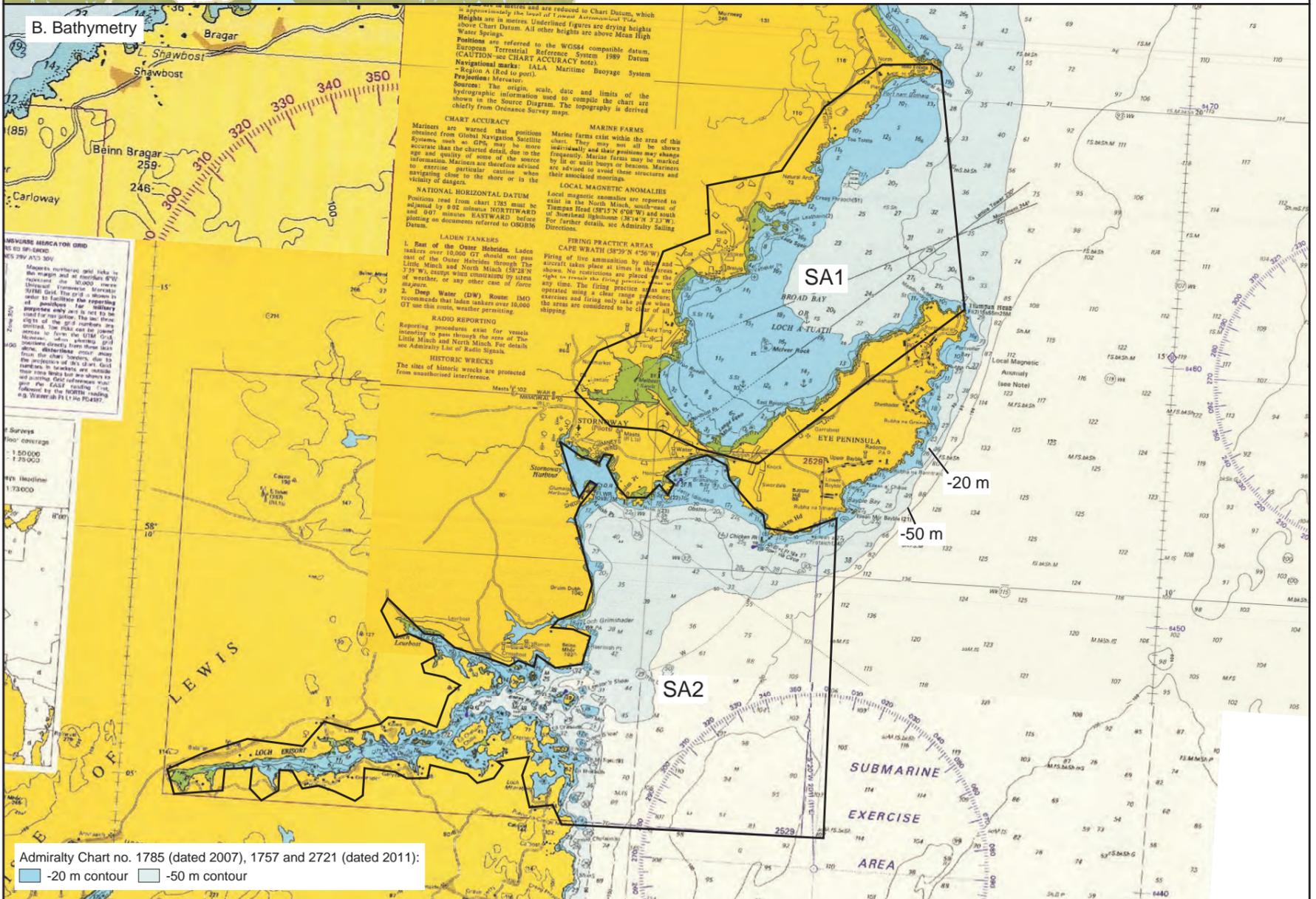
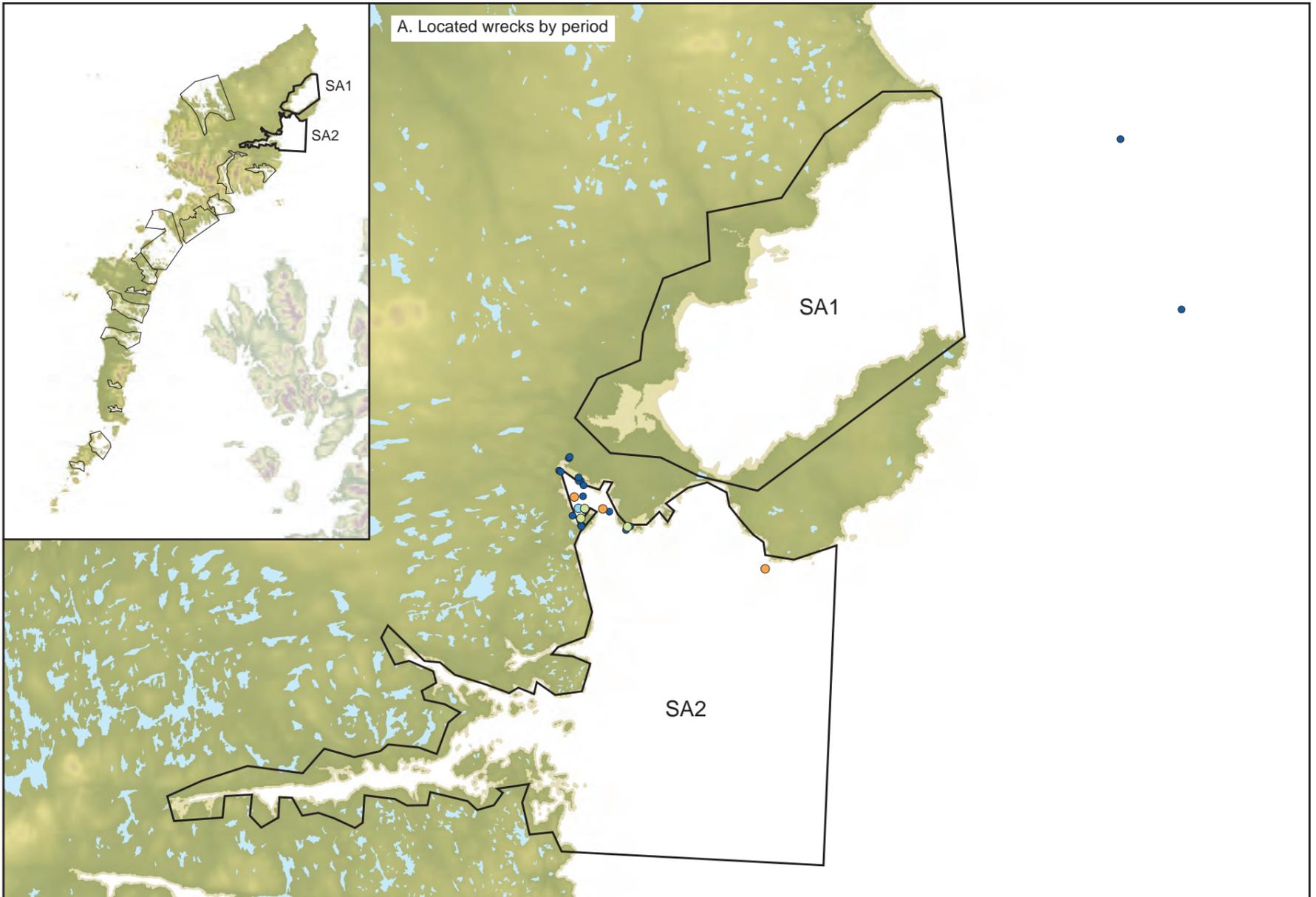
SA1

SA2

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SA1: Broad Bay, SA2: Stornoway Approaches and Loch Erisort

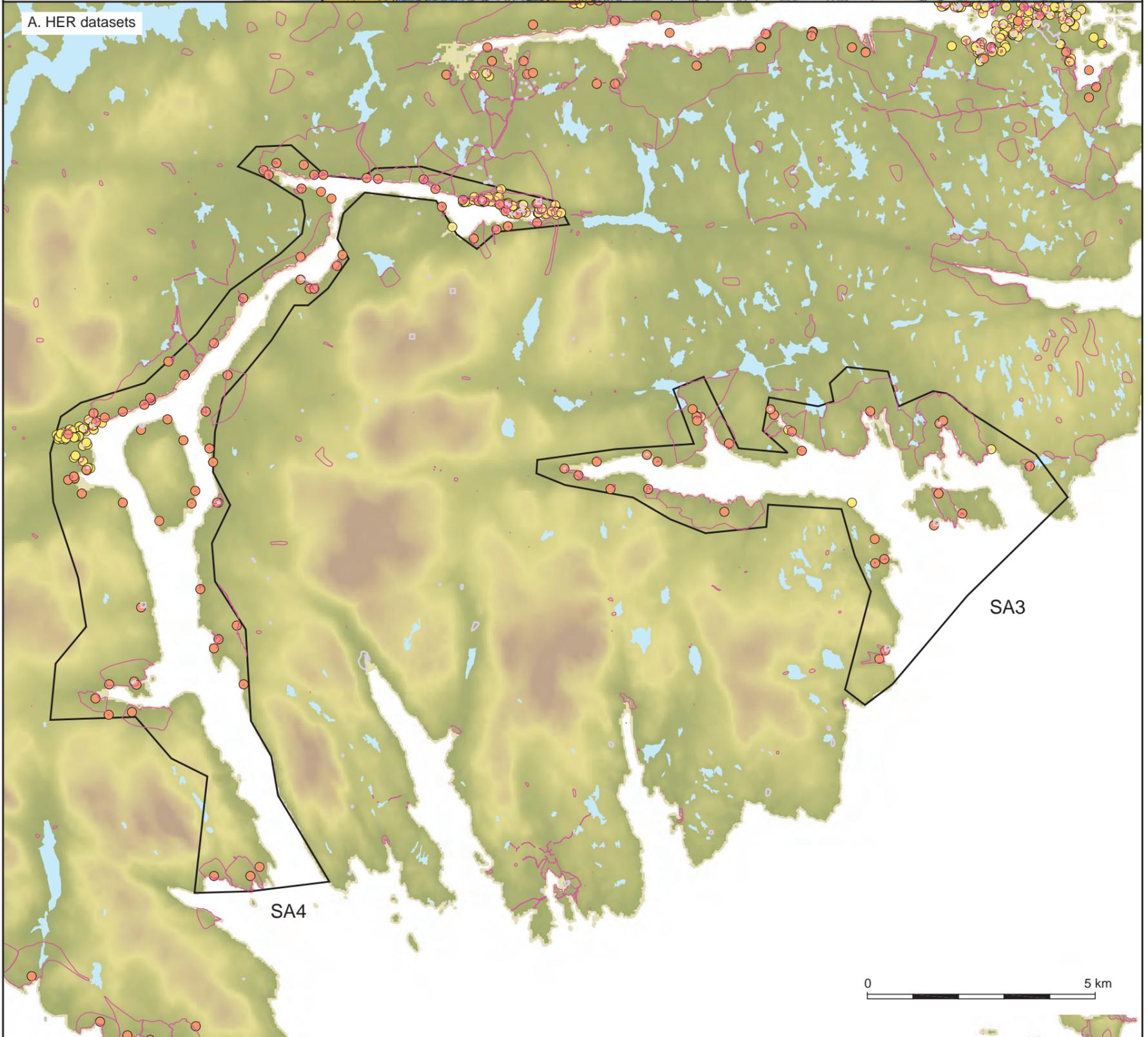
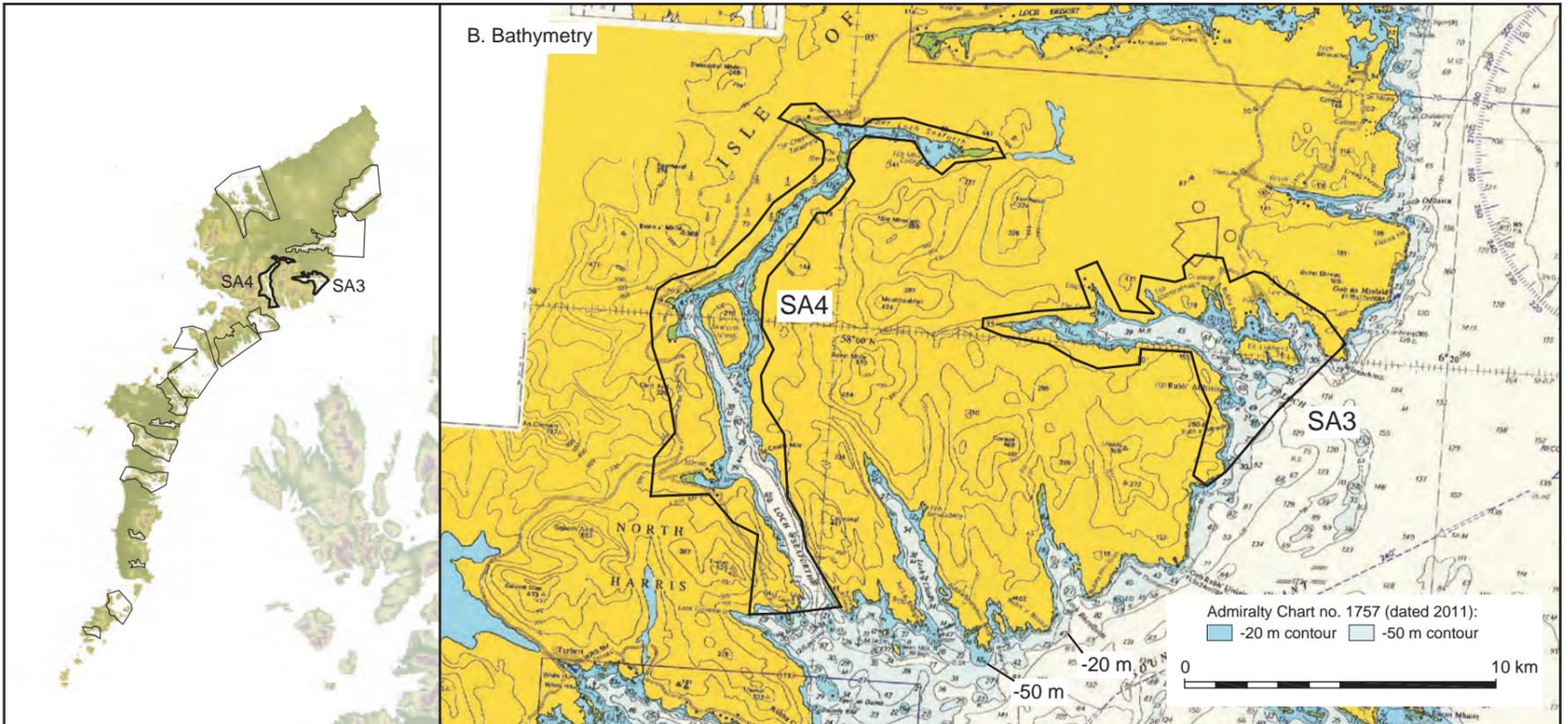
Figure A1(A)



Study Areas 	Located wrecks by period: ● 1728 ● 1939-1945 ● 1816-1913 ● 1945 onwards ● 1914-1918 ● Unknown ● 1919-1938		This product has been derived, in part, from Crown Copyright Material with the permission of the UK Hydrographic Office and the Controller of Her Majesty's Stationery Office (www.ukho.gov.uk) All rights reserved. (Wessex Archaeology Licence Number 820/020220/11) NOT TO BE USED FOR NAVIGATION WARNING: The UK Hydrographic Office has not verified the information within this product and does not accept liability for the accuracy of reproduction or any modifications made thereafter. Contains Ordnance Survey data © Crown Copyright and database right 2011. This material is for client report only © Wessex Archaeology. No unauthorised reproduction.
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SA1: Broad Bay, SA2: Stornoway Approaches and Loch Erisort

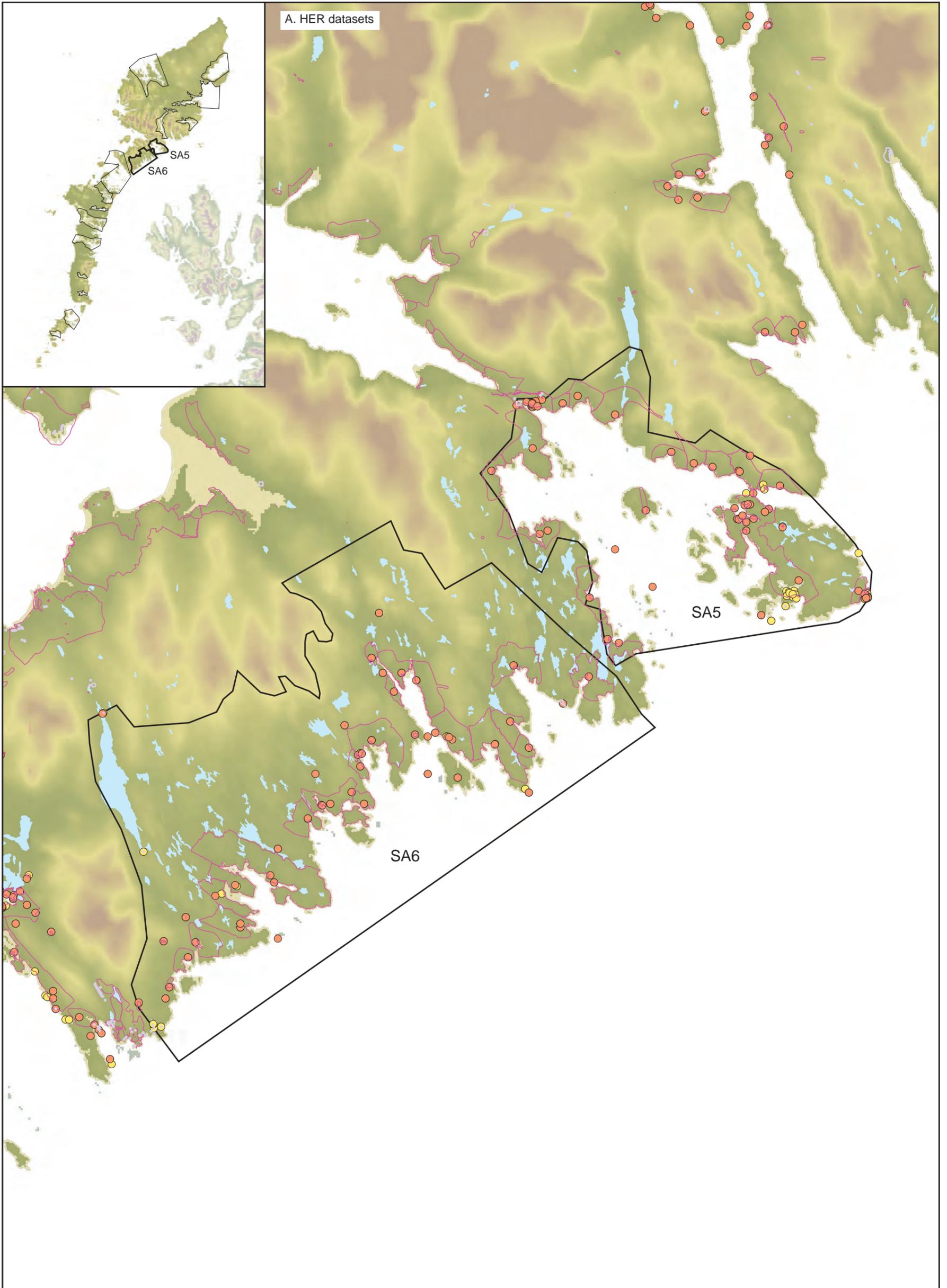
Figure A1(B)



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SA3: Loch Sealg, SA4: Loch Seaforth

Figure A2

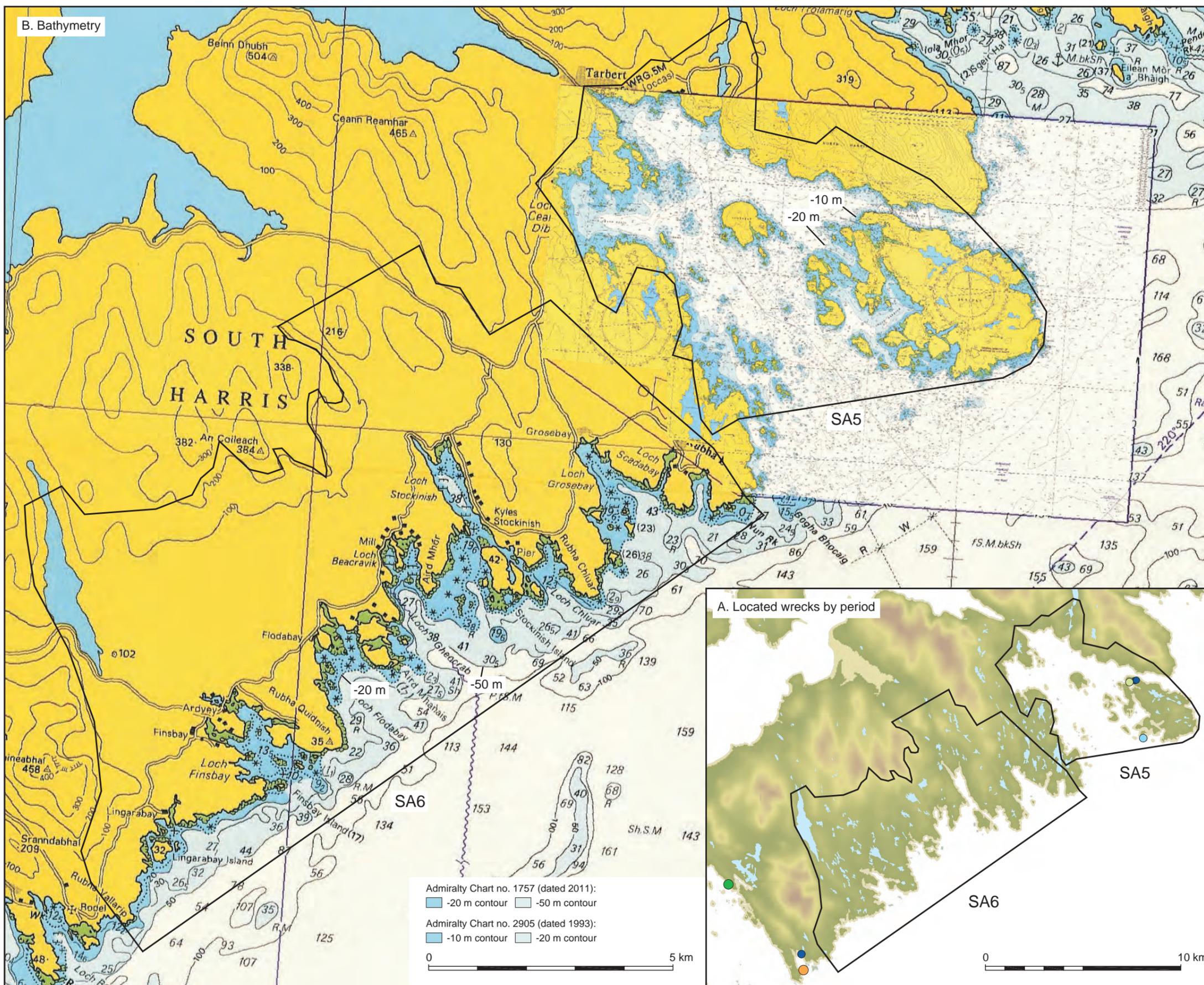


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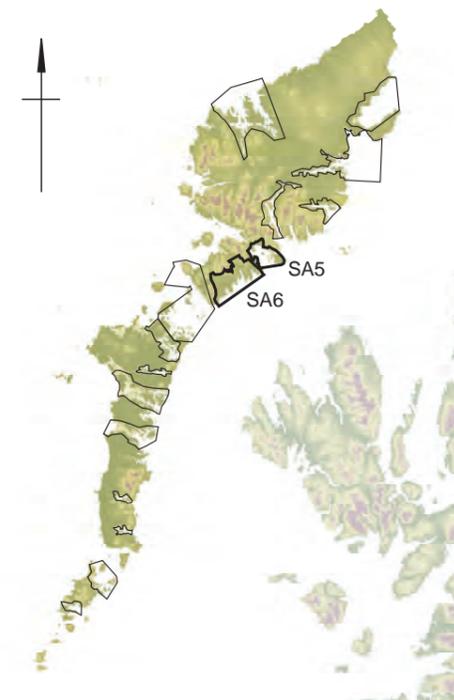
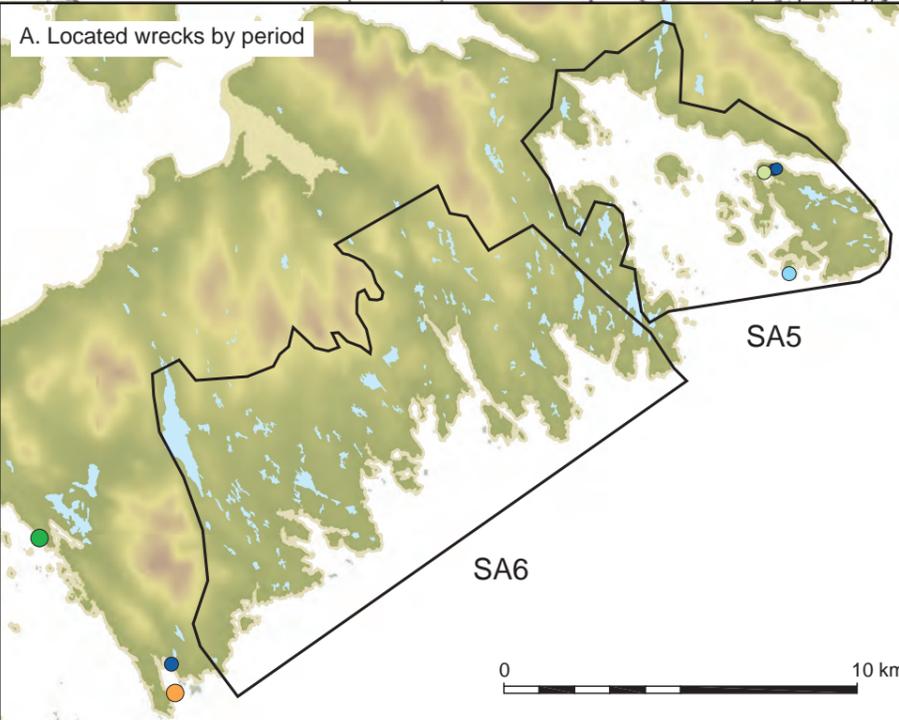
SA5: East Loch Tarbert, SA6: The Bays

Figure A3(A)

B. Bathymetry



A. Located wrecks by period



Study Areas

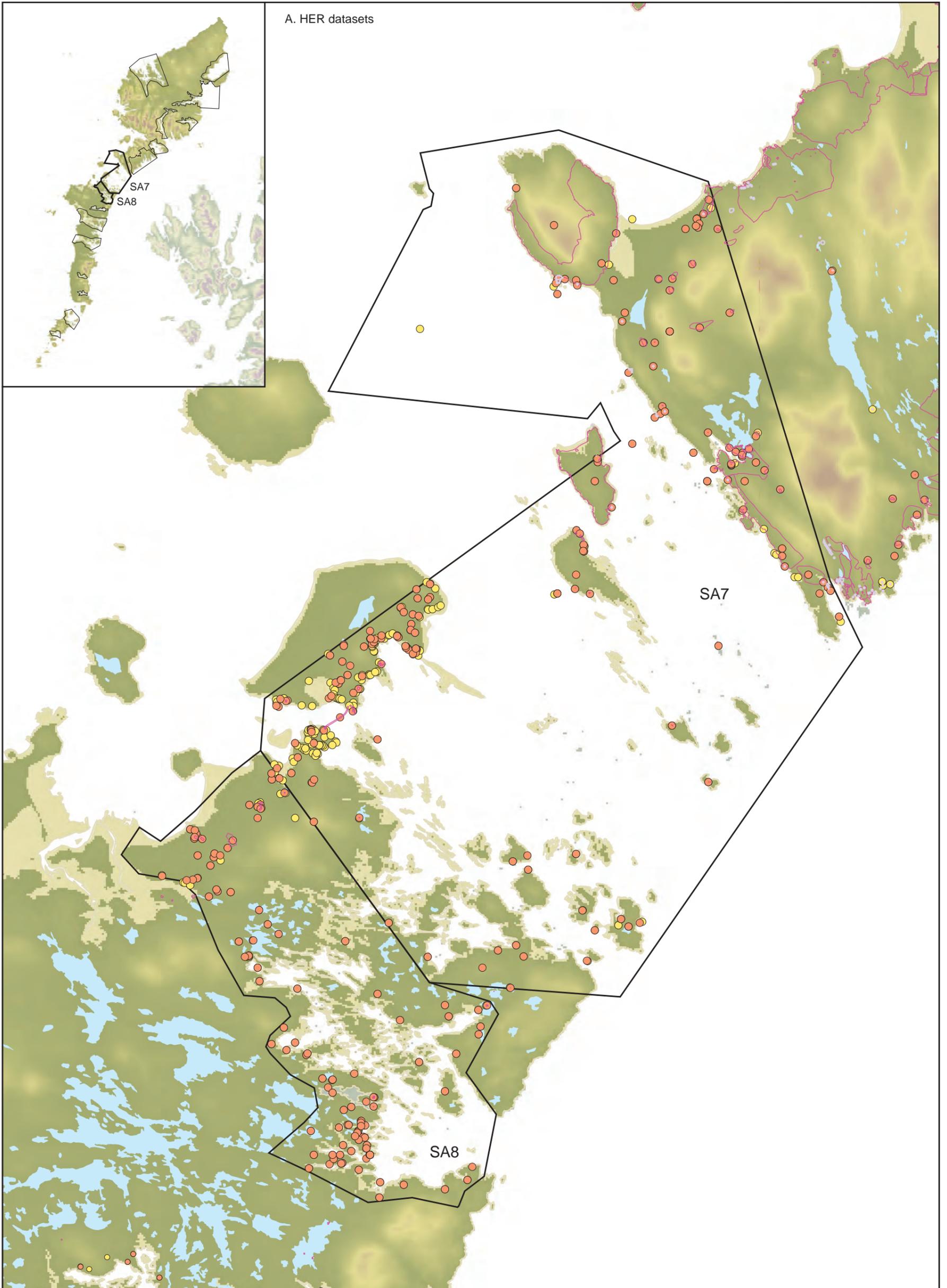
- Located wrecks by period:
- 1728
 - 1816-1913
 - 1914-1918
 - 1919-1938
 - 1939-1945
 - 1945 onwards
 - Unknown

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SA5: East Loch Tarbert, SA6: The Bays

Figure A3(B)

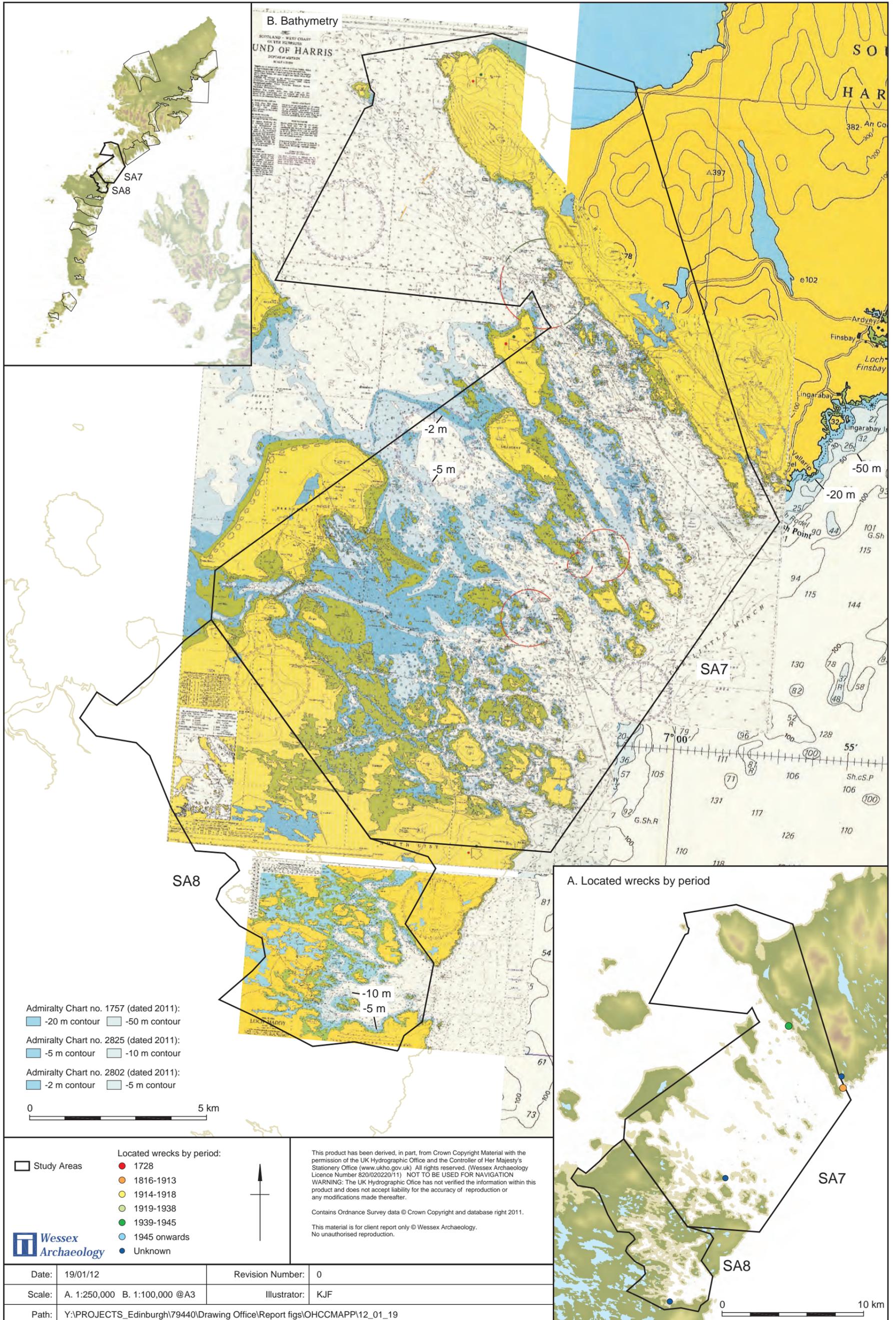


A. HER datasets

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SA7: Sound of Harris, SA8: Lochmaddy

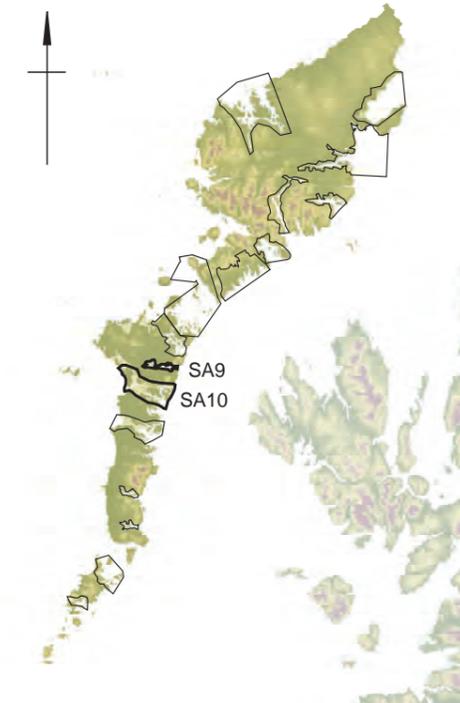
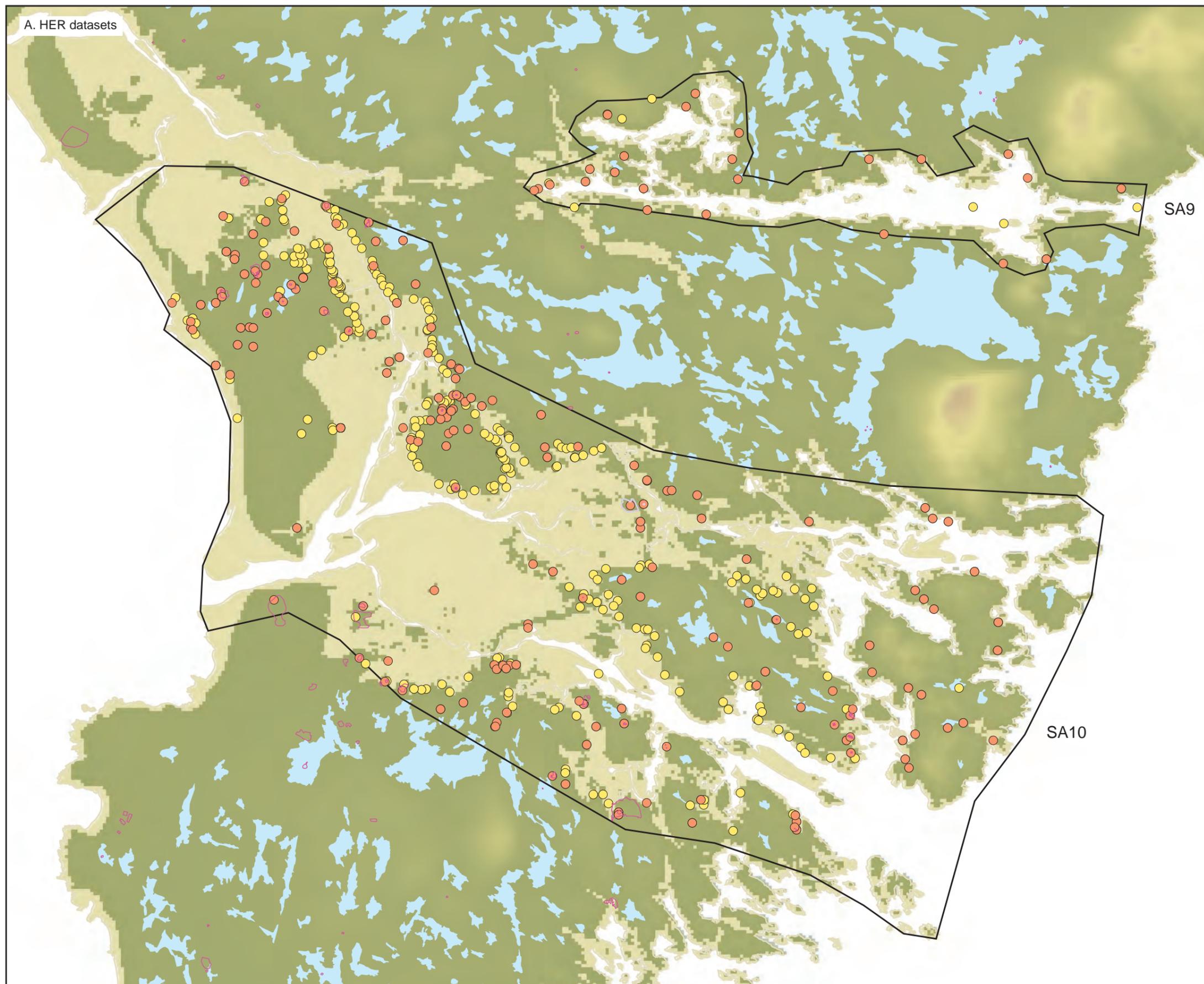
Figure A4(A)



SA7: Sound of Harris, SA8: Lochmaddy

Figure A4(B)

A. HER datasets



- Study Areas
- Discovery areas (DSP)
- Known site extent (DSP)
- CNE-Siar
- NMRS



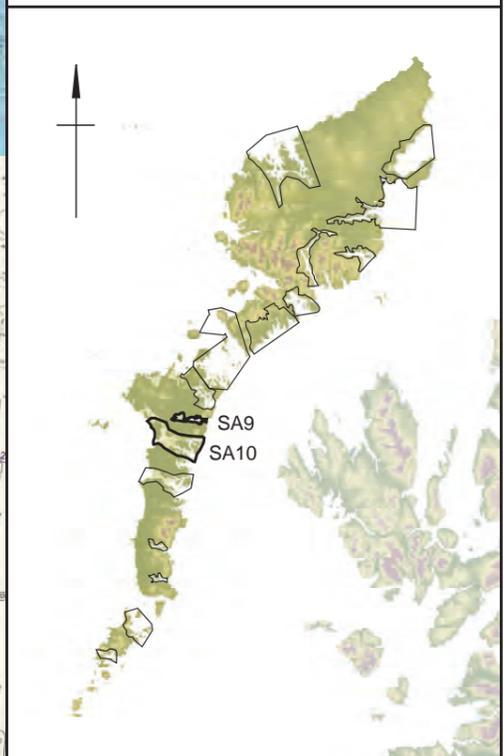
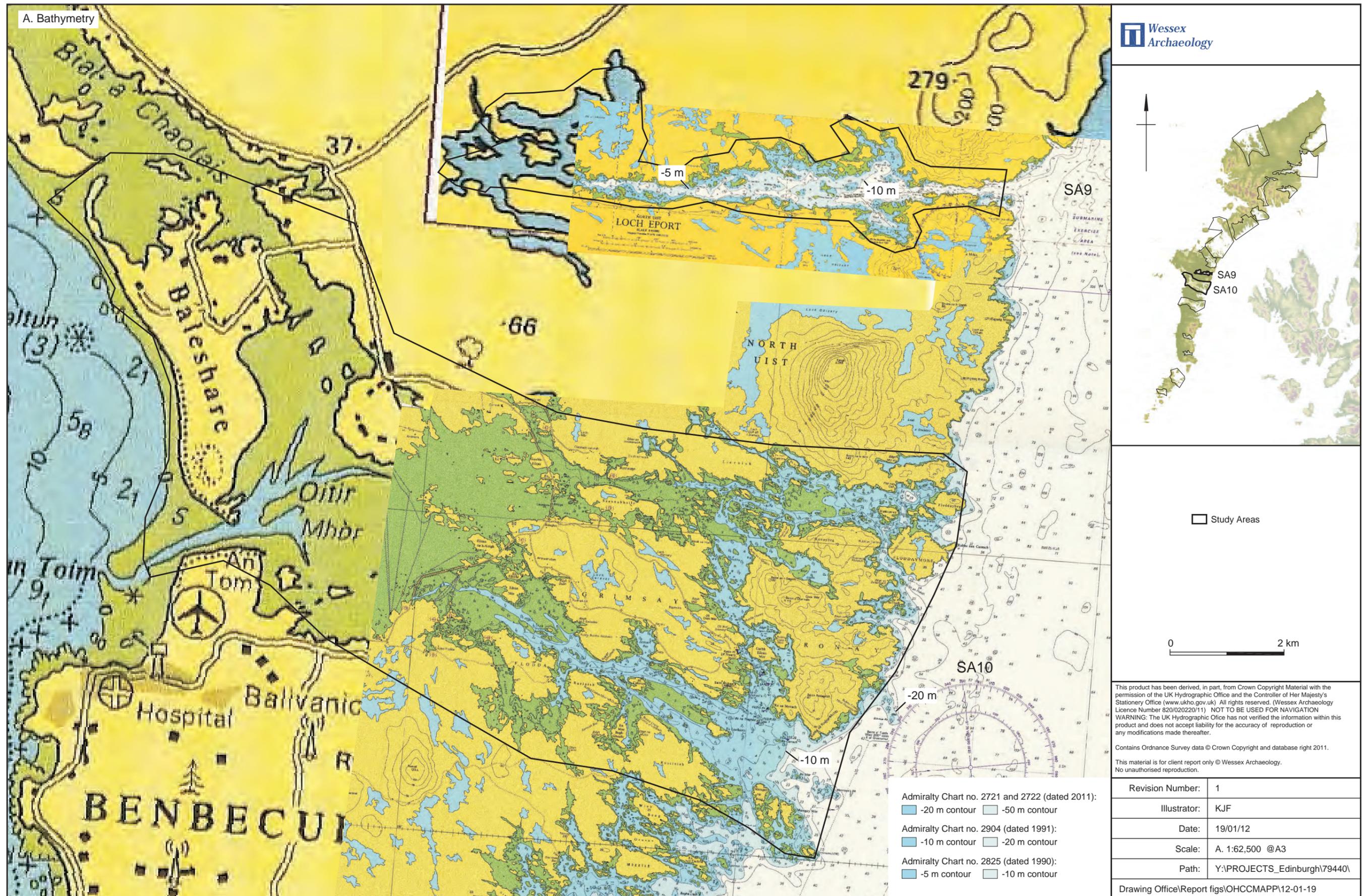
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SA9: Loch Eport, SA10: North Baleshare

Figure A5(A)

A. Bathymetry



Study Areas

0 2 km

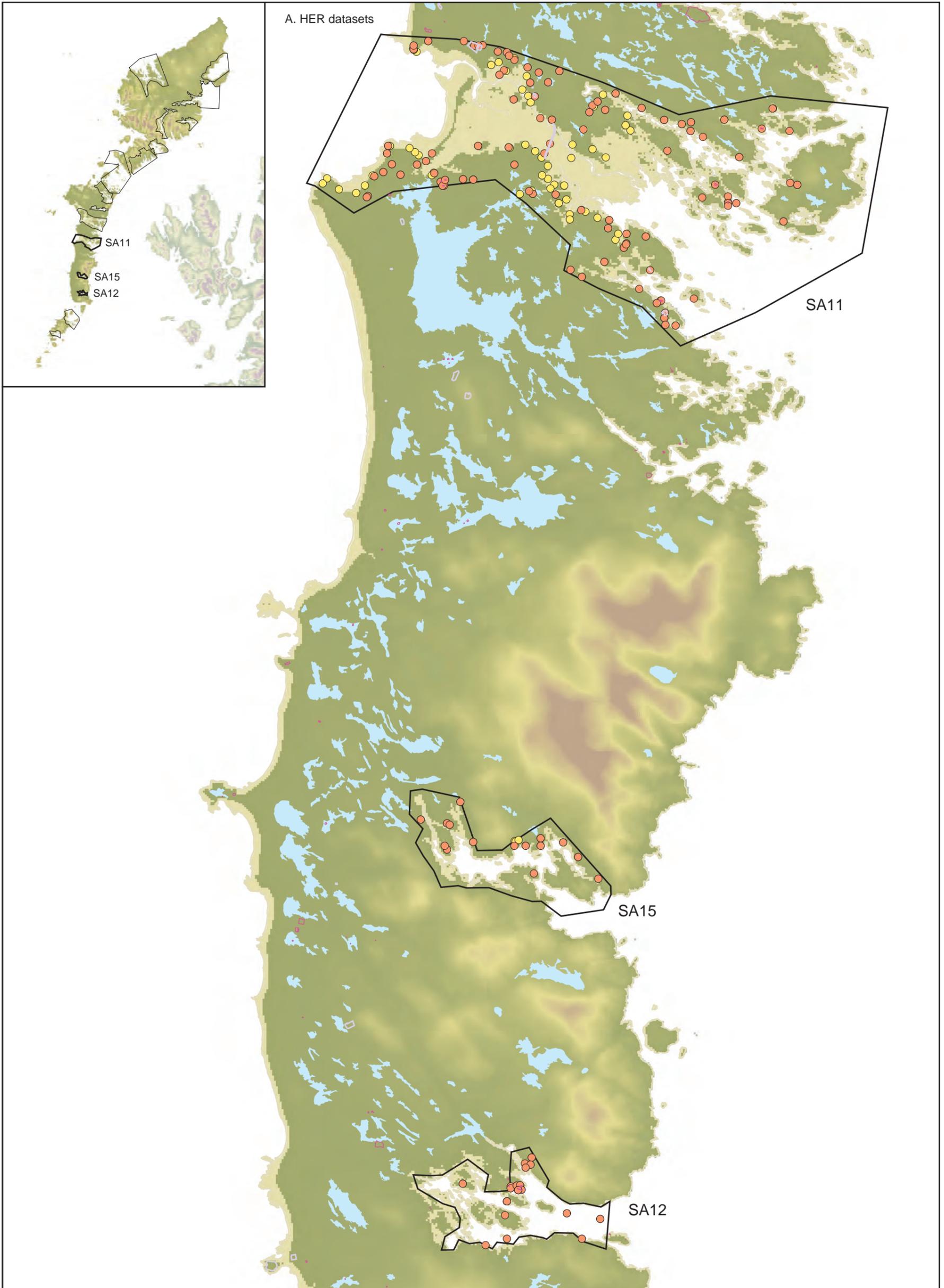
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SA9: Loch Eport, SA10: North Baleshare

Figure A5(B)



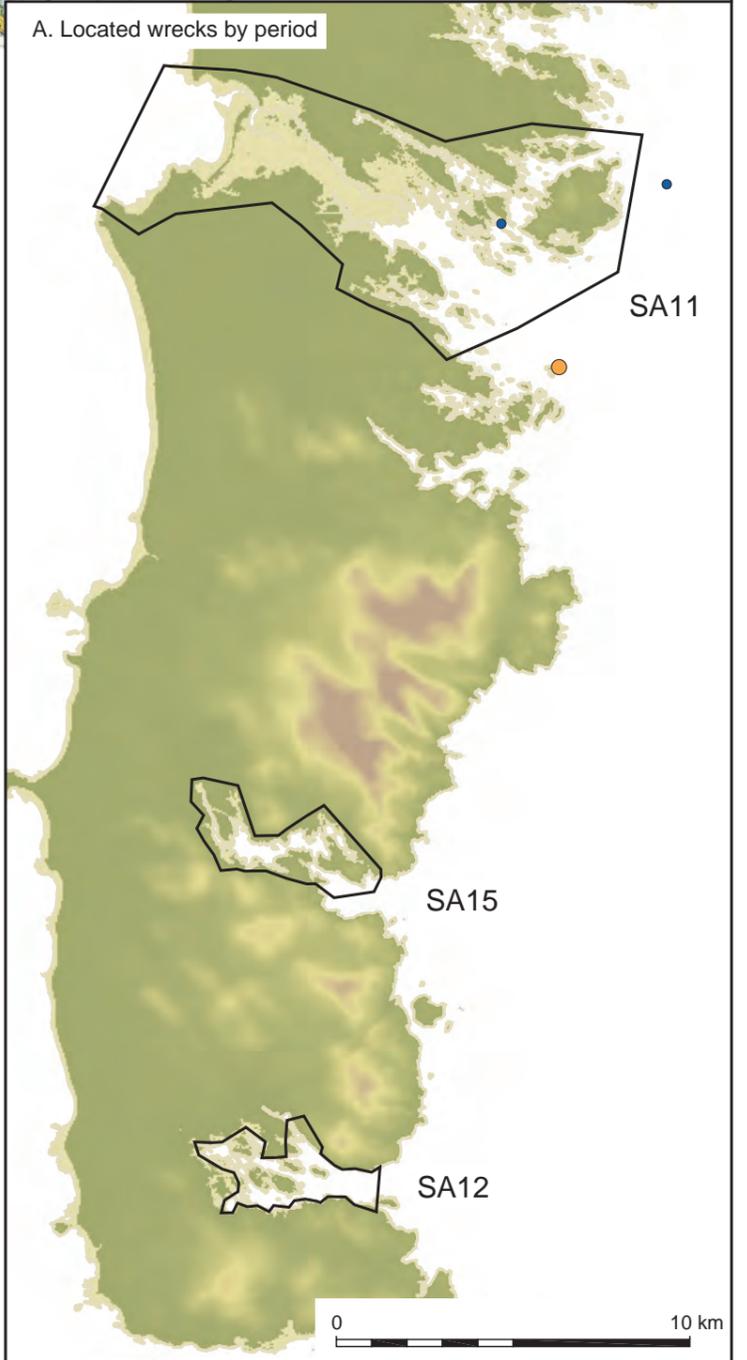
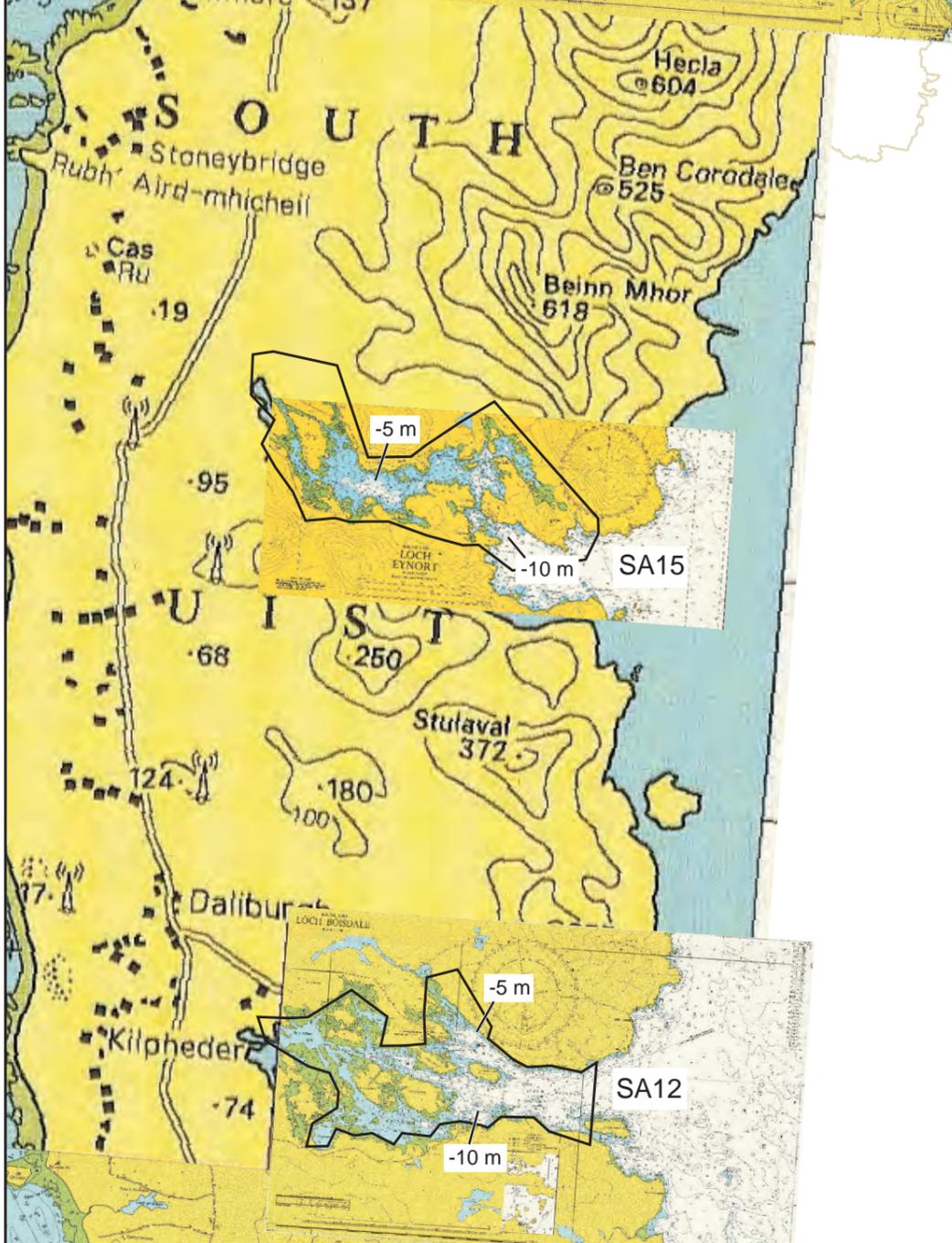
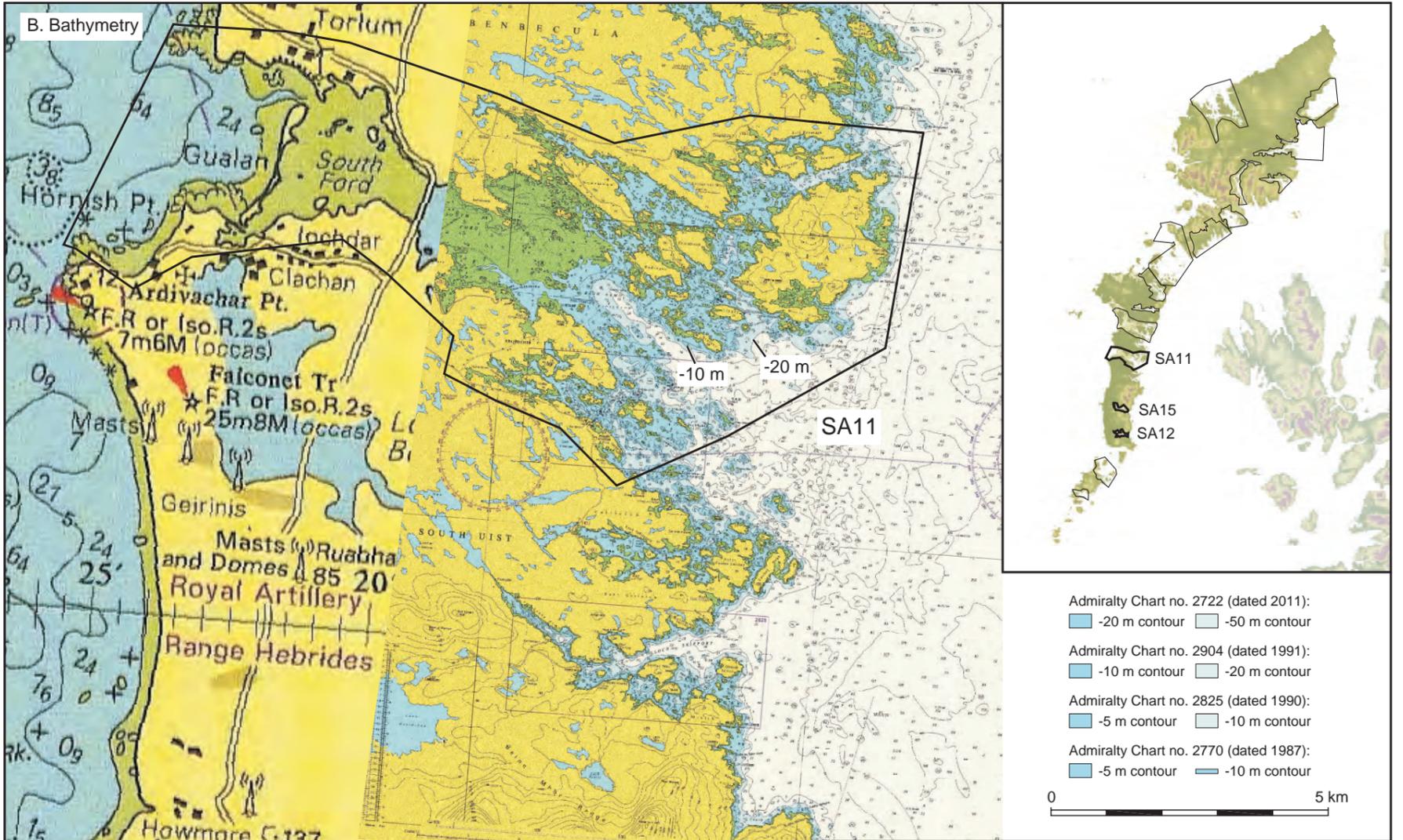
<ul style="list-style-type: none"> Study Areas Discovery areas (DSP) Known site extent (DSP) 	<ul style="list-style-type: none"> ● CNE-Siar ● NMRS 		<p>Contains Ordnance Survey data © Crown Copyright and database right 2011. This material is for client report only © Wessex Archaeology. No unauthorised reproduction.</p> <table border="1"> <tr> <td>Date:</td> <td>20/12/11</td> <td>Revision Number:</td> <td>0</td> </tr> <tr> <td>Scale:</td> <td>1:100,000 @A3</td> <td>Illustrator:</td> <td>KJF</td> </tr> <tr> <td>Path:</td> <td colspan="3">Y:\PROJECTS_Edinburgh\79440\Drawing Office\Report figs\OHCCMAP\11_12_19</td> </tr> </table>	Date:	20/12/11	Revision Number:	0	Scale:	1:100,000 @A3	Illustrator:	KJF	Path:	Y:\PROJECTS_Edinburgh\79440\Drawing Office\Report figs\OHCCMAP\11_12_19		
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0 5 km

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SA11: Bagh nam Faileann, SA15: Loch Eynort, SA12: Loch Boisdale

Figure A6(A)



Study Areas

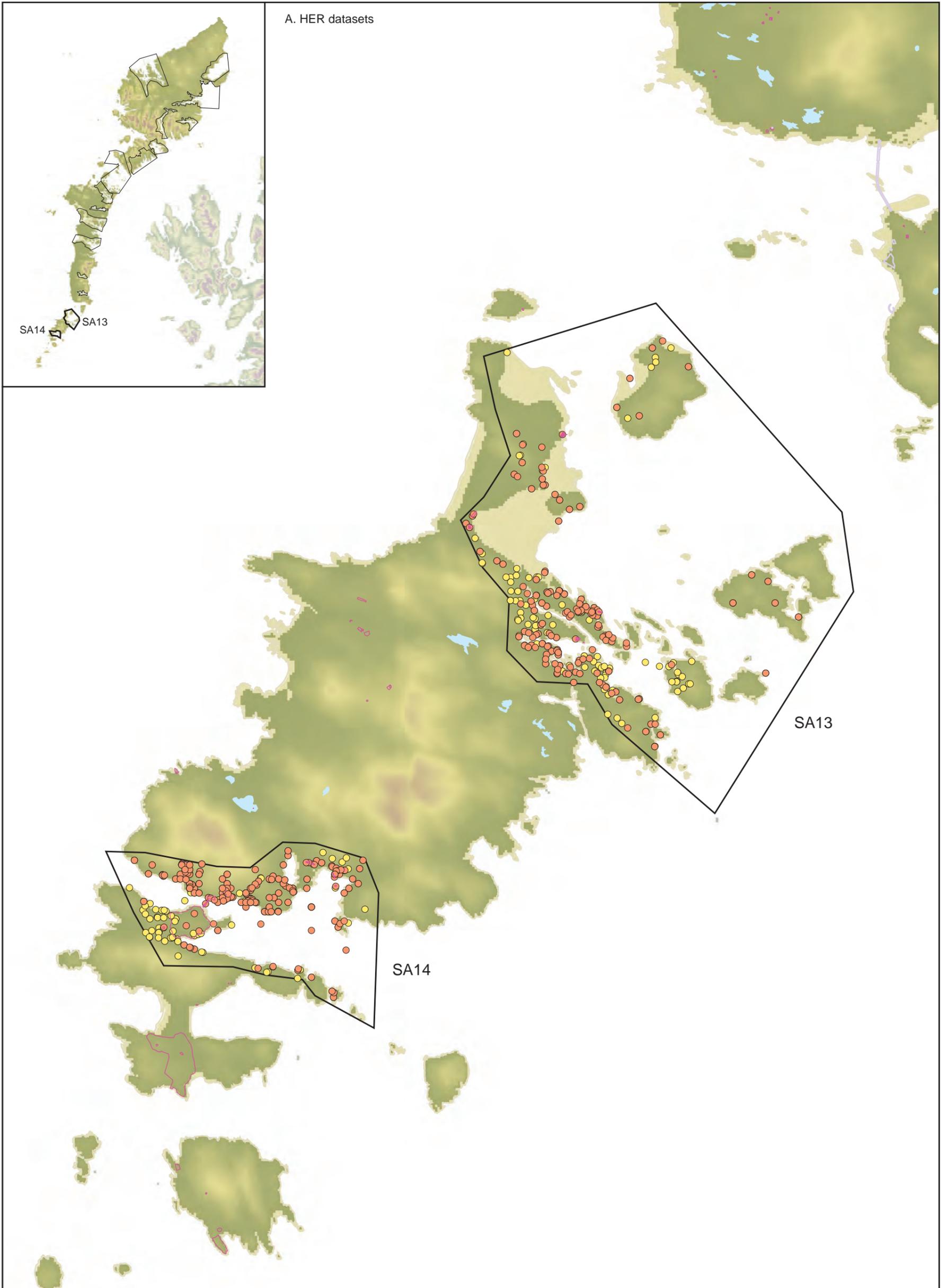
Located wrecks by period:
 ● 1728 ● 1939-1945
 ● 1816-1913 ● 1945 onwards
 ● 1914-1918 ● Unknown
 ● 1919-1938

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SA11: Bagh nam Faileann, SA15: Loch Eynort, SA12: Loch Boisdale

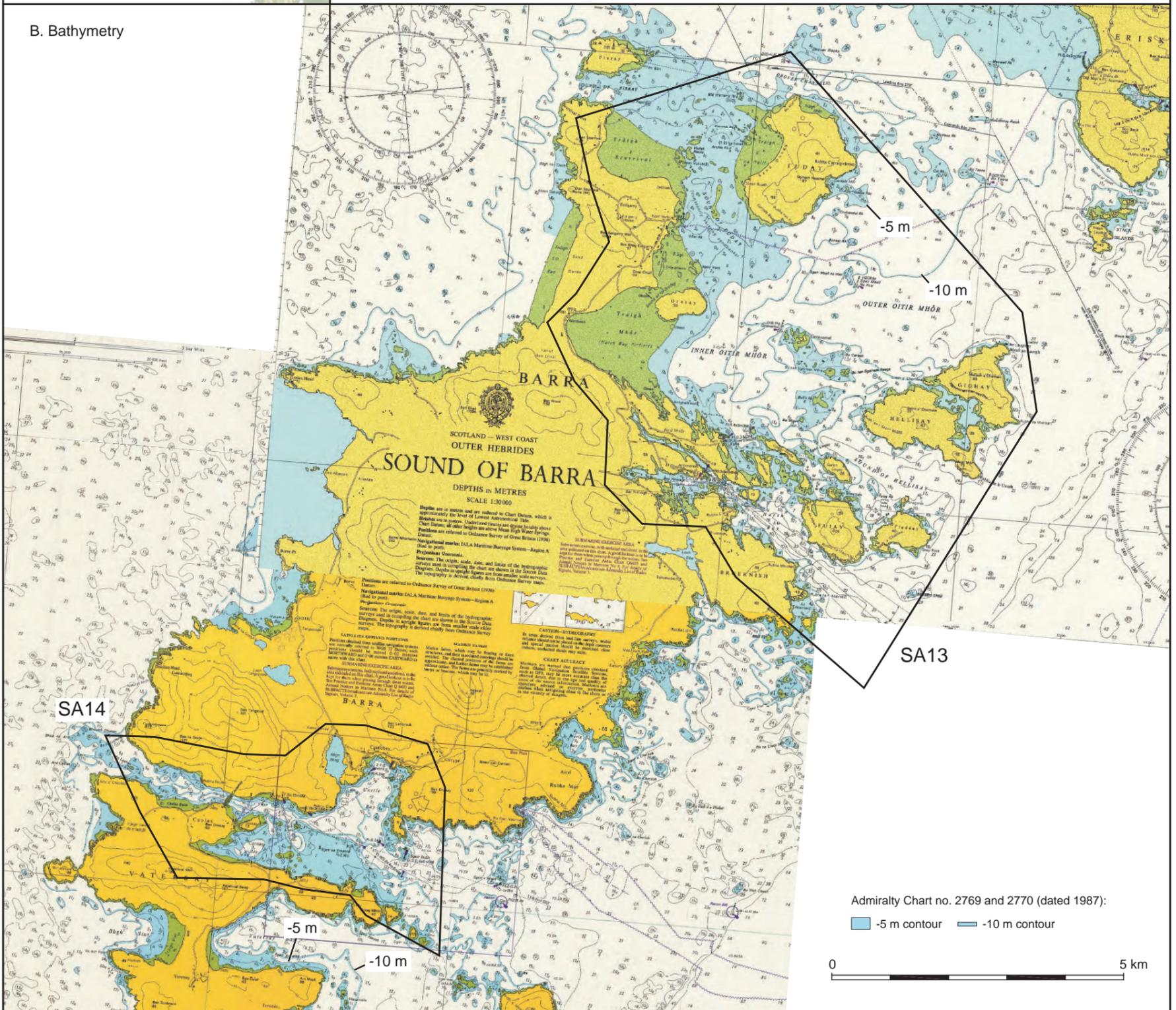
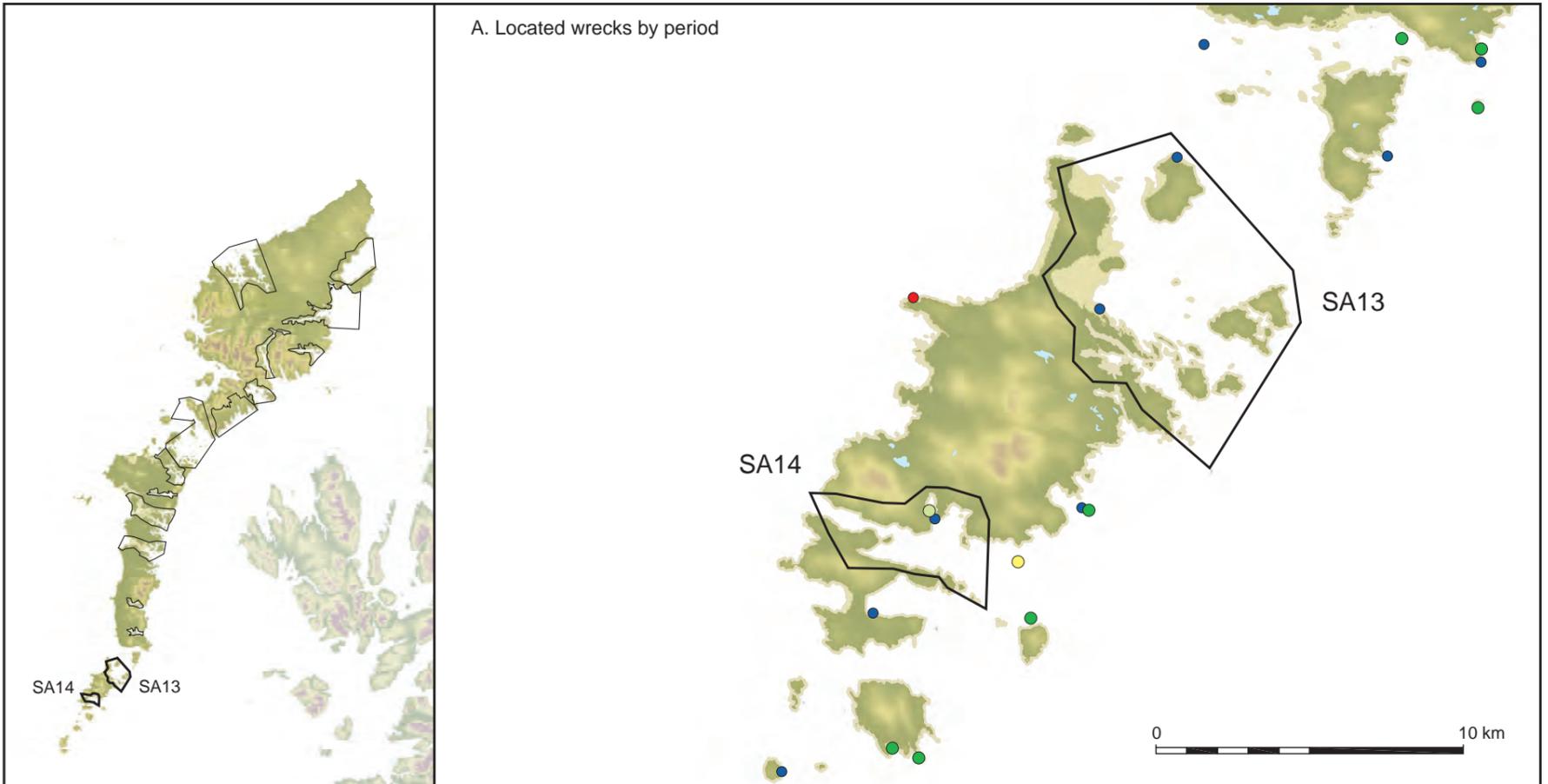
Figure A6(B)



<ul style="list-style-type: none"> Study Areas Discovery areas (DSP) Known site extent (DSP) 	<ul style="list-style-type: none"> ● CNE-Siar ● NMRS 		<p>Contains Ordnance Survey data © Crown Copyright and database right 2011. This material is for client report only © Wessex Archaeology. No unauthorised reproduction.</p>												
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SA13: Bruernish, SA14: Castlebay

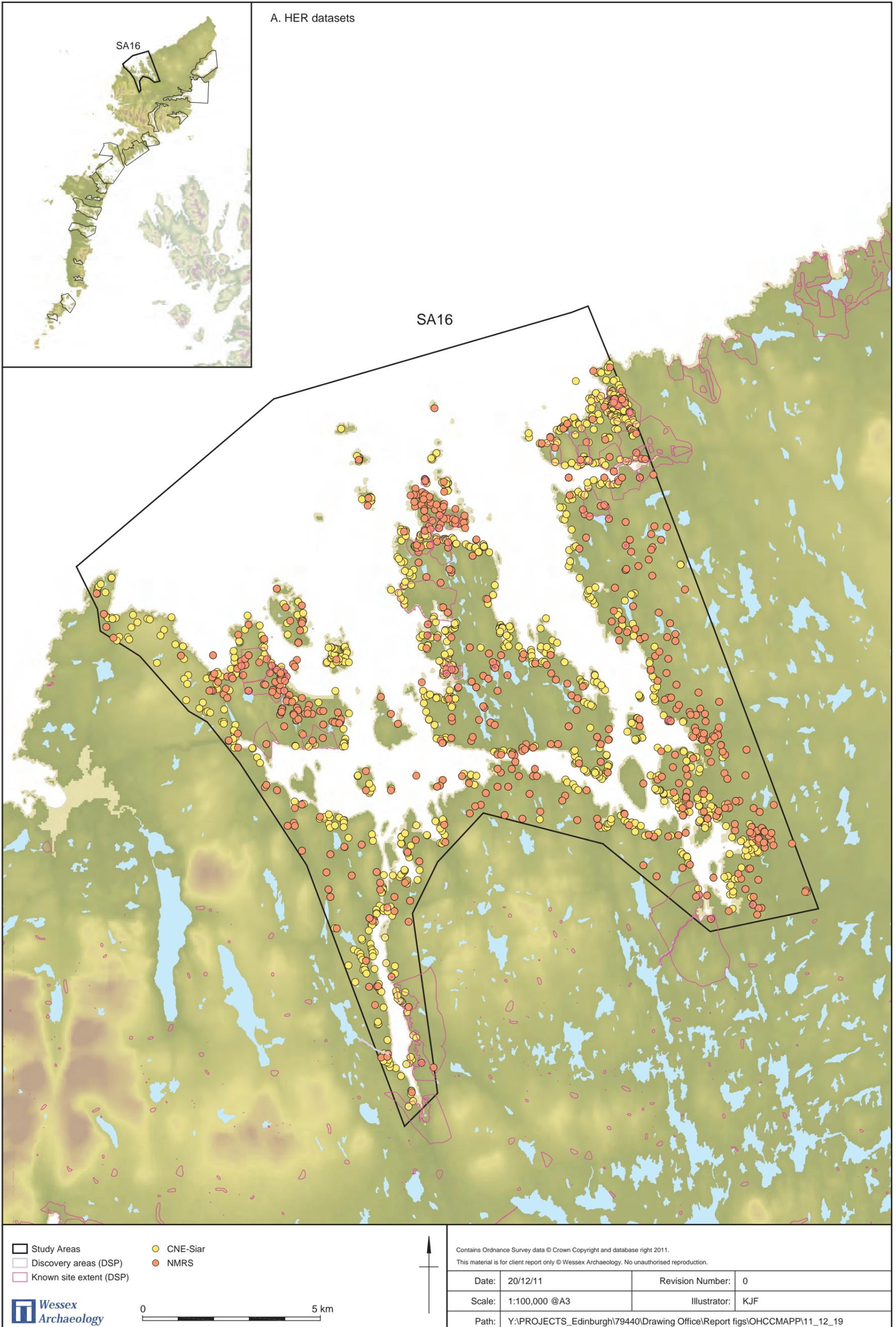
Figure A7(A)



Study Areas 	Located wrecks by period: ● 1728 ● 1939-1945 ● 1816-1913 ● 1945 onwards ● 1914-1918 ● Unknown ● 1919-1938	This product has been derived, in part, from Crown Copyright Material with the permission of the UK Hydrographic Office and the Controller of Her Majesty's Stationery Office (www.ukho.gov.uk) All rights reserved. (Wessex Archaeology Licence Number 820/020220/11) NOT TO BE USED FOR NAVIGATION WARNING: The UK Hydrographic Office has not verified the information within this product and does not accept liability for the accuracy of reproduction or any modifications made thereafter. Contains Ordnance Survey data © Crown Copyright and database right 2011. This material is for client report only © Wessex Archaeology. No unauthorised reproduction.										
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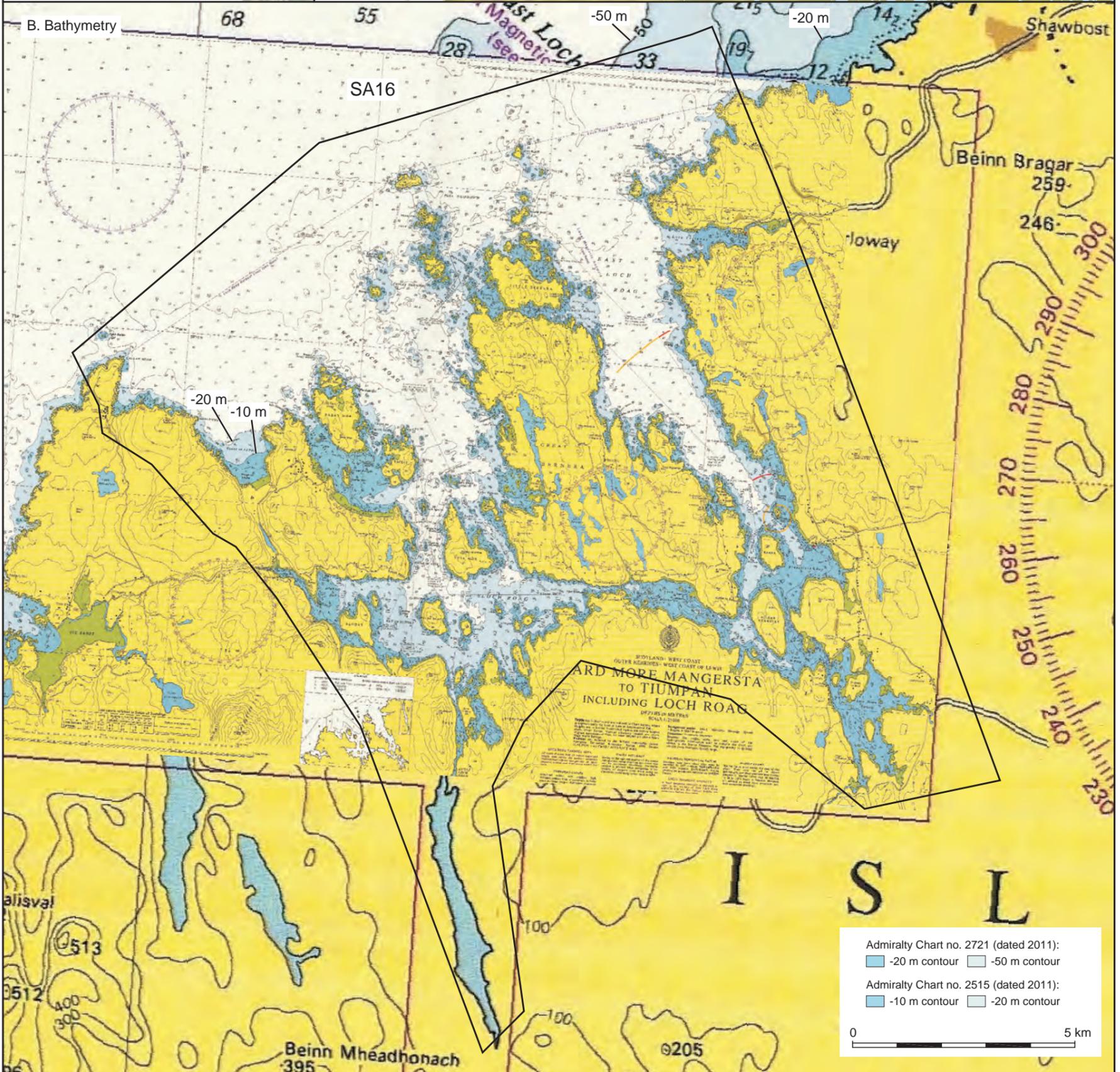
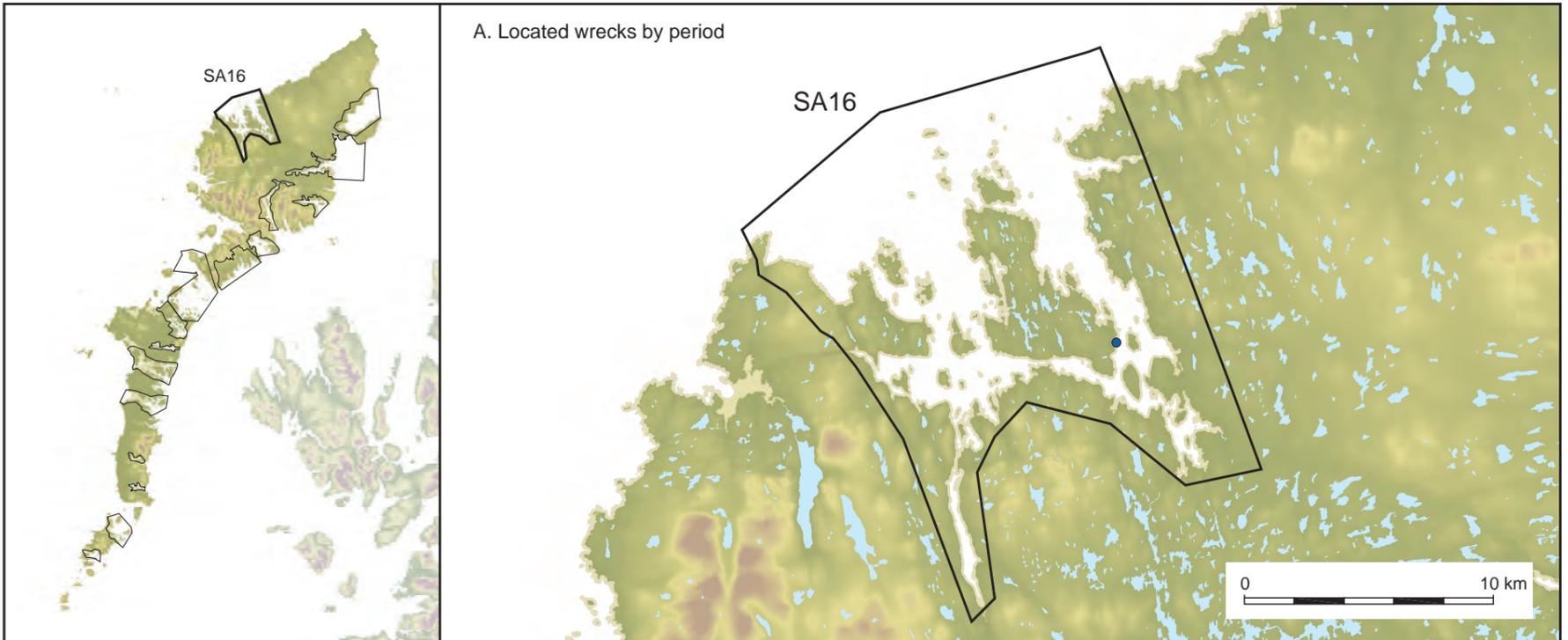
SA13: Bruernish, SA14: Castlebay

Figure A7(B)



SA16: Loch Roag

Figure A8(A)



Study Areas 	Located wrecks by period: ● 1728 ● 1939-1945 ● 1816-1913 ● 1945 onwards ● 1914-1918 ● Unknown ● 1919-1938		This product has been derived, in part, from Crown Copyright Material with the permission of the UK Hydrographic Office and the Controller of Her Majesty's Stationery Office (www.ukho.gov.uk) All rights reserved. (Wessex Archaeology Licence Number 820/020220/11) NOT TO BE USED FOR NAVIGATION WARNING: The UK Hydrographic Office has not verified the information within this product and does not accept liability for the accuracy of reproduction or any modifications made thereafter. Contains Ordnance Survey data © Crown Copyright and database right 2011. This material is for client report only © Wessex Archaeology. No unauthorised reproduction.
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APPENDIX IV: INTERTIDAL STRUCTURES (AERIAL SURVEY)

The following features have been identified from the November 2011 aerial survey conducted by RCAHMS and WA C&M. These represent targets for future field investigations and research.

GAZETTEER OF INTERTIDAL STRUCTURES IDENTIFIED FROM AP SURVEY (NOVEMBER 2011)

Site ID	Description	AP_source	Longitude	Latitude	BNG_E	BNG_N
2000	Fish trap	IMG_0326	-6.52777	58.00839	132643	911107
2001	Fishtrap		-7.32613	57.22477	78682	827473
2002	Multiple Fishtrap Complex	New sites, several intertidal features, at least 4 Not in SMR / NMRS	-7.24111	57.11891	82900	815310
2003	Tidal Pond		-7.37529	56.99901	73737	802619
2004	Fishtrap		-7.28616	57.65826	84849	875456
2005	Wall / fish trap?		-7.29392	57.65925	84395	875603
2006	Fishtrap(s)		-7.42969	57.65663	76286	875953
2007	Chambered Cairn	Geirisclett	-7.41945	57.65030	76839	875201
2008	Fishtrap / Structure	New Site (See AP IMG_0488 / 0465)	-6.85759	58.18684	114612	932299
2009	Fishtrap / Structure	New site (IMG_0485)	-6.85872	58.18634	114542	932248
2010	Fishtrap / Structure	New Site (IMG_0499 / 500)	-6.85740	58.21720	114867	935673



OHCCMAPP Poster:High-Res version @
[HTTP://BLOGS.WESSEXARCH.CO.UK/OHCCMAPP/POSTER/](http://blogs.wessexarch.co.uk/OHCCMAPP/POSTER/)

OUTER HEBRIDES COASTAL COMMUNITY MARINE ARCHAEOLOGY PILOT PROJECT

The Outer Hebrides coast is rich in intertidal and shoreline archaeology. Become part of a community project that discovers new sites and shares knowledge

Pròiseact Coimhearsnachd nan Eilean Siar: ARC-EÒLAS NA MARA SNA CLADAICHEAN

Tha cladaichean nan Eilean Siar còmhdaichte ann an làraichean arc-eòlais, air tìr agus fon mhuir. Nach gabh sibh pàirt anns a' phròiseact choimhearsnachd seo, a' lorg làraichean ùra agus a' toirt seachad fiosrachadh mun deidhinn



Have you seen anything like this whilst fishing, diving or walking near the sea?

Am faca sibh riamh rudeigin mar seo, 's sibh ag iasgach, a' daibheadh fon mhuir no a' coiseachd ri taobh na mara?



Have you seen tree stumps, stone or wooden structures under water or buried at the beach?

If you are interested in this island chain community project, please contact us

www.wessexarch.co.uk/alba



Am faca sibh piosan de chraobhan, no toglaichean fiodha/ cloiche fon mhuir no fon ghainnneach?

Ma tha sibh ag iarraidh pàirt a ghabhail anns a' phròiseact choimhearsnachd seo, no fiù 's ma tha fiosrachadh agaibh, nach leig sibh fios gu:

www.wessexarch.co.uk/alba





OHCCMAPP MEDIA OUTPUT / COVERAGE

Statistics for OHCCMAPP Project Website
(<http://blogs.wessexarch.co.uk/OHCCMAPP/>)

Views per year (18/01/2012)

	Jan	Feb	Mar	Apr	May	Jun	Aug	Sep	Oct	Nov	Dec	Total
2011	n/a	1	698	312	1011							
2012	462	n/a	462									

Average per Day (18/01/2012)

	Jan	Feb	Mar	Apr	May	Jun	Aug	Sep	Oct	Nov	Dec	Overall
2011	n/a	1	23	10	16							
2012	27	n/a	27									

Recent Weeks (18/01/2012)

Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total	Average	Change
Dec 12 7	Dec 13 12	Dec 14 7	Dec 15 18	Dec 16 24	Dec 17 0	Dec 18 3	71	10	
Dec 19 28	Dec 20 104	Dec 21 13	Dec 22 3	Dec 23 3	Dec 24 1	Dec 25 0	152	22	+114.08%
Dec 26 7	Dec 27 4	Dec 28 0	Dec 29 1	Dec 30 10	Dec 31 3	Jan 1 0	25	4	-83.55%
Jan 2 8	Jan 3 20	Jan 4 13	Jan 5 9	Jan 6 4	Jan 7 4	Jan 8 1	49	7	+96.00%
Jan 9 10	Jan 10 15	Jan 11 2	Jan 12 130	Jan 13 74	Jan 14 43	Jan 15 23	297	42	+506.12%
Jan 16 63	Jan 17 44	Jan 18 9					116	54	+26.09%

Press Coverage:

Past Horizons

- Outer Hebrides survey builds a new picture of the past
<http://www.pasthorizonspr.com/index.php/archives/01/2012/outer-hebrides-survey-builds-a-new-picture-of-the-past>

Stornoway Gazette

- Ancient secrets submerged around Western Isles
http://www.stornowaygazette.co.uk/community/ancient_secrets_submerged_around_western_isles_1_1748150

BBC

- In pictures: Coastal archaeology on the Western Isles
<http://www.bbc.co.uk/news/uk-scotland-highlands-islands-16525715>
- Potential medieval village among Western Isles 'finds'
<http://www.bbc.co.uk/news/uk-scotland-highlands-islands-16514793>

BBC Alba

An Là - Aerial photography over the Western Isles
<http://www.youtube.com/watch?v=-sy3jE-nlw0>

An Là - Seabed may hold clues to first inhabitants of Outer Hebrides



http://www.youtube.com/watch?v=YjbONY8gS_w&list=UU0f9WxKxokleXvG5XcvhEmA&index=4&feature=plcp

Daily Mail

- Medieval fishing village discovered in Outer Hebrides by island boatman
<http://www.dailymail.co.uk/news/article-2085842/Medieval-fishing-village-discovered-Outer-Hebrides-island-boatman.html?ito=feeds-newsxml>

Other sources of OHCCMAPP Information:

RCAHMS News

<http://www.rcahms.gov.uk/news/public-tip-offs-result-in-discoveries-in-western-isles>



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Regional offices in Edinburgh, Rochester and Sheffield

For more information visit www.wessexarch.co.uk



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