
Introduction

'In any pre-industrial society, from the upper Palaeolithic to the nineteenth century AD, a boat or (later) a ship was the largest and most complex machine produced... But such a dominating position for maritime activities has not been limited to the technical sphere; in many societies it has pervaded every aspect of social organisation... the course of human history has owed not a little to maritime activities, and their study must constitute an important element in the search of a greater understanding of man's past.'

- Muckleroy, K, 1978, Maritime Archaeology, 3

Whilst shipwrecks capture the imagination, they are only a small part of a broad spectrum of marine historic environment assets encompassed by 'maritime'. Just as remarkable are our submerged and intertidal landscapes containing evidence for the past use of the coast. Lasting cultural associations to these lands, now lost to sea-level rise, are the legends known to every Welsh schoolchild – such as Cantre'r Gwaelod (The Lowland Hundred) encompassing much of Cardigan Bay and Caer Arianhod, a rock formation off Dinas Dinlle, reputed to have been the site of a palace.

To reflect this diversity, this fifth-year Review of the Maritime chapter of the Research Framework for the Archaeology of Wales has been approached from the perspective of 'maritime culture landscapes' – an 'umbrella' term relating to our understanding of the use of the sea by humans, encompassing both physical evidence and cultural associations. Related research comprises archaeology, history, ethnography, the exploration of oral traditions, and the study of material culture, as well as geological and archaeological sciences.

This Document provides an overview of the progress made against previous research priorities; the results of discussion of suggested new research priorities at the Bangor Conference in November 2016; and a more extensive bibliography than has previously been collated.

Research Agenda 2017-2021

Seven overarching research priorities have been identified through the review process:

1. **Coastal Change and Submerged landscapes** – There are great opportunities to understand early prehistory by studying the settlement of the changing coastline of Wales as sea levels rose, through terrestrial evidence and submerged landscapes.
2. **Seafaring and Seascapes (hinterland linkages to the sea)** - We should develop further knowledge of how Welsh shores were used in trade and settlement, the development of ports, and coastal and estuarine navigation.
3. **Marine Transport** - There is much to be learned about the development of distinctive types of vessels in Wales in response to local conditions, materials and traditions, and the requirements of specific industries.
4. **Challenges for Conservation Management** – We need to foster recognition that maritime historic environment assets should not be seen as separate from the marine natural environment, rather they inhabit the same space and contribute many of the same social, cultural and economic benefits. It is important to broaden the basis of data retrieval to include every relevant source which can inform the extent and present condition of sites against boarder agendas, such as the siting of offshore developments and responses to climate change.
5. **Frameworks for Management** – We should embrace opportunities to improve the management of maritime historic environment assets. We should develop coherent and well-planned management responses to significant threats. We should ensure that the sites on which future research relies are both protected, and yet remain accessible. There are significant benefits to be gained by more strategic research engagement with offshore development control and curatorial processes.
6. **Material Culture and Preservation by Record** - As marine geophysical and geotechnical survey technology moves forward, so should our grasp of potential applications to provide unprecedented new access to underwater sites. Knowledge transfer between

professional archaeologists and community groups, in both directions, is the invaluable outcome to be constantly sought through the study of sites and objects.

7. **Maritime Identities** – One of the great strengths of maritime archaeological research is its global relevance. Hence, opportunities to create greater recognition of the value of international research collaborations should be fostered - to explore networks of maritime trade, the spread of ideas, and material culture by seagoing transport.

Past Research Agenda Priorities and Achievements

Research Framework 2004-2011

The first Research Framework for Maritime was presented in September 2004. The following was amongst its chief observations:

'...the paucity of comprehensive record, survey and excavation, competent practitioners or appropriate funding hampers the setting of realistic research agenda. The agenda suggested below, therefore, includes priorities for rectification of these weaknesses in methodology, and legislative and development control as well as recommending strategic or national research topics. It seeks to build on the knowledge base acquired through current or recent studies as well as effective utilisation of opportunities afforded by development.' - Sian Rees, Cadw

As a consequence, the following priority research themes were listed as follows:

- Submerged Prehistoric Land Surfaces: Mapping of Mesolithic Coastline of Wales and Key Littoral Sites;
- Study of Historic Ports and Harbours in Wales;
- Study of Estuaries as major access points for shipping and settlement;
- Welsh Lakes;
- Historic Bridging Points and Wharfage;
- Survey of Maritime Hazards;
- Study of Welsh cargo vessels;
- Technical Advances demonstrated in known wrecks;

The specific objectives set for the first five years were as follows:

- Enhancement of Maritime Database in NMRW and in Trusts' SMR and the better organisation of maritime development control;
- Completion of excavation reports for the Designated historic wrecks in Wales;
- Continuation of diver training and the work of the Nautical Archaeology Society, and the promotion of an increase in the involvement of sub aqua clubs, volunteers and universities;

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- Raising the awareness of the potential of offshore developments to recover information about the marine historic environment;
 - Encouraging the synthesis of information from developer funded projects;
 - Improving the outreach of information to amateurs, divers and general public.

Achievements 2004-2011

During this 2004-2011, a number of the organisations made significant contributions to the research framework

The Royal Commission began the intensive development of its maritime record. This period also saw the completion of the West Coast Palaeolandscapes Project by University of Birmingham, Dyfed Archaeological Trust and the RCAHMW. It saw the implementation of two studies, undertaken by Wessex Archaeology, relating to the vessels associated with slate and coal industries. The studies highlighted 33 wrecks carrying Welsh coal and 23 slate wrecks, some of which would be taken forward into a programme of marine geophysical and diver survey.

Sites from the Slate study were suggested to the Nautical Archaeology Society (NAS) to take forward with local sports diver clubs, potentially as part of the NAS 'Adopt a Wreck' Scheme. Other underwater sites adopted under the same scheme included the SHORT SUNDERLAND I T9044 flying boat in Milford Haven; the CARTEGENA a Great War Admiralty trawler, and NORMAN COURT, a fast clipper ship as famous in its day as CUTTY SARK, THERMOPYLAE and TAEPING (the NORMAN COURT won the annual tea race in 1872 with a time of 96 days).

In 2009, Cadw began funding the Arfordir project to encourage groups and individuals to take part in monitoring the archaeology sites on their own stretches of coastline. The project, modelled on the Scottish Shorewatch, encouraged volunteers to look for archaeological features in the intertidal and at the coast edge, with support for individuals and groups being provided by staff from the Welsh Archaeological Trusts.

Through 2010-11, the Welsh Archaeological Trusts, Nautical Archaeology Society (NAS) and RCAHMW all contributed to coastal research under the umbrella of Arfordir (Welsh Coastal Historic Environment Group). The studies began to unlock the large reservoir of information contained in intertidal hulks, along with a wide range of other coastal sites such as

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submerged forests, shell middens, fishtraps, and settlement sites subject to coastal erosion. For example, in 2012-3 Dyfed Archaeological Trust completed a threat-related assessment of medieval and early post-medieval fish traps visiting 63 sites.

A pan-Wales study of ports, harbours, wharfage, estuaries and supply points was also undertaken by the Welsh Archaeological Trusts, including two larger scale studies 'The Milford Haven Waterway' and 'Crossing the Menai Strait'. The latter explored the ferries of the Menai Strait.

This period saw the discovery of a well preserved medieval masonry wharf in southeast Wales at Skenfrith, another riverside wharf site associated with Roman Caerleon, and ancient bridges at Caldicot and Chepstow – all adding to our understanding of how maritime trade integrated with high status defensive sites, their associated settlements and the wider hinterland.

Research Framework 2011-2016

Substantial progress had been made in a number of key areas by 2011. Nevertheless, revised priority research themes were set as follows:

- Monitoring coastal change and impacts on the marine and coastal assets;
- Marine and coastal industries and their impact on the character of coastal settlement. Industries such as ship building, ship supply industries (e.g. Sail and rope making), installations for trade and control (e.g. Storage depots, warehouses, customs houses) and the development of sea-side tourism might form a series of studies;
- The ground-truthing of theoretical maps of Welsh submerged landscapes
- The archaeological potential of aircraft downed at sea (particularly military relating to the World Wars);
- Welsh-built vessels, particularly smaller vernacular vessels (e.g. fishing vessels, sloops,) and those from medieval and earlier periods, to establish any distinctive qualities which reflect the Welsh seascapes within which they were predominantly used;
- The study of estuaries as major access points for shipping and settlement – more intensive studies of the Dee and Milford Haven at large scale and at smaller scales the Dyfi, and Taf/Cywin might be considered;

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- The study of Welsh lakes, especially with regard to their use and exploitation within industry, trade and settlement (e.g. the role of lakes of northwest Wales within the slate industry);
 - Historic bridging, crossing points and wharfage associated with supply and trade at historic sites and settlements.

The specific objectives for the 2011 – 2016 were:

- Continuing to improve the NMRW's maritime database and its representation of all forms of maritime archaeological features;
- Surveying, mapping and understanding palaeolandscapes now submerged or intertidal, and identifying areas of archaeological sensitivity and potential;
- Studying and surveying underwater wrecks by theme or in certain locations, thereby increasing our understanding of the resource and ensuring the numbers of statutorily protected wrecks are more representative of the resource as a whole;
- Enhancing the understanding of the particularity of vessels designed for specific Welsh environments or industries, and assessing known post-medieval wrecks and hulks for their potential to inform about technical advances in shipping (fishing vessels have been suggested as the next focus for study);
- To continue the study to cover all ports and harbours in Wales, and to examine their commercial relationship with their hinterland not only broadly at a landscape scale, but also at a more intensive, site-specific scale in areas most likely to be at risk from development or natural processes;
- To study and monitor coastal change in relation to the archaeological resource by encouraging appropriately trained volunteers to participate in maritime and coastal archaeology, and to develop closer links between terrestrial, inter-tidal and underwater projects.

Achievements 2011-2016

The Welsh Archaeological Trusts' Arfordir Projects continued to make significant contribution to recording sites under threat from coastal erosion. For Dyfed Archaeological Trust, the most significant sites recorded include cist burial at Whitesands Bay and early medieval cemetery at West Angle Bay, as well as hulks at Lawrenny and Goodwick Sands. For Gwynedd Archaeological Trust, the most significant sites

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recorded included lithics at Porth Neigwl and the eroding promontory fort of Trwyn Porthdinllaen. For Glamorgan Gwent Archaeological Trust, the most significant sites recorded included peat exposures on Swansea Beach and Whitford Burrows and a late Bronze Age trackway at Oystermouth.

The Nautical Archaeology Society continued its training activities initially taking forward its Welsh Coal and Slate wrecks themes with the aim of encouraging sports divers to adopt wrecks carrying such cargos and then in collaboration with the Arfordir initiative undertaking hulk recording training days in three of the Welsh Archaeological Trust regions.

The Royal Commission focussed its maritime recording onto the archaeological potential for downed aircraft at sea. The results suggest over 300 losses at sea with at least 20 being rare or 'extinct' aircraft (no surviving airframes known in private or museum ownership). The Commission also began a GIS digitisation project to identify historic seascapes features, primarily from historic charting and coasting pilots. The features include anchorages, landing places, reefs and other forms of navigational hazards, systems of navigation aids, fishing grounds, military uses of the sea, and early submarine cable installations. This mapping was used to support the consultants employed by Natural Resources Wales in the identification of social and cultural aspects for their national Seascapes Characterisation initiative.

The RCAHMW's desk-based assessments of the archaeological remains within the Ynyslas National Nature Reserve identified many elements of a former top secret military research establishment and also the remains of three vessels belonging to the slate trade of the Dyfi estuary. These three hulks are the only maritime remains to have received statutory protection during this period. The hulks were featured in the Royal Commission's 2015 publication 'Welsh Slate: The Archaeology of the Welsh Slate Industry'. Research into the history of the vessels and a means of stabilising one of the hulks is being continued with Cadw funding by Dyfed Archaeological Trust and Nautical Archaeology Society.

On behalf of Cadw, Wessex Archaeology undertook marine geophysical and diving surveys of selected coal and slate wrecks, along with various wrecks/anomalies of Sarn Badrig.

The survey of Sarn Badrig was continued by Cotswold Archaeology in the last years of Wales' participation in the centralised Protection of Wrecks

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Act diving contract. The ROYAL CHARTER was also revisited with regard to its potential for designation to coincide with an outreach and educational project taken forward by Cadw and the Royal Commission. Over 100 new items (documents, photographs, texts, etc.) were added to the People's Collection Wales www site in support of the schools and colleges educational programme.

In 2013, Cadw commissioned Touchstone Heritage Management Consultants to produce a Pan-Wales 'Maritime Wales/Cymru a'r Môr Interpretation Plan'. The introduction in early 2012 of the Wales Coast Path potentially provided a geographical and administrative framework to plan and tell persuasive and gripping stories about the unique maritime heritage of Wales.

At the end of that year, winter storms lowered beach levels revealing remarkable expanses of intertidal peats and several shipwrecks. The most spectacular were at Tywyn and Maroes, where the wreck believed to be the ROVER was exposed. More shipwreck remains were located at Freshwater west and at Whitesands Bay, Llangennith, Kenfig Sands and at East Aberthaw. These were recorded by the Nautical Archaeology Society, GGAT and DAT volunteers, as well as the Royal Commission. Two cannons were also recovered from Oxwich Bay and taken to Porthcawl museum. Their recording and conservation is being taken forward by Cardiff University in liaison with Porthcawl Museum.

In 2014 a partnership project between Amgueddfa Cymru – National Museum Wales, The Federation of Museums and Art Galleries of Wales (FED) and the Portable Antiquities Scheme in Wales (PAS Cymru) secured Heritage Lottery Grant funding through the Collecting Cultures programme, to run for five years. This project includes a community archaeology project looking at foreshore finds in Swansea Bay. PAS Cymru continued to record foreshore and intertidal finds around the Welsh coast, while AC-NMW started recording seventeenth-century silver dollars from the legendary but hitherto elusive 'Dollar wreck' in Rhossili Bay, for the Receiver of Wreck.

In the University Sector, the SEACAMS initiative at Bangor University undertook surveys which included Great War losses such as HMS DERBENT and the APAPA. The University of Wales Trinity St David won EU funding for 'Forest Resources for Iberian Empires: Ecology and Globalization in the Age of Discovery' and the Newport Ship was the focus of the 'ShipShape Project' to explore the potential of 3D digital datasets

as research tools and as the basis for dissemination - particularly to non-specialist audiences.

In 2014, Natural Resources Wales began its national seascapes characterisation initiative. The Royal Commission was able to supply datasets in their development form to consultancies undertaking both the pilot and roll-out studies, as well as input into the descriptive texts.

In 2015, Cadw and the Royal Commission began the collaboration process to assist Welsh Government with the development of the first Welsh Marine Plan (due for final round of public consultation in the autumn of 2016). During this period, the Royal Commission completed the accreditation process to become the Marine Environment Data Information Network (MEDIN) acknowledged Data Archiving Centre for the marine historic environment of Wales. It also worked with the members of MOROL (Institute of Welsh Maritime Historical Studies) and Welsh maritime museums to develop and submit a Heritage Lottery Fund application 'Commemorating the Forgotten U-boat war around the Welsh coast 1914-8'. One of the aims of the proposed project was to provide advice to Cadw with regard to the relative significance of the 170 losses attributed to enemy action.

The annual conference held by MOROL at Trinity St David University, Lampeter, in November 2015 defined 20 cross-sectoral priorities which included establishing a strategy for the protection of historic wrecks, developing a co-operative approach to the analysis of marine survey data, and ensuring that there are opportunities for learning about Welsh maritime heritage within formal education. This MOROL list is a reminder that much still remains to be done.

Since the inception of the Maritime Research Framework, the following priorities appear not to have been sufficiently addressed:

2004-2011:

- Completion of excavation reports for the Designated historic wrecks in Wales (the Tal-y-Bont/Bronze Bell wreck and Resurgam reports are still outstanding);
- Raising the awareness of the potential of offshore developments to recover information about the marine historic environment;
- Encouraging the synthesis of information from developer funded projects;

2011 – 2016:

- Surveying, mapping and understanding palaeolandscapes now submerged or intertidal, and identifying areas of archaeological sensitivity and potential;
- Studying and surveying underwater wrecks by theme or in certain locations, thereby increasing our understanding of the resource and ensuring the numbers of statutorily protected wrecks are more representative of the resource as a whole;
- Enhancing the understanding of the particularity of vessels designed for specific Welsh environments or industries, and assessing known post-medieval wrecks and hulks for their potential to inform about technical advances in shipping (fishing vessels have been suggested as the next focus for study);
- To continue the study to cover all ports and harbours in Wales, and to examine their commercial relationship with their hinterland not only broadly at a landscape scale, but also at a more intensive, site-specific scale in areas most likely to be at risk from development or natural processes.

The following sections continue the Review under four thematic headings.

Theme 1: Coastal Change and Submerged Landscapes

'Thirteen hundred years ago Cardigan bay was a rich province of ancient Wales - Cantref-y-Gwaelod, the Lowland Hundred – a sort of Welsh Flanders defended by dykes and dams. This fair and fertile region, which contained sixteen fortified towns, was submerged AD 520, owing to the folly of a drunkard. Ruins of houses can, it is said, still be discerned by those who put on their spectacles during boating expeditions, quite 'out to sea', and the bottom chiefly consists of the decayed matter of a forest.'

- Cliff, Charles Frederick, 1847, The Book of South Wales, the Bristol Channel, Monmouthshire, and the Wye, 297

Scientific understanding of the dramatic environmental and climatic shifts that have occurred during Palaeolithic period has certainly come a long way, particularly in the last 10 years. For example, in 2009, the North Sea Prehistory Research and Management Framework (NSPRMF) was published to facilitate large-scale systematic and interdisciplinary study and preservation (where possible) of the unique sedimentary and archaeological record of the southern North Sea. The West Coast Palaeolandscapes/Lost Lands of our Ancestors Project has made an important contribution to research relating to submerged landscapes by proving that methodologies which had been developed in the North Sea in pursuit of 'Doggerland' could also be utilised for the Welsh marine areas. However, the location, extent, and character of archaeological deposits which could provide corroborating evidence for climate shifts remain under-researched and poorly understood in Welsh waters.

Leading palaeo-geographers agree that there are three major processes at work:

- removal of water from the oceans on a global scale as continental icesheets grew or shrank in alternating glacial and interglacial cycles (glacio-eustasy);
- isostatic lift or subsidence of the earth's crust induced by changes in the weight of the ice sheets;
- crustal lift or subsidence due to tectonic forces.

Moreover, there are two methods which have been used with some success for identifying patterns of sea-level change:

- dated geological, sedimentological or biological features with a relationship to past sea-level;

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- numerical models of the Earth's response to ice loading calibrated to observed indicators of past sea-level.

At present time, these methods have suggested:

- peak glacial lowering of sealevels to around 120m below their level today;
- interglacial high points being similar to present-day sealevel or even 6-9m higher (Rohling, et al, 2009).

However, Westley, Flemming and Gibbard provided a cautionary note when stating that there are approximately 1250 validated relative sea level index points (RSL) around the coast of the British Isles, and that the vast majority of these RSLs only provide evidence for sea-level rise during the last 10,000 years. There are very few RSLs being calibrated from geological samples gathered from water depths below 20m and the wider UK continental shelf to facilitate the modelling of earlier periods. They also note that there are observable 'misfits' between predictions of the broad-scale British Isles/northwest Europe models and more regional or local based models (Westley, et al 2013).

Wales presently lacks a coherent model for its coastline at 'regional' scale, despite the presence of geological features capable of providing evidence for sea-level change. For example:

- the glacial moraine ridges forming the Sarns of Cardigan Bay;
- the former coastlines and deltaic systems/glacial run-off systems seen in the geological data for West Coast Palaeolandscapes Project for Liverpool Bay;
- relict palaeochannels observed in modern bathymetry (e.g. tributaries joining the main palaeochannel of the River Severn off Aberthaw, Glamorgan; Stackpole, Pembrokeshire; Llangrannog, Ceredigion, and St Tudwal's Islands);
- over 70 expanses of intertidal peats and submerged forest deposits.

Conventional seismic survey techniques (such as sub-bottom-profiling) and boreholes/cores can be used to retrieve data from beneath marine deposits brought in by transgression and subsequent marine sediment transport systems. However, at present time, sub-bottom profiling data appears to be restricted to areas of oil and gas exploration (with British Geological Survey retaining only a very few cores from these

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explorations) and to the data gathered by the Bristol Channel BIOMAR survey of 1990s undertaken by the National Museum of Wales. Of the cores available, only one from off Strumble Head records peat horizons.

In 2015, Durham University include three sites from the Welsh coast's rich resource of submerged forests and intertidal peats as part of a UK wide initiative. Despite previous projects to record such sites (Smith 2002, Bell 2007), the majority of deposits remain unsampled for the environmental data they contain and, as a consequence, have not been scientifically dated (Pratt 2015).

A number of questions and directions can be identified:

- Cross-sectoral research aimed at increasing precision in the data available to assess relative sea-level change, since the last glacial maximum and for earlier periods of human history;
- Extending the review of available geotechnical data (sub-bottom profiling data) undertaken by the West Coast Palaeolandscapes Project from Bristol Channel and Liverpool Bay to other areas of the Welsh coast, and developing strategies for collaboration to gather new data, including from the UK Continental shelf where Welsh Govt has devolved marine planning responsibilities;
- Identifying additional borehole and coring data for archaeological review not currently indexed by British Geological Survey;
- Utilising the opportunities presented by offshore development control scenarios to unlock the seabed's geological archives;
- Focus on island groupings to gain a better understanding of the processes of inundation and ancestral retreat from the lowland plains;
- Mapping and sampling for scientific dating and analysis of outstanding intertidal forest and peat exposures to gain a better understanding of the evolution of estuaries and coastlines;
- Studies which place Welsh legends associated with the 'lost lands of our ancestors' in the broader context of submergence legends from around the world to help inform present-day climate change research.

Theme 2: Seafaring and Seascapes (hinterland linkages to the sea)

'Almost every cottage in villages like Nefyn and Porthdinllaen, Newborough and Moelfre, bred generations of seaman, and the small ports Amlwch, Bangor, Port Dinorwic, Caernarfon, Pwllheli and Porthmadoc were crammed with sailing ships. To understand the maritime activity of the late eighteenth and early nineteenth centuries, it is necessary to recall the growth of the great port of Liverpool during the period and the extraordinary demand for shipping caused locally in Gwynedd by the development of the slate and copper industries.'

- Eames, A, 1987, *Ventures in Sail: Aspects of the maritime history of Gwynedd, 1840-1914 and the Liverpool connection*, 22

There has been relative little direct study of aspects of maritime and coastal activity from the later prehistoric periods in Wales. Studies of long-distance trade and exchange of cultures traditionally focus on stone and flint tools and their geological provenance, rather than maritime networks. Evidence for seafaring is usually inferred from the identification of Mesolithic sites on islands such as Bardsey, which must have required some form of craft to complete the sea crossing. Skinboats may have been used, but logboats are certainly known from mainland Europe during this period.

Continuing into the Bronze and Iron Ages, there is a long period which is marked only by a few significant maritime/coastal artefact and boat finds, whilst dramatic changes in society, technology and economy are well attested in terrestrial monuments and material culture.

The Roman occupation of Britain was by necessity accomplished by 'maritime' means, with the *classis Britannica* operating both for exploration and like a state haulage company in the first centuries of occupation. Apart from the Barland's Farm boat, no other vessels from the Roman period have been discovered in Wales, even though an inscribed stone found to the west of Chester apparently confirms the age-old navigation dangers of the Dee estuary - 'OPTONIS AD SPEM ORDINUS C LVCILI INGENVI QVI NAVFRAGIO PERIT S E' or 'Optio in the century of Lucilius Inegneus, awaiting promotion to centurion, who died in a shipwreck, is buried' (Wynne-Jones, 2001, 9). The results of recent geophysical survey work and excavation at Caerlon have reinforced the

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importance of the Roman port supporting the Roman legion and its network

Into the early medieval period, there is much more evidence for coastal settlement where maritime communities shared cultural contact around the Irish Sea basin, and into the Western Approaches with contact with continental Europe. From the 6th-7th century onwards, it has been suggested that proto-harbours began to emerge from sheltered beaches along with specialist seafaring traders – often associated with princely strongholds such as Dinas Powys, Hen Gastell, Deganwy and Tenby

The recently published volume 'Maritime Wales in the Middle Ages: 1039-1542' by Ken Lloyd Gruffydd highlights that the maritime medieval archaeological record is sparse – including only the twelfth century logboat of Llyn Padarn, the thirteenth century clinker-built vessel carrying iron ore from Magor Pill, and the fifteenth century Newport Ship. Yet, the early kings of Wales hired Danish and Norse mercenaries in Ireland to wage war, and it was ultimately the strategic use of sea-power by the English that gave dominance - along with the castles. In the early thirteenth century, the medieval port of Llan-faes at the northern entrance of the Menai Strait conducted significant trade in ale, wine, wool, and hides, and maintained a herring fishery, before its Welsh population was moved by Edward I to Newborough on the other side of the island (as a result of the construction of the new castle at Beaumaris). Many other settlements such as Chepstow and Newport sought and received borough charter status during this period, with enterprising merchants alert to the benefits of access to water transportation. Not least in the wine trade, where merchants began to trade with English possessions overseas, such as Gascony and Bordeaux.

The range of seafaring and seascape related research topics expands exponentially from the medieval period into the modern day. Much of the presently available research is related to the expansion in trade in various Welsh commodities such as copper, coal, slate and other stone trades, and associated port developments.

The two World Wars provide two historical periods when the sea lanes became theatres of war. The relationships between defence of the sea lanes and Welsh airfields provides another potential research area.

A recurring theme throughout must be the relationship between the sea and formation of the collective identities of the people of Wales.

A number of questions and directions can be identified:

- How has seafaring (e.g. logboats and sewn-plank boats) contributed to mixed subsistence practices
- To what extent can coastal pilotage and a greater understanding of rising sealevels and coastal processes identify the most likely locations of early landing place and harbours;
- Can a better interrogation of indirect evidence for sea crossings through the provenance of objects and origins of individuals contribute to our understanding of invasion, migration, slavery, and legitimate trade;
- Fieldwork which explores the potential of infilled palaeochannels and their margins to contain boats, parts of boats, and structures associated with landing people and cargoes;
- Studies encompassing rivers and inland navigation systems, lake transport and rail networks to map the movement of Welsh commodities (e.g. coal, slate, limestone, metal ores, etc.) from their source in the hinterland to their transportation by sea to final destination;
 - Trading patterns of individual ships and what they can tell us about broader patterns of voyages undertaken by both coastal and deep-ocean traders;
 - Changing role of Customs Officers (e.g. reeves, Receivers of Wreck etc) from the time of rife piracy in the 16-17th century up to the present day;
- Studies exploring the development of different marine-based industries within coastal settlements, and their impact on the overall character of towns and villages;
 - Social and economic drivers to create vernacular harbours, major harbours of refuge and large commercial ports;
 - Principles of harbour design as related to the prevailing weather and sea conditions;
 - Impact of new technology such as enclosed docks, cranes, integrated transportation;
 - Civil engineers undertaking the design and construction work;

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- Historic repair and maintenance regimes and the relationship to modern conservation strategies;
 - Features in coastal townscapes which provide evidence for maritime trades such as shipbuilding and repair, ropewalks, sail-making, iron founding, etc.;
 - Technological development of leading lights, lighthouses, and other navigational aids and the role such installations continue to play in the present-day seascapes;
 - Mariners' rescue and lifesaving services and the role played by philanthropic individuals and societies;
 - The lives of individual mariners or generations of seafarers belonging to single or extended families which can illuminate the day-to-day life of Welsh mariners, shipowners, merchants, etc;
- Studies which continue the ethnographic tradition of gathering and assessing the recollections and oral traditions of Welsh people who make their living from the sea;
- Studies which explore the exploitation of maritime and intertidal resources for food and agricultural uses (fish, sea mammals, whaling, shellfish, seaweed, etc.);
 - Methods of fish catching from Mesolithic to the present day exploring the differences between subsistence fishing and the development of commercial fisheries;
 - Impact of new methods of catching and preserving fish on traditional ship building and ancillary industry support facilities;
 - The archaeology of seaweed gathering industries;
 - Evidence for salt production linked to herring fisheries;
- Studies which explore the systems of defence established at the coast through differing periods and the reuse of coastal features over time (e.g. defended anchorages, lookout points, gun emplacements);
 - Archaeological potential of seabed to retain evidence for naval battles and/or individual ship-to-ship engagements;
 - Infrastructure to support naval operations around the coast of Wales;
 - Archaeological remains on the seabed associated with the defence of sea lanes during two World Wars;

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- Archaeology on the seabed from the use of parts of the Welsh coast for military training operations, offshore anti-aircraft firing ranges (e.g. operation of range support craft), and for post-war munitions dumping;
- Studies which continue the exploration of the archaeological potential of aircraft downed at sea;
- Studies which inform the settings of marine historic environment assets by identifying patterns of past human activities and ongoing cultural associations;
 - Specific locations, such as clusters of rocky pinnacles and sand-bank systems, which have formed significant navigational hazards over time and which have significant archaeological potential (e.g. South Sands of Caernarvon Bar, West Hoyle Bank, Nash Sands, Scarweather Sands, etc.).

Theme 3: Marine Transport

'For their creations, known to contemporaries as the Western Ocean Yachts, were efficient, probably the finest all round small merchant sailing ships ever built in Britain... they were economical in the crew needed to handle them, they were fast and seaworthy, they faced the icebergs of the North Atlantic and its most violent storms, they sailed to the Baltic and German ports, to be admired. Mariners recognised them as fine seaboats, designers rightly envied their beautiful lines. How is it that a small, tidal harbour, in an out of the way corner of Cardigan Bay, produced such lovely ships?

- Hughes, E and Eames, A, 1975, *Porthmadog Ships*, 55

A recurring theme from past iterations of the Archaeological Research Framework for Wales is the need to explore how coastal waters, coastal landscapes, and the climate of Wales, together with its inhabitants, their motivations and talents, influenced Welsh ship and boat building practices.

There are, of course, differentiations to be made between smaller forms of craft and seagoing vessels of considerable size. Smaller vessels may show persistence in their traditional forms (e.g. coracle perfected to fish on Welsh rivers). Whereas ships represent a bigger investment and cannot be military or commercial failures, so there is a greater need to continually seek improvements in performance.

There are the influences of contact between maritime communities which transfer a method of building or working a vessel which is better than that presently available locally. There are the crossovers in taking the best capabilities of working craft and refining them in leisure and ceremonial craft. There are also the specialisations, for example, in boats employed to serve larger ships. In latter centuries, these would come to include boats for pilots and lighterage, as well as anchor recovery, lifesaving and salvage services, for hydrographic research and for particular marine industries (e.g. sub-sea cable laying) - not just for the transport of goods and people (McKee 1983, 16).

The key types of vernacular boats operating around the Welsh coast were identified by Owain Roberts in 1997 to include Bristol Channel pilot cutters working from the South Wales ports; fishing vessels such as Mumbles oyster skiffs, Tenby luggers, Conway Nobbies, and the beach boats of places such as Aberdaron and the north Anglesey coast; plus

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coastal traders such as Severn Trows (Roberts in Mannering, 1997 (ed)). However, the losses recorded in the National Monuments Record of Wales confirm spatial overlaps with iconic vernacular craft more commonly associated with other regions such as the Mersey flats of Liverpool's river and connecting canal networks; ketch and Polacca barges from north Devon; and trawlers/drifters drawn from Brixham and as far away as Scottish ports for the seasonal fishing.

Whilst strong interest in Welsh coracle building continues, there are few Welsh reconstruction and restoration projects presently underway for the majority of the named traditional craft above – the Pembrokeshire College/West Wales Maritime Heritage Society's Tenby Lugger Projects being notable exceptions.

The National Register of Historic Vessels records only 42 vessels based in Wales (<http://www.nationalhistoricships.org.uk/>). These include service craft such as lifeboats (9), light vessels (2), seaplane tenders (2), tugs such as the CANNING and pilot cutters such as the OLGA and CARIAD. The only Welsh shipbuilders featured amongst the surviving craft are A M Dickie & Sons Ltd, Bangor, and Crossfield Brothers, Conway. This clearly suggests an acute under representation of Welsh boat and shipbuilding outputs surviving in private hands or museum ownership.

Wrecks sites with significant bibliographies are few (less than 1% of the total resource - **see Appendix 1**). The sites reflect that six Designated Wrecks, significant finds in the Severn Estuary, high profile sites associated with large losses of life, the Royal Naval, and recovered artefacts - rather than a coherent representation by period, technical development, and vessel function at time of loss.

Whilst iconography, artefact assemblies, and historic documentation can provide much useful evidence (and the National Waterfront Museum Swansea has digitized many of its images of shipping, while its curator of Industrial Heritage has published widely on the subject, including Captain's logbooks), the vast numbers of vessels built, owned and operated in Welsh waters are represented in the remains on the seabed and in the intertidal zone. This is where recording and research needs to be focussed. It is also suggested that research needs to be combined with the continuing collation of documentary information with regard to losses to facilitate the identification of the large percentage of 'UNNAMED WRECKS' in the National Monuments Record of Wales (i.e. over 760 wreck

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and downed aircraft sites, findspots, plus seabed anomalies which may be wrecks, for which there is no confirmed identity).

For many years, the non-statutory criteria for determining importance for the designation of Historic Wrecks has been the key guidance for establishing priority, but these criteria are now complimented by publication of Cadw's Conservation Principles, Historic England's Ship and Boat Selection Guides, and the BULSI system (Build, Use, Loss, Survival and Investigation) for gathering supporting information (Wessex Archaeology 2006). Utilising the above guidance, below is an initial listing of 'named' sites for further targeted survey and research.

Merchant Ships	Fighting Ships	Service Craft
Cargo Vessel: ALICE WILLIAMS (273198), AMAZON (274142); ANNE FRANCIS (300035); APAPA (272124); ARTHUR (271989); CASTILLIAN (272190); CHARLES HOLMES (273346); CITY OF BRUSSELS (273749); CORK (272119); DAN BEARD (273246 and 240675); EDWIN (273354); EMPIRE BEACON (273229); EMPRESS EUGENIE (240646); ENGLISHMAN (273206); FAIRFIELD (271609); FREDERICK (272173); GILBERT THOMPSON (271874); HELVETIA (273914); HERMINE (272061); HIGHLAND HOME (273100); HUDIIKSVALL	Destroyer: HMS TORMENTOR (240752); HMS CLEVELAND (274189); HMS WHIRLWIND (507233) Escort Vessel: HMS ARBUTUS (274844); HMS MAJORAM (240873) Landing Craft: LCG no 15 (273231); LCG 16 (240005); LCT 7009 (519173); RIVER LOYNE (240015); UNNAMED LANDING CRAFT (240258) Ships of the Line: HMS LEDA (272589), HMS CONWAY (271611) Submarine: RESURGAM (405760), HMSM H5 (240202), U61 (273399), HMS E39 (273405); U-1024 (274897); U-1302	Cable Layer: FARADAY (273247) Dredger: REDVERS BULLER (274033) Lightship: SCARWEATHER LIGHTSHIP (274371); Tug: GUIDING STAR (273020); HASWELL (273830)

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Merchant Ships	Fighting Ships	Service Craft
(272066); JOHN	(273318); U-246	
(274508); KIRKBY	(274463); U-61	
(274829); LEWIS	(273399); U-87	
(273059); LEYSIAN	(274776)	
(273146); LILY	<u>Naval Support Vessels:</u>	
(240679); LOCH SHIEL	Decoy Vessel (Q Ship):	
(273056); LORD	HMS PENSURT	
ATHLUMNEY (271887);	(274657); HMS ROYAL	
LORD DELAMARE	SCOT (273720); HMS	
(271637); LOUISA	WESTPHALIA (274457)	
(405916); MALLENY	Oiler: HMS DERBENT	
(273882); MARY COLES	(272125)	
(272031); MARY JANE	Transport: USAT	
LEWIS (240326);	ROANOAKE (506995)	
MINERVA (271954);	Customs Boat: USCGC	
MISS MADOCK	TAMPA (525557)	
(518194); MISSOURI		
(271999); NORMAN		
COURT (272034);		
NOTRE DAME DE		
BOLOGNA (240376);		
NYDIA (271604);		
OLINDA (271908);		
OMNIBUS (506541);		
PAMELA (240904);		
PORTLAND (273195);		
PRESEIDENT HARBITZ		
(271898); PRIDE OF		
THE SEA (272458);		
PRIMOSE HILL		
(240327); PRINCE		
CADWGAN (273302);		
PRINCESS AMELIA		
(271924); PROGRESS		
(273277); ROSIE		
(240325); SAGE		
(274247); SAINT		
GEORGE (411); SAINT		

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Merchant Ships	Fighting Ships	Service Craft
JACQUES (271164); SARAH (240394); STRATHNAIRN (274804); TEVIOTDALE (114200); THE DIAMOND (307941); TRAFALGAR (507216); VAN STIRUM (273138) Emigrant Ship: NEWRY (271713); NIMROD (272921); OCEAN MONARCH (271692) Passenger Vessel: ALBION (272842); MARY (391); CITY OF BRISTOL ((273749); ROYAL CHARTER; MORNA (272901); QUEEN (272175); SLIEVE BLOOM (272130); SAINT COLUMBA (507213)		

Suggestions for sites to be included in further research and survey will always be welcomed from individuals, community groups, and marine stakeholders.

Questions and themes meriting further research include:

- Studies enhancing the understanding of the particularity of vessels designed for specific Welsh environments or industries;
 - Experimental studies of handling and abilities of old working boats, particular their rigs and sails, using reconstructions or rebuilt original boats;

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- Studies which address the information with regard to Welsh vernacular boat-building in iconography representation such as painting, drawing, carvings, models, etc.;
- Studies which record the disappearing traditional skills of boat and shipbuilding, and ways of working vessels;
- Studies which explore and make links between material culture and artefacts in museum collections and archaeological remains;
- Studies which address the known post-medieval wrecks and hulks for their potential to inform about technical advances in ship and boat design;
- Studies which target the large number of 'Unnamed Wrecks' to help provide confirmed identities and assessments of historic and archaeological importance;
- Studying and surveying wrecks by theme (e.g. Welsh sourced commodities carried such as metal ores, limestone and granite) or by location, thereby increasing our understanding of the resource and ensuring the numbers of statutorily protected wrecks are more representative of the resource as a whole.

Theme 4: Challenges for Conservation Management

2.6.6.2 The historic environment of coastal and offshore zones represents a unique aspect of our cultural heritage. In addition to its cultural value, it is an asset of social, economic and environmental value. It can be a powerful driver for economic growth, attracting investment and tourism and sustaining enjoyable and successful places in which to live and work. However, heritage assets are a finite and often irreplaceable resource and can be vulnerable to a wide range of human activities and natural processes.

2.6.6.3 The view shared by the UK Administrations is that heritage assets should be enjoyed for the quality of life they bring to this and future generations, and that they should be conserved through marine planning in a manner appropriate and proportionate to their significance. Opportunities should be taken to contribute to our knowledge and understanding of our past by capturing evidence from the historic environment and making this publicly available, particularly if a heritage asset is to be lost.

– UK Marine Policy Statement 2011

It is fitting to begin this section with the above quote as a reminder of the wider context in which Welsh maritime research is being undertaken.

The development of Marine Planning in Wales is driving forward seabed mapping for both blue energy development and for ecological research to ensure a coherent network of Marine Protected Areas for Wales. It is vitally important that historic environment research moves forward at the same time, to ensure that a sustainable marine environment promotes healthy, functioning marine ecosystems and protects heritage assets.

It is important to broaden the basis of data retrieval to include every relevant source which can inform the extent and present condition of sites against the boarder agendas, such as the siting of offshore developments and responses to climate change agendas.

Management

Amongst the new challenges faced is the need to foster recognition that marine historic environment assets should not be seen as separate from the marine natural environment, rather assets inhabit the same space and contribute many of the same social, cultural and economic benefits.

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Increasing devolved responsibilities for Welsh Government in marine planning matters, plus an expanding library of best practice guidance, must play a part in this 2016 update of the Archaeological Research Framework for Wales.

It is desirable that Welsh Government creates its own or reviews and endorses the guidance that has been generated by the Crown Estate and other devolved governments for several marine industrial sectors to ensure best practice in both the inner (within 12nm of the coast) and outer zones (e.g. UK continental shelf to the median between England and Ireland) to ensure best practice is consistently adopted. The production of Welsh language versions of the key guidance documents should be explored to conform to the requirements of Welsh Government's new Welsh Language Scheme (adopted January 2017).

It is recommended that the Advisory Panel for the Welsh Historic Environment established as part of The Historic Environment (Wales) Act 2016 includes underwater cultural heritage as an integral part of its remit.

It is also important that opportunities are taken to keep legislative and licensing frameworks under review to introduce greater transparency and simplification. Guidance with regard to how marine licencing is to work best with existing international conventions and UK legislation (e.g. Merchant Shipping Act 1995, Protection of Wrecks Act 1973) is urgently required.

The introduction of the Crown Estate's Marine Antiquities Scheme to encourage reporting by sports divers and fishermen to cover both English and Welsh waters in July 2016 is an initiative which is likely to have increasing importance through the 2016-2021 period of the Research Framework. In time, the Scheme will generate a corpus of finds which will provide opportunities for artefact research in the same way as the terrestrial Portable Antiquities Scheme (PAS Cymru), which also continues to record finds from the intertidal and coastal zone relating to the maritime record.

Methods

Contributors to the corpus of surveys published by contributors to the Severn Estuary Levels Research Committee and Arfordir Project have developed techniques which can record a broad range of sites, deposits and artefacts at the coast edge. However, the environment within which marine survey and research takes place remains challenging.

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During the 2011-2014 period of operation of the Archaeological Research Framework for Wales, English Heritage published *Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Note*, recognising how far the archaeological community has come working collaboratively with the offshore survey industry. However, as the technology moves forward, so should our grasp of potential applications in the pursuit of non-destructive methods of investigation.

There will be instances where preservation *insitu* is not possible (e.g. Newport Ship). As a consequence, capacity in Wales for the conservation of marine artefacts needs to be kept under review in relation to conservation facilities available UK wide.

The development of partnerships across the historic environment, museum and university sectors to maintain and develop capacity and sustainability in this area is highly desirable.

Public Engagement and Outreach

Community groups are undertaking an increasingly amount of welcome survey (which may result in recommendations for protection) and research, but such projects require a training as well as creative input to ensure that participation remains welcoming and attractive to new and existing audiences. Exploring new technologies to communicate with and especially listen to the needs of people who want to engage with the maritime assets is recognised as being extremely important.

Developing bilingual education resources that will allow teachers to bring local maritime history into the classroom in relation to the requirements of the Welsh National Curriculum remains a priority.

Data Production and Maritime Archives

The 2009 report 'Securing the future for Maritime Archaeological Archives' highlighted a perceived crisis in archives management and in the conservation of artefact collections. One of the fundamental problems identified was that maritime archives generally do not progress to deposition. The causes were primarily attributed to differing management and legislative regimes have also had an impact on the generation and deposition of archives. The extra conservation requirements of objects from marine zone may make museums nervous about acquiring maritime material.

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Wales should not be complacent about these issues but must continue to be proactive in liaison with archive producers and the Welsh museums and Archives Wales Network to ensure that key maritime archives are brought into safekeeping in the public domain.

The 'Securing the future for Maritime Archaeological Archives' report recommendations included awareness-raising of processes of archive deposition; developing standards tailored specifically to marine archaeological audiences; ensuring robust archive requirement through legal protection systems and offshore development control; and the encouragement of analysis and publication relating to extant archives to improve access for future research and to inform marine planning.

A recurring theme throughout this 'Challenges for Conservation' section relates to finding ways to explore what 'maritime heritage' means to the people of Wales and finding innovative approaches to ensuring that it continues to have a relevance and resonance in everyday life.

Areas meriting further research include:

- Cross sectoral studies which explore the ecological and social and economic value of shipwreck sites, as well their historic and archaeological value, and contribute to the Welsh Marine Evidence Strategy referred in the Welsh National Marine Plan, draft November 2015, p15);
- Studies which improve the integration of historic environment concerns into offshore development control and which increase understanding of those concerns within marine industrial sectors, licensing authorities, and amongst other marine stakeholder groups (draft policy statements SOC6-9, Welsh National Marine Plan, November 2015, p44-51);
- Studies which continue to harness hydrographic survey technologies to pursue cost effective exploration of offshore heritage assets;
- Studies which identify maritime archaeological archives and quantify paper and digital resources and artefact collections not presently curated within the Welsh museum and archives network, and which work towards providing clear guidance to potential depositors of appropriate formats and materials for long term preservation;

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- Studies which raise the profile of Welsh maritime heritage on the international stage as well as at home through interpreting and making maritime archives digital accessible through the worldwide web;
- Studies which provide educational resources, in both the sciences and the arts, relevant to the Welsh National Curriculum.

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