

### Future Research: Summary Main Recommendations

Contributors to the 2016 update of the Research Framework have agreed that the three overarching priorities identified in 2011 retain their relevance going forward, namely:

- **Prehistoric land use** – 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.
- **Coastal trade** – We should develop further knowledge of how Welsh shores were used in trade and settlement, the development of ports, and coastal and estuarine navigation.
- **Vessels** – 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.

However, there are additional, emerging research topics which should now be added to the priority list:

Theme 1: Coastal Change and Submerged landscapes

insert agreed after autumn 2016 conference

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

insert agreed after autumn 2016 conference

Theme 3: Marine Transport

insert agreed after autumn 2016 conference

Theme 4: Challenges for Conservation Management

insert agreed after autumn 2016 conference

A special thank you is extended to the following contributors:

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This 2016 review document of the maritime and coastal chapter of the Archaeological Research Framework for Wales is dedicated to:

Richard Avent, Martin Dean, Mike Bowyer, J Geraint Jenkins, Robin Evans, and Ken Lloyd Gruffydd.

## 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*, pg3

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 which every Welsh schoolchild knows - 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 at the centre of a much larger realm.

To reflect this diversity, this Review Document has approached the updating of the Maritime chapter of the Research Framework for the Archaeology of Wales 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 Review Document provides an overview of the progress made against previous research priorities and a more extensive bibliography than has previously been collated. It also provides suggestions for a revised priority list for discussion at the forthcoming autumn 2016 conference.

### Past Research Agenda Priorities and Achievements

The first Research Framework for Maritime Archaeology presented in September 2004 noted:

*'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

The initial priority research themes listed were 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;
- 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 period the RCAHMW 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 to take forward with local sports diver clubs, potentially as part of the 'Adopt a Wreck' Scheme. Other underwater sites adopted under the Nautical Archaeology Society's Adopt-a-Wreck Scheme during this period, 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 sited 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 was 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 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.

The period saw the discovery of a well preserved medieval masonry wharf at Skenfrith in the riverside silts adjacent to the castle, another possible site at Roman Caerleon, and of 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 wider hinterland.

Substantial progress had been made in a number of key areas by 2011, but 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
- 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 set for the 2011 – 2016 were as follows:

- 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 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 assessment 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.

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 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 Trust regions.

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 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 Heritage Interpretation Plan.

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 the University Sector, the SEACAMS initiative at the Bangor University undertook seabed 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 build on the computer modelling undertaken to explore the potential of such 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 project is to provide advice to Cadw with regard to the relative significance of the 170 losses attributed to enemy action.

As can be seen, a great deal has been accomplished in the period 2011-2016. However, in November 2015, the annual conference held by MOROL at Trinity St David University, Lampeter, 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.

Indeed, looking back over the past decade of the Research Framework's operation, 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 and extend the Review under four thematic headings to explore additional priorities which might be set.

## 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*, pg297

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 the 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 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.

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
- 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 provide 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 Surveys retaining only a very few cores from these 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).

Research recommendations for 2016-2021 might include:

- 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, pg22*

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. Moreover, 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 sea crossings. Skinboats may have been used. Dugout canoes (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 maritime 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, pg9).

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 6<sup>th</sup>-7<sup>th</sup> century onwards, it has been suggested that proto-harbours began to emerge from sheltered beaches along with specialist seafaring traders.

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 12th century logboat of Llyn Padarn, the 13th century clinker-built vessel carrying iron ore in the Severn, and the 15th 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 13th century, the medieval port of Llan-Fraes at the northern entrance of the Menai Strait conducted significant trade in ale, wine, wool, and hides, and maintained a herring fishery, before it was moved by Edward to be centred on his new castle at Beaumaris. Many other Welsh 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 Welsh 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 first World War providing the context for a commemorative project being undertaken by Welsh maritime museums, the Royal Commission on the Ancient and Historical Monuments of Wales; the School of Ocean Sciences, Bangor University; and the Nautical Archaeology Society.

A recurring theme throughout must be the relationship between the sea and formation of the collective identity of the nation.

Research recommendations for 2016-2021 might include:

- Studies which review evidence for coastal settlement from early periods and begin to explore the roles that seafaring (e.g. logboats and sewn-plank boats) may have contributed to mixed subsistence practices

- Studies which utilise coastal pilotage and greater understanding of rising sealevels and coastal processes the most likely locations of early landing place and harbours
- Studies which make better use of indirect evidence for sea crossings through the provenance of objects and origins of individuals to gain a better understanding of invasion, migration, slavery, and legitimate trade
- Studies which explore 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 by 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 16-17<sup>th</sup> 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
    - 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 (e.g. Battle of the Menai Straits?)
  - 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
  - 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, Pg55

A recurring theme from past iterations of the Archaeological Research Framework for Wales is the acknowledgement of a 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, pg16).

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 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, and 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, the vast numbers of vessels built, owned and operated in Welsh waters are represented in

the unnamed remains of vessels and objects recovered from the seabed and in the intertidal zone. This is where recording and research needs to be focussed. It 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 and downed aircraft sites, findspots, plus seabed anomalies which may be wrecks, for which there is no confirmed identity).

Suggestions for sites to be included in further research and survey will always be welcomed from individuals, community groups, and marine stakeholders. 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 (272066); JOHN (274508); KIRKBY (274829); LEWIS (273059); LEYSIAN (273146); LILY (240679); LOCH SHIEL (273056); LORD ATHLUMNEY (271887); LORD DELAMARE (271637); LOUISA (405916); MALLENY (273882); MARY COLES (272031); MARY JANE	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 (273318); U-246 (274463); U-61 (273399); U-87 (274776)  <u>Naval Support Vessels:</u>	Cable Layer: FARADAY (273247)  Dredger: REDVERS BULLER (274033)  Lightship: SCARWEATHER LIGHTSHIP (274371);  Tug: GUIDING STAR (273020); HASWELL (273830)

<p>LEWIS (240326); MINERVA (271954); MISS MADOCK (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 JACQUES (271164); SARAH (240394); STRATHNAIRN (274804); TEVIOTDALE (114200); THE DIAMOND (307941); TRAFALGAR (507216); VAN STIRUM (273138)</p> <p>Emigrant Ship: NEWRY (271713); NIMROD (272921); OCEAN MONARCH (271692)</p> <p>Passenger Vessel: ALBION (272842); MARY (391); CITY OF BRISTOL ((273749); ROYAL CHARTER; MORNA (272901); QUEEN (272175); SLIEVE BLOOM (272130); SAINT COLUMBA (507213)</p>	<p>Decoy Vessel (Q Ship): HMS PENSHURT (274657); HMS ROYAL SCOT (273720); HMS WESTPHALIA (274457)</p> <p>Oiler: HMS DERBENT (272125)</p> <p>Transport: USAT ROANOAKE (506995)</p> <p>Customs Boat: USCGC TAMPA (525557)</p>	
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Research recommendations for 2016-2021 might 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



- 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.

Increasing devolved responsibilities for Welsh Government in marine planning matters, plus an expanding library of best practice guidance, must also 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) of its marine planning responsibility. The production of Welsh language versions of the guidance should be explored.

It is vitally important 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 in order to introduce greater transparency and simplification, as well as ensuring clear guidance is produced on the reporting responsibilities of those making underwater discoveries in relation to Welsh Government's marine licensing requirements as implemented by Natural Resources Wales.

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 Portable Antiquities Scheme.

### Methods

The corpus of intertidal surveys produced by contributors to the Severn Estuary Levels Research Committee publications and Arfordir Project has 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.

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

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

A dedicated university department or institution working in conjunction with museums sector to develop and maintain capacity in these fields would be desirable, also to provide access to scholarships to enable archaeologists to obtain basic diving qualifications.

#### Public Engagement and Outreach

Community groups are undertaking an increasingly amount of welcome survey and research, but such projects require a training element as well as creative input to ensure that the themes remain attractive to existing and audiences. Exploring new technologies to communicate with and especially listen to the needs of people who want to engage with the maritime historic environment is recognised as being extremely important. Knowledge transfer between professional and community group, in both directions, is the valuable and rewarding outcome to be constantly sought.

Developing bilingual education resources which will allow teachers to bring local maritime history into the classroom as a basis for skills development in relation to the requirements of the Welsh National Curriculum remains a priority.

#### Data Production and Maritime Archives

The publication of 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. It was noted that as maritime archaeology has developed as a discipline, it has often been seen as 'different' and outside the mainstream of both archaeology and museums. Differing management and legislative regimes have also had an impact on the generation and deposition of archives, with the extra conservation requirements of objects from marine zone making museums nervous about acquiring maritime material.

Wales cannot be complacent on 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.

The recurring theme for this 'Challenges for Conservation' section is 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.

Research recommendations for 2016-2021 might 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, pg15)
- 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, pg44-51)
- 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
- 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 www
- Studies which provide educational resources, in both the sciences and the arts, relevant to the Welsh National Curriculum for schools and colleges

## **Selected Bibliography**

### **Coastal Change and Submerged Landscapes**

Allen, J R L and Rippon, S J 1997, Iron Age to early modern activity at Magor Pill and palaeochannels, Gwent: an exercise in lowland coastal-zone geoarchaeology, *in Antiquaries Journal*, 77, 327-70

Allen, J R L, 2001, Late Quaternary stratigraphy in the Gwent Levels (southeast Wales): the surface evidence, in *Proceedings of the Geologists Association* 112, 289-315

Bates, M R, Bates, C R & Briant, R M, 2007, Bridging the gap: a terrestrial view of shallow marine sequences and the importance of the transition zone, in *Journal of Archaeological Science*, 34: 1537-1551

Bell, MG, Caseldine, AE and Neumann, H, 2000, Prehistoric Intertidal Archaeology in the Welsh Severn Estuary, CBA Research Report 120: York

Bell, M, 2007. Prehistoric coastal communities: the Mesolithic in western Britain, in J Sidel & F Haughey (eds), *Neolithic Archaeology in the Intertidal Zone*

Bell, M & Neumann, H , 1997, Prehistoric intertidal archaeology and environments in the Severn Estuary, Wales, *in World Archaeology* 29, 1, 95-113

Bell, M, 2007, Prehistoric Coastal Communities: The Mesolithic in Western Britain, CBA Research Report 149, 2

Bibby, H C, 1940, The Submerged Forests at Rhyl and Abergele, North Wales. Data for the study of postglacial history III, *in New Phytologist*, 39, 220-5

Brooks, A J, Bradley, S L, Edwards, R J, Milne, G A, Horton B & Shenna, I, 2008, Post glacial relative sea level observations from Ireland and their use in glacial rebound modelling *in Journal of Quaternary Science*, 13 (2): 175-192

Coles, B J, 1998, Doggerland: a speculative survey, in *Proceedings of the Prehistoric Society* 64: 435-81

Cummings, V and Fowler, C, *The Neolithic of the Irish Sea: Materiality and Traditions of Practice*, Oxbow

DAT, 2012, Borth Coastal Defence Scheme: Phase 1, Borth Ceredigion Archaeological Watching Brief, report ref: 2012/23 (<http://www.dyfedarchaeology.org.uk/projects/borthcoastaldefence.pdf>)

David, A, 2007, Palaeolithic and Mesolithic Settlement in Wales, British Archaeological Report Series 448

Figgis, N P, 1999, Welsh Prehistory: A Catalogue of Accessions in the County and Local Museums of Wales and Other Collections

Fitch, S and Gaffney, V, 2011, West Coast Palaeolandscapes Survey, Report ref WCPS-1997-3b (<http://www.dyfedarchaeology.org.uk/lostlandscapes/WCPStechical.pdf> )

Flemming, N C, 2005, The Scope of Strategic Environmental assessment of the Irish Sea Area SEA6 in regard to prehistoric archaeological remains. Technical report produced for Strategic Environmental Assessment SEA 6, UK Department of Trade and Industry ([https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/197300/SEA\\_6\\_Archaeology\\_NCF.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/197300/SEA_6_Archaeology_NCF.pdf))

Greenly, E, 1928, Some recent work on the submerged forest in Anglesey, *in Proceedings of the Liverpool Geological Society*, 15, 56-62

Hall, H F, 1866, Notice of submerged forests at Rhos, near Colwyn *in Proceedings of Liverpool Geological Society*, 7, 31

Huddart, S, Gonzalez, S & Roberts, G, 1999, The archaeological record and mid-Holocene marginal coastal palaeoenvironments around Liverpool Bay, in K J Edwards & J D Sadler (eds), *Holocene Environments of Prehistoric Britain: Journal of Quaternary Science* 14.6, 563-74

Hyde, A, 1932, St Ishmaels Submerged forest, *in Transactions of the Carmarthenshire Antiquarian Society and Field Club*

Hyde, H A, 1936, On a peat bed at East Moors, Cardiff, *in Transactions of the Cardiff Naturalists' Society*, 69, 38-48

Jackson, D I, Jackson, A A, Evans, D, Wingfield, R T R, Barnes, R P & Arthur, M J, 1995, The Geology of the Irish Sea, HMSO

Lambeck, K, 1995, Late Devensian and Holocene Shorelines of the British Isles and the North Sea, in *Journal of Geological Society* 152, 437-48

Leach, A L, 1918, Flint-working sites on the submerged land (submerged forest) bordering the Pembrokeshire Coast, in *Proceedings of the Geologists' Association* 29, 46-67

Lewis, M P, 1992, The Prehistory of Coastal Southwest Wales 7500-3600 BP: an interdisciplinary palaeoenvironmental and archaeological investigation, unpublished PhD thesis, Dept of Archaeology, University of Lampeter

Locke, S, 1970-1, The post-glacial deposits of the Caldicot Level and some associated archaeological discoveries, *in The Monmouthshire Antiquary* III, 1-16

Murphy, K, Caseldine, A E, Barker, L, Fielding, S, Burrow, S and Carlsen, S, 2014, Mesolithic human and animal footprints at Lydstep Haven, Pembrokeshire, 2010: the environmental

context in *Archaeologica Cambrensis* 163 (2014), 23-41  
(<http://www.dyfedarchaeology.org.uk/projects/lydstep.pdf> )

Musson, C, Taylor, J A and Heyworth, A, 1989, Peat Deposits and a medieval trackway at Llanaber near Barmouth, Gwynedd, in *Archaeology in Wales*, 29, 22-6

Pratt, Naomi R A, 2016, Submerged forests and tree ring stable isotopes: A preliminary investigation, Department of Earth Sciences, Durham University

Reid, C, 2006, Submerged Forests

Roberts, M J, Scourse, J D, Bennell, J D, Huws, D G, Jago, C F, and Long, B T, 2011, Late Devensian and Holocene relative sea-level change in North Wales, U.K, in *Journal of Quaternary Science*, 26, (2), 141 – 155

Rohling, E J, Grant , K, Bolshaw, M, Roberts, A P, Siddall, M, Hemberbe, C 7 Kuceera, 2009, Antarctic temperature and global sea level closely couple over the past glacial cycles in *Nature Geoscience*, 2: 500-4

Scaife, R G, 1993, The palynological investigation of the peats and sediments, in S Godbold and R C Turner (eds), *Second Severn Crossing: Archaeological Response Phase I - the intertidal zone in Wales*. Cadw, 51-7

Severn Estuary Levels Research Committee (<http://www.selrc.org.uk/publications.html> ):

Annual Reports 1990-1993, Vols 1-3

Archaeology in the Severn Estuary 1993 – 2009, Vols 4 - 20

Shennan, I, & Andrews, J, 2000, Holocene Land-Ocean Interaction and Environmental Change around the North Sea

Shennan, I, Petlier, W R Drummond, 7 Horton, B, 2002, global to local scale parameters determining relative sea-level changes and the post- glacial isostatic adjustment of Great Britain in *Quaternary Science reviews* 21, 397-408

Shennan, I, Bradley, S, Milne, G A, Brooks, A, Basset, S E & Hamilton, S, 2006, relative sea-level changes glacial isostatic modelling and ice-sheet reconstructions from the British Isles since the Last Glacial Maximum, in *Journal of Quaternary Science* 21 (6); 585-99

Smith, G, Davidson, A and Kennedy, J, 2002, North Wales Intertidal Peat Survey, report 450, Gwynedd Archaeological Trust

University of Southampton, 2013, The Social Context of Submerged Prehistoric Landscapes, English Heritage Project no. 6593, Meeting Report: July 2013

Wenban-Smith, F, 2002, Marine Aggregates Dredging and the Historic Environment: Palaeolithic and Mesolithic Archaeology on the Seabed, BMAPA and English Heritage (<http://www.wessexarch.co.uk/files/projects/BMAPA-Protocol/mads2.pdf> )

Wesley, K, Dix, J & Quinn, R, 2008, A re-assessment of the archaeological potential of Continental Shelves, Aggregate Sustainability Fund Project 3362, prepared for English Heritage ([http://archaeologydataservice.ac.uk/archives/view/continentshelves\\_eh\\_2008/](http://archaeologydataservice.ac.uk/archives/view/continentshelves_eh_2008/))

Westley, K, Flemming, N and Gibbard, P, 2013, Appendix 2 (Palaeolithic Chapter) – Sea level Change, Palaeo-Environmental Change and Preservation Issues *in* Adams, et al, 2011 and 2013, Maritime and Marine Historic Environment Research Framework for England

([http://archaeologydataservice.ac.uk/archiveDS/archiveDownload?t=arch-1043-1/dissemination/pdf/publication\\_appendices/Appendix\\_2\\_Palaeolithic.pdf](http://archaeologydataservice.ac.uk/archiveDS/archiveDownload?t=arch-1043-1/dissemination/pdf/publication_appendices/Appendix_2_Palaeolithic.pdf) )

Whittow, J B, 1965, The Interglacial and Post-glacial strandlines of North Wales *in* J B Whittow and P D Wood (eds) *Essays in Geography for Austin Miller*, University of Reading, Reading, 94-117

### **Seafaring, Seascapes and Marine Transport**

Bennett, T, 1981, *Welsh Shipwrecks*

Bennett, T, 1987, *Shipwrecks Around Wales*

Bennett, T, 1994, *Shipwrecks around St David's*

Bennet, T, 1995, *Shipwrecks around Anglesey*

Butler, Rev P O, 1989, Some Bangor Maritime Inscriptions, *in* *Cymru a'r Môr /Maritime Wales* (10), 146-152

CPAT 1997 Coastal Erosion Survey, Clwyd-Powys Archaeological Trust Report 194 (held at Trust, RCAHMW and Cadw)

CPAT, 2004-7, Ports and Harbours of North-East Wales, (<http://www.cpat.org.uk/projects/longer/ports/ports.htm>)

Collins, G. 1693, *Great Britain's Coasting Pilot*

Cowell, J, 1990, *Liverpool to North Wales Pleasure Steamers: A Pictorial History 1821-1962*

DAT 1996, 1997, 1998, 1998 Coastal Erosion Surveys, Dyfed Archaeological Reports

DAT, 2008, Milford Haven Waterway Ports and Harbours Project, report ref: 2008/38 (<http://www.dyfedarchaeology.org.uk/projects/waterways.pdf> )



DAT, 2010, Arfordir Coastal Heritage 2009-2010, Report ref: 2010/23  
(<http://www.dyfedarchaeology.org.uk/arfordir/reports/arfordir09-10.pdf> )

DAT, 2012, Arfordir Coastal Heritage 2010-2011, Report ref: 2011/18  
(<http://www.dyfedarchaeology.org.uk/arfordir/reports/arfordirreport2010-11.pdf> )

DAT, 2012, Arfordir Coastal Heritage 2011-2012, Report ref: 2012/24  
(<http://www.dyfedarchaeology.org.uk/arfordir/reports/arfordirreport2011-12.pdf> )

DAT, 2013, Arfordir Coastal Heritage 2012-2013, Report ref: 2013/23  
(<http://www.dyfedarchaeology.org.uk/arfordir/reports/arfordirreport2012-13.pdf> )

DAT, 2013, Medieval and Early Post Medieval Fishtraps: A Threat-Related Assessment 2012  
<http://www.dyfedarchaeology.org.uk/projects/fishtraps.pdf>

DAT, 2014, Ynyslas Hulks, Ynyslas, Ceredigion: Archaeological Investigations 2014 Interim Report  
(<http://www.dyfedarchaeology.org.uk/projects/ynyslasinterim2014.pdf> )

Davidson, A, (et al) 2002 Coastal Archaeology of Wales, CBA Research Report

Davies, H R. 1942, The Conway and Menai Ferries

Davies, P N, 1978, The Discovery and Excavation of the Royal Yacht Mary, *in Maritime Wales/Cymru a'r Môr* 3: pg 25-32

Davies, T, 2004, Borth: A Seaborn Village

Davies, T, 2009, Borth: A Maritime History

Eames, A, 1973. Ships and Seamen of Anglesey 1558-1918, Anglesey Antiquarian Society

Eames, A, and Hughes, Emrys, 1975, Porthmadog Ships, Gwynedd Archive Services

Eames, A, 1987, Ventures into Sail: Aspects of the Maritime History of Gwynedd 1840-1914 and the Liverpool Connection, Gwynedd Archive Service, Merseyside Maritime Museum, and National Maritime Museum

Eames, A, 1991, Shrouded Quays: The Lost Ports of Wales

Eames, A, 2016, The Captain's Wife: The Diary of a voyage from the Golden Age of sail in Wales, Llygad Gwalch Cyf

Ellis-Williams, M, 1988, Bangor Port of Beaumaris: The Nineteenth Century Shipbuilder and Shipowners of Bangor

Evans, D E, 2007, Troubled Waters: the story of 12 Disasters off the North Anglesey Coasts

Evans, R, 2009, Ffarwel i'r Grassholm Gribog: Moelfre a'r Môr, Gwasg Carreg Gwalch

Evans, R, 2011, Pysgotwyr Cymru a'r Môr, Gwasg Carreg Gwalch

- Evans, R, 2013, Merched y Môr, Gwasg Carreg Gwalch
- Fenton, R, 1988, Steam packet to Wales, *in* *Cymru a'r Mor/Maritime Wales* (12), 55-63
- Fenwick, V and Gale, A, 1999, Historic Shipwrecks Discovered, Protected and Investigated
- GAT 1994, 1996, 1997 Coastal Erosion Surveys, Gwynedd Archaeological Trust Reports 79, 198, 251, 253
- GAT, 2000, An Assessment of Coastal fish weirs and Traps, GAT Report, 363
- GAT, 2005-7, Port and Harbours, Project Refs: G1824  
(<http://www.heneb.co.uk/cadwprojs/cadwprojectsnewindex.html>)
- GAT, 2006, Menai Straits Ferries. Project Refs: G1866  
(<http://www.heneb.co.uk/cadwprojs/cadwreview2006/menaistraits06.html>)
- GAT, 2010-13, Arfordir – Coastal Heritage  
(<http://www.heneb.co.uk/arfordir/arfordirprojects2012-13.html>)
- Gater, D, 1992, Historic Shipwrecks of Wales
- GGAT 1996, 1997, 1998 Coastal Erosion Surveys, GGAT Reports 96/015, 97/011, 98/010
- GGAT, 2004, Urban Waterfronts in Southeast Wales, report number: 2004/075
- Godbold, S & Turner, R C, 1994, Medieval Fish Traps in the Severn Estuary, *in* *Medieval Archaeology*, 38, pg19-54
- Goodard, T, 1983, Pembrokeshire Shipwrecks
- Green, C, 1992, The Severn Fisheries in Severn Estuary Research Committee Annual report 1992  
(<http://www.selrc.org.uk/content/documents/Volume31992.pdf>)
- Greenhill, B, 1982, Garlandstone, National Museum of Wales
- Gruffydd, K L, 1987, Sea Power and the Anglo-Welsh Wars 1210-1410 *in* *Cymru a'r Môr/Maritime Wales* (11), 28-53
- Gruffydd, K L, 1993, Wales's Maritime Trade in Wine during the Later Middle Ages *in* *Cymru a'r Môr/Maritime Wales* (15), 7-42
- Gruffydd, K L, 2016, Maritime Wales in the Middle Ages 1039-1542, Bridge Books
- Heaton, P M, 1989, Welsh Shipping, Forgotten Fleets
- Hawkes, G I, 1986, Illicit Trading in Wales in the Eighteenth Century *in* *Cymru a'r Môr /Maritime Wales* (10), 89-107

Hawkes, G I, 1987, Shipping on the Dee: the rise and decline of the creeks of the Port of Chester in the Nineteenth Century, in *Cymru a'r Môr/Maritime Wales*, 112-133

Holden, C, 2003, The Essential Underwater Guide to North Wales, Vol 1: Barmouth to South Stack

Holden, C, 2008, The Essential Underwater Guide to North Wales, Vol 2: South Stack to Colwyn Bay

Holden, C, 2009, Life and Death on the Royal Charter: The True Story of a Treasure Ship wrecked on Anglesey

Hope, B D, 2005, A Commodious Yard: the Story of William Thomas & Sons, Shipbuilders of Amlwch

Hudson, B, 2006, Irish Sea Studies 900-1200

Hughes, E and Eames, L, 1975, Porthmadog Ships, Gwynedd Archive Service

Hughes, C E, 1937, Wales and Piracy: A study in Tudor Administration 1500-1640, University of Cardiff MA Thesis

Hughes, Lt Col H, 1969, Immortal Sails: a story of a Welsh Port and some of its Ships

Hughes, T M, 1996, The Ferries to Anglesey

Hutchinson, G, 1984, A plank fragment from a boat find from the River Usk at Newport in *International Journal of Nautical Archaeology (IJNA)*, Vol 13.1, 27-32.

Illsley, J S and Roberts, O T P, 1979. An 19<sup>th</sup> century boat in Lake Padarn, North Wales in *International Journal of Nautical Archaeology (IJNA)*, Vol 8.1, 45-67.

Illsley, J S and Roberts, O T P, 1980. Two further boat finds in the Snowdon Lakes in *International Journal of Nautical Archaeology (IJNA)*, Vol 9.4, 342-48

Insole, P, 1995, Trows and the Severn Coastal Trade in Archaeology in the Severn Estuary, Vol 6 (1995), 95-96

James, David N, 2006, Down the slipway! Ships of Pembrokeshire's secret waterway, West Wales Maritime Heritage Society

James, H & James, T, 2003, Fish Weirs on the Taf, Towy and Gwendraeth estuaries, Carmarthenshire in *The Carmarthenshire Antiquary*, Vol XXXIX, pg22-48

Jenkins, D, 1985, Jenkins Brothers of Cardiff: A Ceredigion Family's Shipping Venture, National Museum of Wales

Jenkins, D, 1997, Shipowners of Cardiff: A Class by Themselves, National Museum of Wales

- Jenkins, D, 1993, Shipping at Cardiff: Photographs from the Hansen Collection 1920-1975, National Museum of Wales
- Jenkins, J G, 1979, Herring Fishing in Wales *in Maritime Wales/Cymru a'r Môr*, Vol 4, 5-32
- Jenkins, J G, 1982, Maritime Heritage: the Ships and Seamen of South Ceredigion
- Jenkins, J G, 1982, Evans Thomas Radcliff: A Cardiff Shipowning Company, National Museum of Wales
- Jenkins, J G, 1987, The Fishing Ports of Wales *in Maritime Wales/Cymru a'r Môr*, Vol 11, 74-96
- Jenkins, J G, 2006, Welsh Ships and Sailing Men
- Jenkins, J G, 2007, *Traddodiad y Môr*, Gwasg Carreg Gwalch
- Jenkins, J G, 2009, The Inshore Fishermen of Wales
- Jones D C, 1977, A relic of the Slate Trade on the Menai Strait in *Maritime Wales/Cymru a'r Môr*, 2, 13-15
- Jones, C, 1978 The Pwll Fanog wreck: a slate cargo in the Menai straits *in International Journal of Nautical Archaeology (IJNA)*, Vol 7.2, 152-7.
- Jones, C, 1980, The Riddle of the Slate Wreck in *Diver*, Vol 25.3, March 1980, 44-5.
- Kilminster, G and Mytum, H, 1987, Mariners at Newport, Pembrokeshire: The Evidence from the Gravestones, *in Cymru a'r Môr /Maritime Wales* (11), 7-27
- Konstam, A., 1988, Site Excavation Report of the Bronze bell site, Gwynedd, unpublished licensee report. Document within NA/GEN/2005/002e.
- Lewes, E, 1924, The Goredi near Llandewi Aberarth, Cardiganshire, *in Archaeologica Cambrensis*, 79, 397-9
- Lewis, E A, 1927, The Welsh Port Books (1550-1603) with an analysis of the customs revenue accounts of Wales for the same period, Honorable Society of Cymmrodorion
- Lloyd, L, 1993, Where Ever Freights May Offer: The Maritime Communities of Abermawr and Barmouth 1565-1920
- Lloyd, L, 1991, Pwllheli: The Port and Mart of Llŷn
- Lloyd, L, 1989, The Port of Caernarfon 1793-1900
- March, E J, 2005, Inshore Craft of Britain in the Days of Sail and Oar
- Mc Grail, S, 1987 (revised 1998), Ancient Boats in Northwest Europe
- McKee, A, 1986, The Golden Wreck: The Tragedy of the Royal Charter

Masefield, J, 1953, The Conway

Morgan, G, 1991, Aberystwyth Herring Tithes and Boat Names in 1730 in *Cymru a'r Mor/Maritime Wales* (14), pg7-15

Morgan, G, 1994, The Wrecking of Aberystwyth Ships and Other Disasters in *Cymru a'r Mor/Maritime Wales* (16), pg9-19

Morris, Lewis. 1748, Plan of Harbours, Bays and Roads in St George's Channel

Mullen, R. 1993, Echoes of a Bronze Bell, *in Scuba World*, July 1993 pg 28-30

Murphy, W, 1987, The Life of Reverend George Garrett Pasha. Father of the Submarine, Willian Kimber and Company.

Mytum, H, 1990, Mariners at St Dogmaels, Pembrokeshire: The Evidence from Gravestones in *Cymru a'r Mor/Maritime Wales* (13), 18-32

Nayling, N, Maynard, D and McGrail, S 1994, Barland's Farm, Magor, Gwent: A Romano-Celtic boat', *in Antiquity* 68, 596-603

Nayling, N, 1995, The Excavation, Recovery and Provisional Analysis of a Medieval Wreck from Magor Pill, *in Archaeology of the Severn Estuary* 6, 85-95

Nayling, N, 1998, The Magor Pill Medieval Wreck, Council for British Archaeology Research Reports 115: York

Nayling, N, 2005, Wood identification of samples for the Designated Historic Wreck Site 'the Diamond', Cardigan Bay. NA/ME/2005/002e

Nayling, N and McCraill, S, 2004, The Barland's Farm Romano-Celtic Boat, Council for British Archaeology Research Report 138

Nichols, M., 1984, The Bronze Bell Wreck, *in Popular Archaeology*, January 1984, 34-6

Nicholson, J A, 1987, Pembrey and Burry Ports, their harbours, Shipwrecks and Looters

Parry, H, 1969, Wreck and Rescue on the Coast of Wales, the Lifeboats of Cardigan Bay and Anglesey

Philips, A, 2010, Defending Wales: The Coast and Sea Lanes in Wartime

RCAHMW, 2010, Ynyslas National Nature Reserve: Non-Intrusive Survey

Redknap, M. 1992. A Remarkable Viking find in a remote site, *in Amegueddfa*, 14, 19

Redknap, M & Jenkins, David, 1994, Cardiff's relic from the last age of sail: the nineteenth century hulk in the Taff, thought to be the LOUISA (1851) *in Archaeology in the Severn Estuary*, Vol 5 (1994), 53-58

- Redknap, M 1998. The Historical and Archaeological Significance of the Magor Pill Boat in Nayling (ed) *The Magor Pill Medieval Wreck*, CBA Research report 115, 143-54
- Redknap, M (ed), 1997, *Artefacts from Wrecks*
- Redknap, M and Besley, E, 1997, *Wreck de Mer and wreck sites: the case of the ANN FRANCIS (1583)* in Redknap, M (ed), 1997, *Artefacts from Wrecks*, 191-208
- Redknap, M & Nayling, N, 1997, *Coastal Transport in 13<sup>th</sup> Century Wales*, in G D Boe & F Cederlund (ed). *Post Medieval Boat and Ship Archaeology*, BAR International Series 256, 339-421
- Redknap, M, 2010, *Shipping in Medieval Society in Wales and beyond* in *Archaeology in the Severn Estuary*, Vol 21 (2010): 9-28
- Roberts, O T P, 1979, *Pwll Fanog Wreck, Menai Straits, North Wales* in *International Journal of Nautical Archaeology (IJNA)*, Notes and News, Vol 8.3, 249-54.
- Robert, O, 1998, *That the Royal Yacht Mary is certainly shipwrecked*, in *Cymru a'r Môr/Maritime Wales*, 19, 50-5
- Roberts, R F, 1996, *Ships built on the River Clwyd*, in *Cymru a'r Môr /Maritime Wales*, 13, 16-21
- Skidmore, I, 1979, *Anglesey and Llyn Shipwrecks*
- Smith, C, 1993, *Gower Coast Shipwrecks*
- Stammers, MK 2001 'Iron Knees in Wooden Vessels – an attempt at a typology', in *International Journal of Nautical Archaeology* 301, 115-21
- Smylie, M, 2005, *Working the Welsh Coast*
- Tanner, Matthew Richard, 2008 *Royal Yacht Mary: The discovery of the first royal yacht*
- Thomas D, 1949, *Hen Longau a Llongwyr Cymru/Old Ships and Sailors of Wales*, University of Wales
- Thomas, D, 2007, *Hen Longau Sir Gaernarfon, Gwasg Carreg Gwalch*
- Thomas, E, 1997, *The Diamond Shipwreck Charity*, in *Cymru a'r Môr/Maritime Wales*, 19, 88
- Thornley, F C, 1952, *Steamers of North Wales, Past and Present*
- Trett, B (ed), 2010, *Newport Medieval Ship: A Guide*, The Friends of the Newport Ship/Newport City Council
- Troughton, W, 2006, *Ceredigion Shipwrecks*
- Turner, R, 2010, *The Fish Trade in medieval Wales and the Marches* in *Archaeology in the Severn Estuary* Vol 21 (2010): 81-88

Wessex Archaeology, 2005, Strategic Environmental Assessment SEA 6: Irish Sea Maritime Archaeology

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/197296/SEA\\_6\\_Archaeology\\_Wessex.pdf0](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/197296/SEA_6_Archaeology_Wessex.pdf0)

Wessex Archaeology, 2004, Diamond, Sarn Badrig, Cardigan Bay, Designated Site Assessment: Preliminary Report, report ref: 53111.02u, NA/ME/2005/002e

Wessex Archaeology, 2006, Diamond, Cardigan Bay, Designated Site Assessment: Full Report, report ref: 53311.03u. NA/Gen/2006/009e

Wessex Archaeology, 2007, Pwll Fanog, Menai Strait, Designated Site Assessment: Full Report, AENT21/07

Wessex Archaeology, 2009. The Maritime Archaeology of the Welsh Coal Trade, report ref: 53111.02s-3

Wessex Archaeology, 2009, The Maritime Archaeology of the Welsh Slate Trade, report ref: 53111.02s-4

Wignal, S. 1979, The Bronze Bell Wreck: Archaeological Survey of a late 17th century shipwreck lying in Cardigan Bay, unpublished Licensee report. Document within NA/GEN/2005/002e.

Wilkinson, S, 2015, Mimosa – the life and times of the ship that sailed to Patagonia, Y Lolfa Cyf

Wynne-Jones, I, 2001, Shipwrecks of North Wales, 4ed

#### **Journals and Newsletters:**

Cymru a'r Mor/Maritime Wales

[http://www.gwynedd.gov.uk/gwy\\_doc.asp?cat=6141&doc=22311&Language=1](http://www.gwynedd.gov.uk/gwy_doc.asp?cat=6141&doc=22311&Language=1)

International Journal of Nautical Archaeology

<http://www.wiley.com/bw/journal.asp?ref=1057-2414>

Mariners Mirror, Society of Nautical Research

<http://snr.org.uk/the-mariners-mirror-archive/>

Nautical Archaeology Society Newsletter

<http://www.nauticalarchaeologysociety.org/publications/index.php>

Severn Estuary Levels Research Committee: Archaeology in the Severn Estuary

<http://www.selrc.org.uk/publications.html>

**National and Regional Research Frameworks neighbouring Wales and Welsh waters:**

Maritime and Marine Historic Environment Research Framework for England 2013

[http://archaeologydataservice.ac.uk/archives/view/mheresearch\\_eh\\_2011/](http://archaeologydataservice.ac.uk/archives/view/mheresearch_eh_2011/)

Scottish Archaeological Research Framework (SCARF) 2016

<http://www.scottishheritagehub.com/sites/default/files/u12/ScARF%20Source%20to%20Sea%20September%202012.pdf>

North West England Archaeological Research Framework 2006

<http://www.liverpoolmuseums.org.uk/mol/archaeology/arf/index.aspx>

South West England Archaeological Research Framework 2012

<http://www1.somerset.gov.uk/archives/hes/downloads/swarfweb.pdf>

Palaeolithic Research Framework for the Bristol and Avon Basin 2005

<https://www.bristol.gov.uk/documents/20182/33848/Palaeolithic+Research+Framework+for+th+e+Bristol+Avon+basin.pdf/a3d95de1-a749-481d-a8ae-7266c67fc05d>

North Sea Prehistory Research and Management Framework 2009

<https://www.historicengland.org.uk/images-books/publications/ns-prehistory-research-manage-framework/>

**Other useful WWW resources:**

Borth: A Maritime History

<http://borthmaritimehistory.com/>

Britannia's Dragon – Welsh naval History

<https://britanniasdragon.com/>

British Commission for Maritime History

<http://www.maritimehistory.org.uk/>

Crew List Index Project

<http://www.crewlist.org.uk/>

Crest Lists of the British Merchant Navy 1915

<http://1915crewlists.rmg.co.uk/>

Friends of the Newport Ship

<http://newportship.org/>



Mariners on Swansea Registered Ships

<http://www.swanseamariners.org.uk/>

The Maritime Heritage Trust

<http://www.maritimeheritage.org.uk/>

Morol - Welsh Institute of Maritime Historical Studies

<https://www.facebook.com/MOROL.eu/>

National Historic Ships

<http://www.nationalhistoricships.org.uk/>

Welsh Mariner 1800-1945

[www.welshmariners.org.uk](http://www.welshmariners.org.uk)

**Developing Best Practice:**

***International Conventions***

**UNESCO Convention on the Protection of Underwater Heritage 2001** - sets out basic principles for the protection of Underwater Cultural Heritage (UCH); provides a framework for countries to cooperate, share information and promote public awareness; and, with the Annex, sets out widely recognized practical rules for survey and research. The convention defines UCH as traces of human existence which have been partially or totally underwater, periodically or continuously for at least 100 years, forming an integral part of a common global archaeological and historical heritage. The UK has adopted 'The Rules' contained in the Annex to the Convention which includes the principle that UCH should not be commercially exploited. In the determination of marine licences, this policy suggests that projects should comply with 'The Rules'.

<http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/2001-convention/official-text/>

[Http://www.unesco.org.uk/wp-content/uploads/2015/05/UKNC-Policy-Brief-17\\_Underwater-Cultural-Heritage\\_March-2015\\_REVISED.pdf](Http://www.unesco.org.uk/wp-content/uploads/2015/05/UKNC-Policy-Brief-17_Underwater-Cultural-Heritage_March-2015_REVISED.pdf)

**The European Convention on the Protection of the Archaeological Heritage 1991 (Valletta, January 1992)** - countries being party to the convention (including the UK) agree to seven priorities amongst which are the institution of a legal system to protect the archaeological heritage, including the maintenance of an inventory and the designation of protected monuments and areas; to establish archaeological reserves, even without any visible remains on the ground or under water, for the preservation of material evidence to be studied by next generations; to institute the mandatory reporting to the competent authorities by finders of chance discoveries of elements of the archaeological heritage and making them available for examination; and to prevent any illicit excavation or removal of elements of the archaeological heritage.

[http://www.coe.int/t/dg4/cultureheritage/heritage/Resources/Publications/Archaeology\\_brochure\\_EN.pdf](http://www.coe.int/t/dg4/cultureheritage/heritage/Resources/Publications/Archaeology_brochure_EN.pdf)

***Principal UK Legislation***

**Protection of Wrecks Act 1973** - Section One: Wrecks and wreckage assessed to be of historical, archaeological or artistic importance can be protected by way of site specific designation. It is an offence to carry out certain activities within a defined area surrounding a designated wreck, unless a licence for those activities has been obtained through Cadw. Section Two: Wrecks considered as being potentially dangerous and is administered by the Receiver of Wreck through the MCA. In the interest of safety, there is a strict no-entry policy for wrecks considered dangerous because of their contents. These wrecks have a prohibited area around them.

**Ancient Monuments and Archaeological Areas Act 1979** (as amended by the Historic Environment Bill (Wales) 2015) - This Act is primarily used to protect terrestrial sites, but has also been used to protect underwater sites. Scheduled Monuments and Areas of Archaeological Importance are afforded statutory protection by the Secretary of State, and consent is required for any major works. The law is administered by Cadw.

**Protection of Military Remains Act 1986** - Regardless of nationality, all aircraft which have been in the military service of any country and which lie in UK territorial waters are protected under the Protection of Military Remains Act 1986. Maritime vessels (e.g. ships and boats) lost during military service are not automatically protected. The Ministry of Defence can, however, designate wrecks lost within the last 200 years, whose position is known, as ‘controlled sites’, and can designate named vessels lost on or after 4 August 1914 (Britain’s entry into World War I), whose location is unknown, as ‘protected places’. It is not necessary to demonstrate the presence of human remains for wrecks to be designated as either ‘controlled sites’ or ‘protected places’.

**Merchant Shipping Act 1995** - This Act sets out the procedures for determining the ownership of underwater finds classified as ‘wreck’; defined as any flotsam, jetsam, derelict and lagan found in or on the shores of the sea or any tidal water. It includes ship, aircraft, hovercraft, parts of these, their cargo or equipment. If any finds are brought ashore, the salvor is required to give notice to the Receiver of Wreck that he/she has found or taken possession of them and, as directed by the Receiver, either hold them pending the Receiver’s order or deliver them to the Receiver. The Act is administered by the Maritime and Coastguard Agency.

<http://www.legislation.gov.uk/ukpga/1995/21/contents>

**Treasure Act 1996** - This Act replaces the common law of treasure trove in England, Wales and Northern Ireland and, although primarily terrestrial, applies within the intertidal zone to low water, provided the finds do not constitute ‘wreck’, in which case the Merchant Shipping Act applies. Under the Act all finders of ‘treasure’ have a legal obligation to report such items. The Act addresses the definition of treasure, along with the payment of rewards in relation to permitted metal detecting. Items which are not defined as treasure and found in the course of metal detecting are in principle also owned by the landowner. The Portable Antiquities Scheme, co-funded by the National Museum of Wales, Cadw and the Museums, Archives and Libraries Division (MALD), Welsh Government, is a mechanism to record and publish archaeological finds made by members of the public with a central coordinator based at the National Museum of Wales.

<https://museum.wales/portable-antiquities-scheme-wales/>

***Wales Best Practice Guidance:***

Cadw, 1999, Caring for Coastal Heritage

[http://cadw.gov.wales/docs/cadw/publications/Caring\\_for\\_Coastal\\_Heritage\\_EN\\_CY.pdf](http://cadw.gov.wales/docs/cadw/publications/Caring_for_Coastal_Heritage_EN_CY.pdf)

Cadw, 2009, Caring for Military Sites

[http://cadw.gov.wales/docs/cadw/publications/Caring\\_for\\_Military\\_Sites\\_EN.pdf](http://cadw.gov.wales/docs/cadw/publications/Caring_for_Military_Sites_EN.pdf)

Cadw, 2011, Conservation Principles for the Sustainable Management of the Historic Environment in Wales

[http://cadw.gov.wales/docs/cadw/publications/Conservation\\_Principles\\_EN.pdf](http://cadw.gov.wales/docs/cadw/publications/Conservation_Principles_EN.pdf)

Welsh Government, 2015, The Welsh National Marine Plan: Initial Draft, November 2015

*Policy SOC-06: Decision making authorities should support opportunities to better understand the significance of historic assets, the cultural benefits they provide and the issues that affect them*

*Policy SOC-07: Decision making authorities should ensure that proposals demonstrate how potential impacts on historic assets and their setting have been taken into consideration at an early stage of development and should in order of preference:*

- a) Avoid adverse impacts on historic assets and their settings*
- b) Minimise them where they cannot be avoided*
- c) Mitigate them where they cannot be minimised*
- d) Present the case for proceeding where (a-c) are not possible*

*Policy SOC-08: Decision making authorities should, where appropriate, support opportunities to maintain or enhance public access to the historic environment; restrictions on public access to existing historic sites should be avoided*

<http://gov.wales/docs/drah/publications/151130-welsh-national-marine-plan-initial-draft-november-2015-en.pdf>

***Examples UK Policy and Guidance:***

***Military Remains***

Department of Culture, Media and Sport and Ministry of Defence, 2014, Protection and Management of Historic Military Wrecks outside UK Territorial Waters Guidance on how existing policies and legislation apply to historic military wreck sites

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/307961/Protection and Management of Historic Military Wrecks outside UK Territorial Waters April 2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307961/Protection_and_Management_of_Historic_Military_Wrecks_outside_UK_Territorial_Waters_April_2014.pdf)

Ministry of Defence, Service Personnel and Veterans Agency, 2010, Crashed Military Aircraft of Historical Interest, Licensing of Excavations in the UK, Notes for Guidance of Recovery Groups

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/28264/POMRACT BOOKLET Jun11.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/28264/POMRACT_BOOKLET_Jun11.pdf)

English Heritage, 2002, Military Aircraft Crash Sites – Archaeological guidance on their significance and future management

<https://content.historicengland.org.uk/images-books/publications/military-aircraft-crash-sites/milaircsites.pdf/>

***Shipwreck Remains***

Chartered Institute for Archaeologists (CIFA) have produced a series of codes, standards and guidelines which are used as benchmarks for archaeological best practice. This S&G nautical archaeological recording is designed as a high-level document that sets down standard for levels of recording within which specific strategies for individual sites and situations can be developed.

<http://www.archaeologists.net/codes/cifa>

[http://www.archaeologists.net/sites/default/files/CifAS&GNautical\\_1.pdf](http://www.archaeologists.net/sites/default/files/CifAS&GNautical_1.pdf)

Historic England, 2012, Designation Selection Guides: Ships and Boats Prehistory to the Present

Historic England, 2016, Introductions to Heritage Assets: Ships and Boats Prehistory to 1840

Historic England, 2016, Introductions to Heritage Assets: Ships and Boats 1840 to 1950

<https://www.historicengland.org.uk/images-books/publications/dsg-ships-boats/>

Historic England, 2013, Designation Scheduling Selection Guides: Maritime and Naval

<https://www.historicengland.org.uk/images-books/publications/dssg-maritime-naval/>

Joint Nautical Archaeology Policy Committee, 1998, Underwater Finds: Guidance for Divers - prepared by the Joint Nautical Archaeology Policy Committee, the British Sub-Aqua Club, the Professional Association of Diving Instructors and the Sub Aqua Association.

<http://www.jnapc.org.uk/Underwater%20Finds%20Booklet.pdf>

### ***Marine Planning and Offshore Industry Sectors:***

HM Government, Northern Ireland Executive, Scottish Government and Welsh Assembly Government (DEFRA), 2009, Our Seas – A Shared Resource: High Level Marine Objectives

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/182486/ourseas-2009update.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/182486/ourseas-2009update.pdf)

HM Government, Northern Ireland Executive, Scottish Government and Welsh Assembly Government (DEFRA), 2011, UK Marine Policy Statement

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69322/pb3654-marine-policy-statement-110316.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69322/pb3654-marine-policy-statement-110316.pdf)

Joint Nautical Archaeology Policy Committee (JNAPC), 2006, Code of Practice for Seabed Development - defining best practice in terms of co-operation and discussion between archaeologists and seabed developers ([http://www.jnapc.org.uk/jnapc\\_brochure\\_may\\_2006.pdf](http://www.jnapc.org.uk/jnapc_brochure_may_2006.pdf))

### ***Marine Aggregates***

Marine Aggregate Dredging and the Historic Environment: Guidance Note, 2003 - Provides practical guidelines on assessing, evaluating, mitigating and monitoring archaeological impacts of marine aggregate dredging. The principles outlined apply throughout the UK Continental Shelf.

<http://www.wessexarch.co.uk/projects/marine/bmapa/dredging-hist-env.html>

British Marine Aggregates Producers Association (BMAPA) Protocol for Reporting Finds of Archaeological Interest, 2005 - The protocol deals with the reporting of finds made by staff on board dredging vessels, and at wharves. In 2008, an annex to the Protocol was produced with regard to reporting finds in relation to aircraft crash sites at sea

<http://www.wessexarch.co.uk/projects/marine/bmapa/arch-interest.html>

<https://www.scribd.com/document/2174360/Annex-to-the-Protocol-Guidance-on-the-use-of-the-Protocol-for-Reporting-Finds-of-Archaeological-Interest-in-Relation-to-Aircraft-Crash-Sites-at-Sea>

### ***Offshore Renewables***

COWRIE, 2006, Historic Environment Guidance Note for the Offshore Renewable Energy Sector: Guidance Note

<https://www.thecrownestate.co.uk/media/5876/km-ex-pc-historic-012007-historic-environment-guidance-for-the-offshore-renewable-energy-sector.pdf>

COWRIE, 2007, Guidance for Assessment of Cumulative Impact on the Historic Environment from Offshore Renewable Energy

Crown Estate/Wessex Archaeology, 2010, Model Clauses for Archaeological Written Schemes of Investigation Offshore Renewables Projects

[http://www.wessexarch.co.uk/system/files/WSI%20Renewables\\_low%20res.pdf](http://www.wessexarch.co.uk/system/files/WSI%20Renewables_low%20res.pdf)

COWRIE, 2011, Offshore Geotechnical Investigations and Historic Environment Analysis: Guidance for the Renewable Energy Sector

<https://www.thecrownestate.co.uk/media/5901/km-ex-pc-historic-012011-offshore-geotechnical-investigations-and-historic-environment-analysis-guidance-for-the-renewable-energy-sector.pdf>

Crown Estate/Wessex Archaeology, 2014 Offshore Renewables Protocol for Reporting Archaeological Discoveries

[http://www.wessexarch.co.uk/system/files/PAD%20Offshore%20Renewables\\_reduced.pdf#sthash.xKUFBPAH.dpuf](http://www.wessexarch.co.uk/system/files/PAD%20Offshore%20Renewables_reduced.pdf#sthash.xKUFBPAH.dpuf)

English Heritage, Historic Scotland, Cadw, 2013, Historic Environment Guidance for Wave and Tidal Energy, prepared by Fjordr Ltd

<https://www.historicengland.org.uk/images-books/publications/historic-environment-guidance-wave-tidal-energy/>

### ***Ports Sector***

Department of Transport, 2012, National Policy Statement for Ports

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/3931/national-policy-statement-ports.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/3931/national-policy-statement-ports.pdf)

Historic England/Wessex Archaeology, 2016, The Assessment and Management of Marine Archaeology in Port and Harbour Developments - intended to inform developers on the importance and relevance of the historic environment in relation to ports and how development proposals should take this into account.

<https://historicengland.org.uk/images-books/publications/assessment-management-marine-archaeology-port-and-harbour-development/>

## **Fishing Industry**

Firth, A, McAleese, L, Anderson, E, Smith, R, and Woodcock, T, 2014, Fishing and the Historic Environment, prepared for English Heritage

[\(https://content.historicengland.org.uk/images-books/publications/fishing-and-historic-environment/EH6204\\_Report\\_FINAL.pdf/\)](https://content.historicengland.org.uk/images-books/publications/fishing-and-historic-environment/EH6204_Report_FINAL.pdf/)

### ***Selected bibliography underpinning emerging best practice***

Bournemouth University, 2007, Enhancing our Understanding: identifying shipwrecks of historic importance within deposits of marine aggregate, (project number 3916)

Bournemouth University, 2007, Mapping navigational hazards as areas of maritime archaeological importance (project number 3917)

Bournemouth University, 2009, Refining areas of maritime archaeological potential (AMAPs) for Shipwrecks (project number 5083)

Cornwall County Council Historic Environment Service, 2008, England's Historic Seascapes; HSC Method Consolidation (project number 5254)

Hampshire and Wight, 2007, Assessment of Archaeology within marine aggregate areas (project number 4740)

Museum of London Archaeology Service, 2007, Severn Estuary assessment of sources for appraisal of the impact of maritime aggregate extraction (project number 3968)

Museum of London Archaeology, 2011, Hulk Assemblages: Assessing the National Context, (report number 5919)

University of St Andrews, 2009, Transition zone mapping for marine-terrestrial archaeological continuity (contiguous palaeolandscapes reconstruction) (project number 4632)

University of Southampton, 2008, Reassessment of the archaeological potential of continental shelves (project number 3362)

University of Southampton, 2008, Modelling exclusion zones for marine aggregate dredging (project number 3365)

Wenban-Smith, F, 2002, Palaeolithic and Mesolithic Archaeology on the Sea-bed: Marine Aggregate Dredging and the Historic Environment, for British Marine Aggregates Producers Association (BMAPA)/Wessex Archaeology

Wessex Archaeology, 2006, On the Importance of Shipwrecks (project number 3767)

Wessex Archaeology, 2006, BMAPA Protocol for reporting finds of archaeological interest



Wessex Archaeology, 2008, High resolution sonar for the archaeological investigation of marine aggregate deposits

Wessex Archaeology, 2007, Artefacts from the Sea (project number 3322)

Wessex Archaeology, 2007, Wrecks on the Seabed (Project numbers 3324, 3594, 3877)

Wessex Archaeology, 2008, Aircraft Crash Sites at Sea (project number 5223)

Wessex Archaeology, 2008, Wrecks Ecology (project number 5402)

Wessex Archaeology, 2008, Marine class description and principles of selection for aggregate producing area (project number 5383)

Wessex Archaeology, 2009, Seabed Prehistory (project numbers 3876, 4600, 5401)

Wessex Archaeology, 2013, Audit of Current State of Knowledge of Submerged Palaeolandscapes and Sites, (project number 6231)

**Organisations with Maritime Interests**

**Welsh Government:**

Cadw, Welsh Government

Plas Carew Unit 5/7 Cefn Coed, Parc Nantgarw, Cardiff CF15 7QQ

Tel. 01443 336000

[cadw@wales.gsi.gov.uk](mailto:cadw@wales.gsi.gov.uk)

[www.gov.wales/cadw](http://www.gov.wales/cadw)

Coastal and Maritime Archaeology:

<http://cadw.gov.wales/historicenvironment/protection/maritimewrecks/?lang=en>

Wrecks and Wreck:

<http://cadw.gov.wales/historicenvironment/protection/maritimewrecks/wrecksnwreck/?lang=en>

Designated Historic Shipwrecks of Wales:  
<http://cadw.gov.wales/historicenvironment/protection/maritimewrecks/wrecksnwreck/wreckswales/?lang=en>

**Welsh Government Sponsored Bodies:**

National Library of Wales

Ffordd Penglais, Aberystwyth, SN23 3BU

Tel: 01970 632800

[enquiry@llgc.org.uk](mailto:enquiry@llgc.org.uk)

<https://www.llgc.org.uk/>

National Museum of Wales

National Museum Cardiff, Cathays Park, Cardiff, CF10 3NP

Tel: (029) 2039 7951

<http://www.museumwales.ac.uk/enquiries/>

<http://www.museumwales.ac.uk/cardiff/>

Natural Resources Wales

c/o Customer Care Centre, Ty Cambria, 29 Newport Road, Cardiff CF24 0TP

Tel: 0300 065 3000

[enquiries@naturalresourceswales.gov.uk](mailto:enquiries@naturalresourceswales.gov.uk)

<http://naturalresources.wales/>

Royal Commission on the Ancient and Historical Monuments of Wales

RCAHMW, Ffordd Penglais, Aberystwyth, SY23 3BU

Tel. 01970 621200

[nmr.wales@rcahmw.gov.uk](mailto:nmr.wales@rcahmw.gov.uk)

[www.rcahmw.gov.uk](http://www.rcahmw.gov.uk)

National Monuments Record of Wales

[nmr.wales@rcahmw.gov.uk](mailto:nmr.wales@rcahmw.gov.uk)

[www.coflein.gov.uk](http://www.coflein.gov.uk)

**Welsh Archaeological Trusts:**

Clwyd-Powys Archaeological Trust

41 Broad Street, Welshpool SY21 7RR

Tel. 01938 553670

[trust@cpat.org.uk](mailto:trust@cpat.org.uk)

[www.cpat.org.uk](http://www.cpat.org.uk)

Dyfed Archaeological Trust

The Shire Hall, 8 Carmarthen Street, Llandeilo SA19 6AF

Tel. 01558 823121

[info@dyfedarchaeology.org.uk](mailto:info@dyfedarchaeology.org.uk)

[www.dyfedarchaeology.org.uk](http://www.dyfedarchaeology.org.uk)

Glamorgan-Gwent Archaeological Trust

Heathfield House, Heathfield, Swansea SA1 6EL

Tel. 01792 655208

[enquiries@ggat.org.uk](mailto:enquiries@ggat.org.uk)

[www.ggat.org.uk](http://www.ggat.org.uk)

Gwynedd Archaeological Trust

Craig Beuno, Garth Road, Bangor LL57 2RT

Tel. 01248 352535

[gat@heneb.co.uk](mailto:gat@heneb.co.uk)

[www.heneb.co.uk](http://www.heneb.co.uk)

**Welsh Universities offering Maritime Courses:**

University of Wales Trinity St David: BA in Nautical Archaeology

<http://www.uwtsd.ac.uk/ba-nautical-archaeology/>

**Welsh Museums and Archives:**

Welsh Archives Network

<http://www.archiveswales.org.uk/>

Ceredigion Museum

<http://www.ceredigion.gov.uk/index.cfm?articleid=197>

Chepstow Museum

<http://www.monmouthshire.gov.uk/places-to-visit/chepstow-museum>

Holyhead Maritime Museum

<http://www.holyheadmaritimemuseum.co.uk/>

Amgueddfa Forwrol Llŷn Maritime Museum

<http://www.llyn-maritime-museum.co.uk/>

Menai Heritage (Thomas Telford Centre)

<http://menaibridges.co.uk/>

National Waterfront Museum, Swansea

<https://museum.wales/swansea/>

Newport Ship

<http://www.newport.gov.uk/heritage/Newport-Ship/Newport-Ship.aspx>

Porthcawl Museum

<http://www.porthcawlmuseum.com/>

Porthmadog Maritime Museum

<http://www.porthmadogmaritimemuseum.org.uk/page12.html>

Ships Timbers Llandudno

<https://www.facebook.com/Ships-Timbers-610174629025689/>

Swansea Museum

<http://www.swanseamuseum.co.uk/>

West Wales Maritime Heritage Society

<http://www.westwalesmaritimeheritage.org.uk/>

World of Boats, Cardiff

<http://www.worldofboatscardiff.com/>

**UK-wide Organisations:**

Maritime and Coastguard Agency

Receiver of Wreck

[row@mcga.gov.uk](mailto:row@mcga.gov.uk)

Tel. 02380 329 474

<https://www.gov.uk/guidance/wreck-and-salvage-law>

Ministry of Defence (Downed Aircraft)

Defence Business Services JCCC, Room G35, Innsworth House, Imjin Barracks, Gloucester  
GL3 1HW

[dbs-jcccgrouppmailbox@mod.uk](mailto:dbs-jcccgrouppmailbox@mod.uk)

Tel. 01452 712612 extension 7330/6303

Ministry of Defence Wrecks Section (Naval Vessels and Merchant Ships on Admiralty Service)

FLEET-DCS 3rd SECTOR- HERITAGE, Navy Command HQ (MP1.3), Leach Building, Whale  
Island, Portsmouth, Hants, PO2 8BY

Tel: 023 9262 5620.

UK Hydrographic Office

UK Hydrographic Office, Admiralty Way, Taunton TA1 2DN

Tel. 01823 337900

[www.gov.uk/the-ukho-archive](http://www.gov.uk/the-ukho-archive)

## Appendix 1: Catalogue of Vessel Sites with Significant Bibliography

### 3<sup>rd</sup>-4<sup>th</sup> century

#### **Barlands Farm Boat**

Nayling 1995, Nayling and McGrail 2004

### 9<sup>th</sup> century

#### **Llyn Langorse, Brecon** – remains of a logboat (c814 ± 60)

McGrail 1978 and 1998

### 10th century

#### **Newport, River Usk** – remains of a vessel with clinker-laid planks (c950 ± 80)

Morgan 1878; Hutchinson 1984; 1994b: 195

### 12-13<sup>th</sup> century

#### **Llyn Padarn, Llanberis** – remains of logboat (1187-1205 cal AD)

Illsley and Roberts, 1979; 1980

#### **Magor Pill, Gwent** – incomplete forward section of clinker-built boat, originally 15-20m c 3.3m wide(c 1240)

Nayling 1995; Allan 1996: 267-70, Blue 1997; Redknap and Nayling 1997: Nayling 1998; Redknap 1998

### 15-16<sup>th</sup> century

#### **Magor Pill, Gwent** – remains of keel plank and saw oak plans, 4m long (c. 1418-1634)

Nayling 1995; Blue 1997; Redknap and Nayling 1997: Nayling 1998; Redknap 1998

#### **Oxwich bay, Gower Peninsula** – remains of vessel lost circa 1557

Redknap 1997a: 140

#### **Pwll Fanog, Menai Strait** – remains of a vessel believed to be of 'ballinger' type carrying some 40,000 slates

Illsley and Roberts 1979; Fenwick & Gale 1998

#### **Anne Francis** – ship of around 80 tons owned by a Kings Lynn merchant Francis Shaxton, which ran shore on 29 December 1583

Redknap and Besley 1997

### **17<sup>th</sup> Century**

**Royal Yacht Mary** – built for the Dutch East India Company and gifted by the City of Amsterdam to Charles II; wrecked on the Skerries, 25 March 1675

Davies 1978; Gater, 1992; Fenwick and Gale 1999; Tanner, M, 2008

### **18<sup>th</sup> Century**

**Bronze Bell or Talybont wreck** – remains of merchant ship carrying a cargo of Carrera marble in early 1700s

Illsley, John, 1982; Nichols, M., 1984; Fenwick and Gale, 1999; Wessex Archaeology, 2006

**Planters Welverd** – Dutch East Indiamen which ran onto Sker Point in 1760s

Smith 1991

### **19<sup>th</sup> Century**

**Royal Charter** - passenger steamer operating between Liverpool and Australia wrecked on 25-26 October 1859 with 450 lives, contributing to call to establish Met Office and storm warning service

Dickens 1860; Bennett 1987; McKee 1986; Gater, D, 1992; Wynne-Jones 2001 Holden 2009;

**Resurgam** – remains of experimental submarine built in 1879 by Rev George William Garrett

Murphy 1987; Fenwick and Gale 1999; Wynne-Jones 2001

### **20<sup>th</sup> Century**

**HMS Conway** – built as HMS NILE, 92 gun, second rate ship of the line by Sir Robert Sepping, served as a static training ship until 1954

Masefield 1953, Davies 1996, Windsor 2008, Huws 2013