Appendix 1i: Cultural Heritage

A1i.1 Introduction

The cultural heritage of the area covered by OESEA4 includes coastal sites which date some of the earliest settlement in the UK, and submerged sites in shelf seas which were exposed during previous glacial periods and later shipwrecks and aircraft losses. Designated sites are relatively few in number compared to those which are recorded, and with the exception of shipwreck, all are terrestrial. The following section provides an overview of the cultural heritage resource of the UKCS and adjoining coast.

A1i.2 UK Context

A1i.2.1 The earliest human occupation of Britain and the archaeological potential of the UK Continental Shelf

The Pleistocene period (2.58 million-11,700 years before present, BP) was characterised by successive glacial and interglacial periods. During glacial periods, sea levels were substantially lower than in interglacial periods (like the present day) due to the amount of water from the world's oceans being held as ice in terrestrial environments (Fairbanks 1989, Long & Roberts 1997, Long *et al*. 2004). The North Sea was *ca.* 120m lower than the present day during the Last Glacial Maximum (LGM) between *ca.* 26 and 19 thousand years ago (kya) (Clark *et al.* 2009, 2012). Given the relatively shallow depths of shelf seas around the UK, particularly the southern North Sea, these areas would have been essentially terrestrial land suitable for subsistence and settlement for early hominins in the region to the south of 53°N (Flemming 2004a) – the so called Doggerland (Coles 1998, see Figure A1i.1). Additionally, the area would also have provided a migration route between the continent and the now British Isles. While a continuous area of land connecting Britain to the European mainland was probably severed between 9 and 8.5kya (Sturt *et al.* 2013)[1], the area would have been generally fragmented at this time, being described as the Dogger Archipelago by Walker *et al.* (2020). The area of the Dogger Bank likely remained as an island for some time following inundation of much of "Doggerland", though the tsunami associated with the Storegga landslide event of 8.15kya may have had a devastating impact on it, and potentially its people should it have been inhabited (see Weninger *et al.* 2008, Hill *et al.* 2014, 2017, Walker *et al.* 2020). This event may have had a wider effect on the Mesolithic coastal communities of the southern North Sea, with evidence suggesting the tsunami reached the southern North Sea (Gaffney *et al.* 2020), however, the scale of effect is likely to have been less than further north in Scotland, and not significant outside of the Dogger Bank (Long 2018, Walker *et al.* 2020).

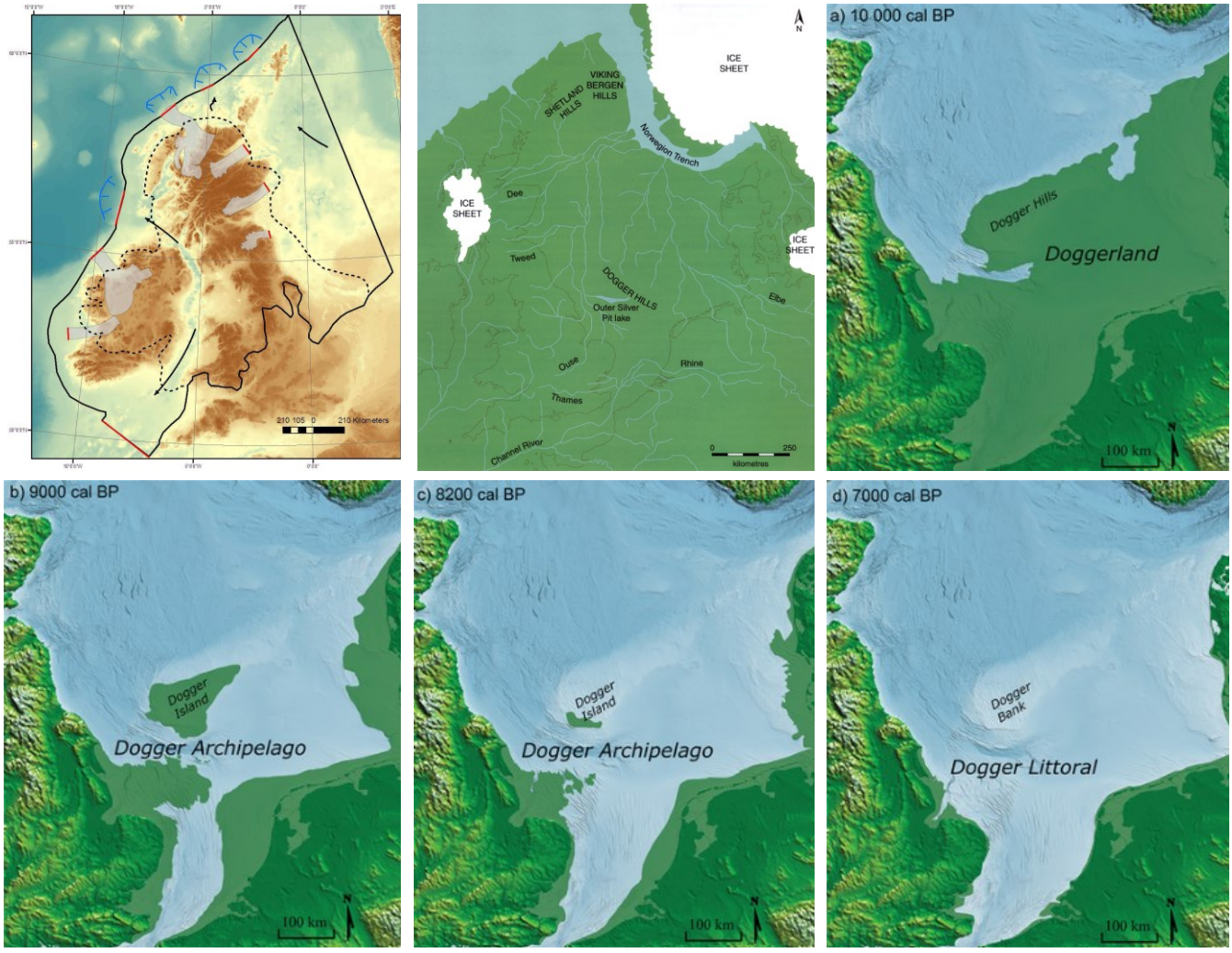
A land bridge between Britain and Ireland existed until approximately 15kya (Montgomery *et al.* 2014), with Lambeck & Purcell (2001) indicating the potential for an exposed area of continental shelf at about 51° N. They note that this is likely to have been only a few metres above its contemporary sea level and would have been flooded quickly by glacial meltwater. Migration to Ireland was more complicated and may also have been later (as indicated by

[1] Sturt *et al.* (2013) provide an up-to-date overview of the last marine transgression in 500 year increments between 11kya and present (or see Brooks *et al*. (2011) for a spatially and temporally coarser perspective for the last 20,000 years).

current archaeological knowledge), as without a land bridge seafaring would have been the only means to reach the island.

These pathways for early people to migrate from the continent, and to Ireland, were opened and closed a number of times in a series of marine transgressions during interglacial periods (Flemming 2002), and would have been similarly important for post-glacial colonisation by plants and animals (see Montgomery *et al.* 2014).

Figure A1i.1: The maximum extent of the British and Irish Ice Sheet (BIIS) at the Last Glacial Maximum and the hypothetical exposure of the continental shelf at its maximum extent following ice retreat, and during the early Holocene to 7000 BP



Source: top left, Clark *et al.* (2012), top middle (Coles 1998), cited in Gaffney *et al.* (2007); all others Walker *et al.* (2020).

Note: top left shows two end-member reconstructions – the dashed line is the traditionally held view, and whilst far from conclusive, there is strong evidence to support a larger BIIS from landform and ice-rafted debris.

Archaeology associated with hominin activities either on the current seafloor of the southern North Sea, in the coastal zone of the British Isles and further inland, has the potential to date back at least as far as 500,000 years BP – see Table A1i.1 for an overview of the major recent geological and cultural periods relevant to Section A1i. For example, research by Roberts & Parfitt (1999) found ovate hand axes at Boxgrove dating to *ca.* 500kya, and Preece *et al*. (2007) and Wenban-Smith *et al*. (2006), date human occupation to *ca*. 400kya (Marine Isotope

Stage[2] 11), and more recently evidence from Happisburgh Site 1 indicates a date of occupation of *ca*. 500kya (MIS 13) (Lewis *et al.* 2019a, also see Gibbard *et al.* 2019 and Lewis *et al.* 2019b). Evidence of earlier occupation has been found in relation to flint artefacts from the Cromer Forest-bed Formation, Suffolk, which date to as early as 700kya (Parfitt *et al*. 2005), and finds from the Norfolk coast suggest occupation as early as MIS 15 (575kya) (Wenban-Smith 2002). Finds (e.g. hand axes and a variety of other flint finds) near the town of Happisburgh, Norfolk, tentatively push early hominin occupation back to a maximum age of *ca.* 700-950kya (Parfitt *et al.* 2010, Roberts & Grün 2010; see Hosfield & Cole 2018 for an early European perspective). Depending on whether a geomorphological or biological approach to dating is taken, this tentative date can be accepted or challenged respectively, with biological evidence suggesting a more recent (MIS 13 or 15) date (Westaway 2011, Scherjon & Kamermans 2014). An additional find at Happisburgh were rare fossil human footprints, the oldest of their kind outside of Africa, which have been linked to the species *Homo antecessor* (Ashton *et al.* 2014), which would be consistent with the earlier dating evidence. In a wider European context, though not considered to be rare in the early Pleistocene period, hominins were certainly not abundant (Rodríguez *et al.* 2015, also see Hosfield & Cole 2018).

These above finds are all of Palaeolithic provenance, a period extending from initial habitation (albeit in the mid-Pleistocene or earlier) to the end of the last glaciation. Bicket (2013) notes that palaeolandscapes of the upper Palaeolithic characterise the Irish Sea region, with lower and middle Palaeolithic landscapes offering significant opportunities for research in the western English Channel and southern North Sea. These people were superseded by Mesolithic cultures in the early Holocene up to *ca.* 6,000 BP, when Neolithic farming practices became prominent.

Table A1i.1: Time periods referred to in the text

Period	Epoch	Age	MIS	Period	Approximate Date Range
Quaternary (2.58 million BP to present)	Holocene	~11,700 BP to present	1	Modern (19th and 20th centuries)	AD 1800-present
				Early Modern (incorporating a range of periods including Tudor, Elizabethan, Stuart, Georgian and Victorian)	AD 1500-AD 1800
				Medieval	AD 1066-AD 1500
				Anglo-Saxon (early medieval outside England)	AD 410-AD 1066
				Roman	AD 43-AD 410
				Iron Age	700 BC-AD 43
				Bronze Age	2,200-700 BC

[2] Marine Isotope Stages represent alternate warm and cool periods of earth's palaeoclimate, expressed as odd (warm) and even (cool) numbers, increasing in value with age (MIS1 being the most recent stage). The isotope referred to is oxygen-18 (^{18}O) – high levels of ^{18}O are characteristic of cool periods, and vice versa is true. The ratio of ^{18}O and ^{16}O, for instance in fossil calcite, can provide data on the nature of the past climate.

Period	Epoch	Age	MIS	Period	Approximate Date Range
				Neolithic	4,000-2,200 BC
				Mesolithic	9,500-4,000 BC
	Pleistocene	2.5 million to 11,700 BP	3-1	Upper Palaeolithic	40,000 BP-9,500 BC
			7-3	Middle Palaeolithic	300,000 BP-40,000 BP
			25-7*	Lower Palaeolithic	970,000 BP-300,000 BP

Notes: *the MIS/earliest date associated with the lower limit of the Palaeolithic period remains uncertain. Source: adapted from Limpenny *et al.* (2011) and modified using Murphy (2014)

Most submarine archaeology across the UKCS has a theoretical maximum age of *ca.* 100kya, coinciding with the start of the Devensian glaciation. Following this period, there would not be a significant glacial readvance after the LGM and only one marine transgression separated the migration and settlement of the continental shelf area and modern sea-levels (see Shennan *et al*. 2000, 2011 and Shennan & Horton 2002 for a consideration of Holocene relative sea-level changes). The possibility for the preservation of earlier sites pre-dating the last marine transgression should, however, not be dismissed (see Flemming *et al.* 2012), and it should also not be assumed that material from before the last glacial maximum would have universally been eroded or reworked beyond providing archaeological information (Boyne & Historic England 2017). Earlier finds are possible, and their survival is a function of the severity of erosional and other processes at work and the physical nature of preservational contexts (Bicket *et al.* 2014, and also see below). Early finds in UK waters are few, and of late-glacial to early-Holocene age (12-11kya), however finds within Area 240, an aggregates licensing area 11km off the Norfolk coast (see Figure A1i.3), provide evidence that earlier material can survive in marine contexts and on the UKCS, being dated to MIS 8/7 (250-200kya) (Tizzard *et al.* 2014). It should be noted that this heritage resource largely reflects now submerged "terrestrial" archaeology, rather than maritime archaeology, though interaction with the marine environment would have taken place (Peeters *et al.* 2020).

As sea-levels rose, sites on the continental shelf would have been inundated and in many places destroyed (Dix *et al*. 2002), however the level of any destruction would be a function of the nature of the transgression, and topographic and geological controls. The topography of an area would have controlled how efficiently it was destroyed or preserved by sea-level rise, with shallow slopes in low energy environments (lagoons, the lee of islands) promoting sedimentary accretion and preservation – the reciprocal being true (Flemming 2002, 2004a). The accretion of sediment (Holocene or earlier) protects archaeological areas but also makes them difficult to find, while those areas exposed either during sea-level rise or by the more recent redistribution of sediments are progressively destroyed.

The subsequent taphonomy of sites and artefacts is important in their preservation. Notwithstanding the recent evidence that cultural heritage have the potential remain preserved through the Pleistocene, and related marine transgressions, several type-areas have been identified (Flemming 2004a, b, also see Flemming *et al.* 2017) which have a greater probability

of supporting prehistoric remains based on advantageous taphonomy, site and hydraulic conditions during the marine transgression. These areas are:

- 'Fossil' estuaries and rivers
- The flanks of banks and ridges which have been proven to have peat layers, or which are likely to have peat layers
- Valleys, depressions, or basins with wetland or marsh deposits
- Nearshore creeks, mudflats, and peat deposits
- 'Fossil' archipelago topographies where sites would have been sheltered by low-lying islands as the sea level rose
- Niche environments in present coastal zones, wetlands, intertidal mudflats, lochs, and estuaries
- Caves and rock shelters in re-entrant bays, fossil erosional shorelines, submerged rocky shores protected by other islands, or in archipelagos
- Deposits of sediments formed within, or washed into rocky gullies and depressions
- Coastal sites comparable by analogy to modern Inuit migratory sites, adjacent to sea ice, giving access to marine mammals as a food resource.

Of importance is the level of subaerial weathering which takes place prior to sites being covered with protective sediments, and the nature and timing of inundation (Bailey *et al.* 2020).

Palaeolithic sites and remains, whether they occur on land or within submerged contexts will have particular importance if:

- Any hominin bone is present in relevant deposits
- The remains are in an undisturbed, primary context
- The remains belong to a period or geographic area where evidence of a hominin presence is particularly rare or was previously unknown
- Organic artefacts are present
- Well-preserved indicators of the contemporary environment (floral, faunal, sedimentological etc.) can be directly related to the remains
- There is evidence of lifestyle (such as interference with animal remains)
- One deposit containing Palaeolithic remains has a clear stratigraphic relationship with another
- Any artistic representation is present, no matter how simple
- Any structure, such as a hearth, shelter, floor, securing device etc, survives
- The site can be related to the exploitation of a resource, such as a raw material
- Artefacts are abundant (English Heritage 1998).

Knowledge of the potential for offshore archaeology has previously been development led (e.g. finds from fisheries and other industry, particular marine aggregates). The Marine Aggregate Levy Sustainability Fund (MALSF) has assisted research in this area through its Regional Environmental Characterisation (REC) programme. REC Studies were undertaken for areas of the Bristol Channel, eastern English Channel, South Coast (James *et al.* 2010), Outer Thames (Emu Ltd & University of Southampton 2009), East Coast (Limpenny *et al.* 2011) and Humber (Tappin *et al.* 2011) which, amongst other topics including geology and benthos, conducted a desk based review of marine archaeology in the study areas augmented by new survey data. The REC programme contributed significantly to UK marine archaeology, both methodologically and in terms of resource knowledge, for example area 240 mentioned above (Bicket 2013). More recently, development-led work continued to be completed by offshore developers, including for offshore wind, which in some instances leads to peer-reviewed publications (e.g. Brown *et al.* 2018). A recent English Heritage (2021)[3] advice note provides some guidance to developers of offshore renewable energy developments in relation to effects and mitigation (at a high level), the importance of written schemes of investigation to agree methodologies, and the need to take account of the setting of historic assets, and how perception of offshore historic environment may be affected by developments (also see Appendix 1c).

Connected with the above is work to understand the palaeolandscapes of the UK continental shelf that would have once been inhabited by people during glacial lowstands as described above (see Fitch *et al.* 2011). This includes the work of Gaffney *et al*. (2007, 2009) on the Mesolithic landscapes of the southern North Sea, subsequent research in selected areas of the Bristol Channel and Irish Sea to the west of the UK (Fitch & Gaffney 2011) and the Channel (Momber *et al.* 2011). The palaeolandscapes work highlights a number of themes including the largely undeveloped archaeological resource of UK shelf seas, its interaction with activities involving the seafloor, and how predictive methodologies might be developed to assess the archaeological prospectivity of certain areas (see Section A1i.4).

The collective inventory and knowledge of maritime sites in particular is quite poor and may be subject to recording biases, and assessments of the archaeological potential of the UKCS are therefore speculative. The current understanding of marine prehistoric archaeology is based on knowledge of the palaeolandscapes of the continental shelf intervening the UK and Europe during glacial phases and limited finds of archaeological materials in this location, augmented with knowledge of analogous cultural and archaeological contexts from modern day terrestrial locations. A number of publications have contributed to the synthesis of progress on the understanding of submerged archaeology and its methods (e.g. Flemming *et al.* 2017, Bailey *et al.* 2017) of relevance to the UK including the North Sea (Cohen *et al.* 2017), northern North Sea (Dawson *et al.* 2017), Celtic Sea and the Channel (Farr *et al.* 2017) and the Irish Sea and Atlantic margin (Westley & Edwards 2017). The publications highlight the number of known sites in European continental shelf waters (>2,600), and the potential for additional sites to be found based on technological advances and a better understanding of the offshore environment (e.g. Sturt *et al.* 2018).

Broader understanding of the historic context of the modern landscape has been delivered through historic landscape characterisation (HLC) and historic seascape characterisation (HSC). The methods for HSC were developed through a MASLF funded pilot in Liverpool Bay, and a series of areas have been subject to this approach since the 2006 pilot, and the

[3] https://historicengland.org.uk/images-books/publications/commercial-renewable-energy-development-historic-environment-advice-note-15/

programme is still ongoing. The outputs from these programmes are discussed in Appendix 1c.

A1i.2.2 Wrecks

The strategic importance of the sea; the concentration of much of the North Sea fishing fleet in coastal ports; the importance of maritime trade routes in the area and the treacherous nature of many nearshore waters, has led to a large number of ship and aircraft wrecks in UK waters, though information on the number, type and location of these is limited.

The UK Hydrographic Office maintains a register of wreck locations; the Wrecks Database contains *ca.* 70,000 records, of which approximately 20,000 are named vessels. The number of known sites for Scottish waters stands at over 5,200, though a recent integration of data from a number of sources has raised the number of wreck records significantly, for instance the inclusion of 18,500 records from Ian Whittaker's "Off Scotland" database as part of Project Adair (Historic Scotland & RCAHMS 2013). Similarly, the MALSF England's Shipping project has been responsible for the creation of a GIS atlas mapping historic shipping patterns around the UK in an attempt to improve the assessment of seabed archaeological potential[4]. Wessex Archaeology (2009) put 'best guesses' of the wreck resource at between 100,000 and 500,000 for the wider UKCS – an indication of the number of known wreck positions is given in English Heritage (2017). Few of these sites have had their condition or archaeological provenance assessed, and the positional accuracy and correspondence between datasets containing wreck data is often poor (e.g. see Grant *et al.* 2019). The record for wreck sites is biased towards those from the post-Medieval and later periods, presumably a function of greater traffic and increased reporting associated with the introduction of marine insurance (Jamieson *et al*. 2007) and the Lloyds of London list of shipping casualties in 1741 (Wessex Archaeology 2009). Wessex Archaeology (2004b) collated information relating to trade routes and patterns of shipping, focussing on the Medieval period to counter this bias towards later wreck recording, the final output being a digital atlas to complement existing information on known wreck locations. Information regarding the whereabouts of wrecks may also be influenced by selective reporting, for instance those wrecks recorded in the Severn Estuary are clustered around sandbanks and shipping channels where knowledge of their whereabouts is advantageous to seafarers (Jamieson *et al*. 2007). A corollary of this may be that there are many undiscovered wreck sites in areas which do not meet these criteria.

In addition, it must be considered that there is the potential for substantial aircraft remains (primarily WWII) to be found on the seabed both within and outside of the 12nm limit. Although the overwhelming concentration of losses is in the period between 1939 and 1945, aircraft losses at sea span the entire period of aviation history from the early 20th century to very recent post-WWII losses. Sites relating to losses have become an increasing concern for both the heritage and offshore development sectors. In response to an increasing number of finds by the dredging industry, guidance has been published on the actions to be taken on discovery of military aircraft at sea (Wessex Archaeology 2008a, b). The wider concern of interactions between offshore industry (particularly renewables) and the marine archaeological resource, has led to the development of a series of guidance documents (see Wessex Archaeology 2007, COWRIE 2008, Gribble & Leather 2011, English Heritage 2013, Historic England *et al.* 2018, Historic England 2021).

Aircraft remains on the seabed are also often ephemeral and not easily distinguishable in standard geophysical surveys, for instance a B-24 Liberator bomber lying in more than 50m of

[4] http://www.wessexarch.co.uk/projects/marine/alsf/englands_shipping/index.html

water off the Hampshire coast identified by Wessex Archaeology in 2006 was previously recorded by UKHO as a small, intact, possibly wooden shipwreck (Wessex Archaeology 2009). Though there are extensive documentary sources relating to aviation loss at sea, these do not provide accurate positions and there is no single list of losses, which may be expected to exceed 13,000 (Wessex Archaeology 2009) – for instance see Chorley's nine volume RAF Bomber Command Losses of the Second World War (various dates), Franks' three volume Royal Air Force Fighter Command Losses of the Second World War (various dates) and McNeill's publication about Coastal Command losses (McNeill 2003).

Wessex Archaeology (2009) categorise aviation losses into three chronological divisions:

- Pre-1939 – the period during which flight technology was developed. Few flights over water and the fragility of airframes make any find of interest. At least 119 aircraft models were used by the UK military during this period, examples of only 24 survive.
- 1939-1945 – Technological advances had increased the reliability and range of aircraft and large areas of the UKCS were flown over during WWII. This period also saw the highest number of aircraft and associated human casualties in aviation history.
- Post-1945 – Jet propulsion was rapidly developed. Losses in the UKCS of military aircraft during training sessions are of particular importance.

A1i.2.3 Coastal archaeology

Attention is brought to numerous initiatives, for instance the Archaeology Scotland has attempted to recruit local amateurs to monitor and report on coastal archaeology which might include local history and archaeology societies, schools and branches of the Young Archaeologists' Club (YAC) – the project is entitled, 'Shorewatch'. The Scottish Coastal Archaeology and the Problem of Erosion (SCAPE) Trust also conducted 28 coastal zone assessment surveys between 1996 and 2009 for a number of regions in association with Historic Environment Scotland (formerly Historic Scotland) and other organisations such as the Centre for Field Archaeology. A standardised database of sites at risk is available through an online map[5].

Similarly, Historic England has been undertaking a series of Rapid Coastal Zone Assessment Surveys (RCZAS) since the 1990s which have the broad aims of identifying materials of Palaeolithic or later age in the coastal zone so that they might be added to the National Record of Historic England (formerly the National Monuments Record) and Sites and Monuments Record (SMR) and considered in relation to Shoreline Management Plans (SMP) – see the review of the programme provided in English Heritage (2019). A series of reports are available from the Historic England website[6] and have previously been listed in Murphy (2014). The Arfordir Project was also concerned with the coastal archaeology, and used volunteers to record archaeological sites on the coast of Wales and the changes affecting them.

More generally, the National Record of Historic England, the National Record of the Historic Environment in Scotland, and National Monuments Records of Wales and Northern Ireland, hold more than 11.5 million records on the terrestrial and maritime archaeology of the UK, and may be consulted via their respective websites:

[5] https://scapetrust.org/sites-at-risk/
[6] https://historicengland.org.uk/images-books/publications/

- England: https://www.heritagegateway.org.uk/gateway/
- Scotland: https://canmore.org.uk/
- Wales: https://rcahmw.gov.uk/ and https://archwilio.org.uk/arch/
- Northern Ireland: https://www.communities-ni.gov.uk/services/sites-and-monuments-record, also see: https://www.communities-ni.gov.uk/publications/historic-environment-digital-datasets

While the above resources provide records of intertidal and nearshore finds, attribution of these can be indiscriminate. For example, the records may not provide an indication of whether material recorded in the intertidal area is likely to have been reposited, and whether the redeposition may be from the marine of terrestrial environment (Bailey *et al.* 2020).

A1i.2.4 Site designations

Sites in territorial waters may be protected if they fall within the definitions of the *Protection of Wrecks Act 1973* or the *Marine (Scotland) Act 2010*. Information on the selection guidance for historic wreck designations is provided in Historic England (2017). Additionally, some military sites which are also of historic interest may be more widely protected in all UK waters under the *Protection of Military Remains Act 1989*, either as controlled areas or designated vessels (see Appendix 2 for more information). Intertidal and sites out to 12nm may be designated as scheduled monuments under the *Ancient Monuments and Archaeological Areas Act 1979* and buildings may also be listed under the *Planning (Listed Buildings and Conservation Areas) Act 1990* into the intertidal area, and the relevance of these features is often in relation to their setting in addition to the specific periods or characteristics they represent. The *Ancient Monuments and Archaeological Areas Act* is not typically used to designated wrecks, although does contain provisions to schedule these.

The *Historic Environment (Wales) Act 2016* made amendments to the above Acts in relation to scheduled monuments and listed buildings in Wales, and is accompanied by a range of updated planning and other advice notes. The Act amended the *Ancient Monuments and Archaeological Areas Act 1979* such that “Monument” also has the meaning, “any site in Wales...comprising any thing, or group of things, that evidences previous human activity”, which mirrors the wording of the *Marine (Scotland) Act 2010* with regards to those marine historic assets which may be considered for designation as a Historic Marine Protected Area. Northern Ireland may also schedule monuments including in territorial waters under the *Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995*.

The number of statutory or other designations is small compared to the number of recorded sites or features, both in the terrestrial and marine environment. The Marine Policy Statement (MPS) indicates that though not subject to designation, some sites are of equivalent importance, and a lack of designation does not necessarily indicate a lower significance. A wider overview of the international, national and local legislation and policy relevant to this topic is provided in Appendix 2, and relevant designated terrestrial sites are mapped in Appendix 1j. Additionally, while the UK has not ratified the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage, the principles of the Convention have been adopted by the UK.

A1i.3 Features of Regional Sea 1

A1i.3.1 Submerged heritage

The ability to predict the occurrence of prehistoric remains, particularly in the north of Regional Sea 1, is much lower than areas further south (e.g. Regional Sea 2), partly due to a covering of glacio-marine deposits, the infilling of sea-bed features by modern sediments, which impairs any ability to assess the prehistoric landscape or fluvial drainage patters (Flemming 2004b) – however note the work of Gaffney *et al.* (2007, 2009) using seismic data for areas of southern North Sea to reconstruct such features.

Offshore spot finds in Scottish waters are relatively few and are dominated by post-Medieval items (see Lancaster 2012). The discovery of a single flint scraper in a borehole core off the Viking Bank (150km northeast of Lerwick) is unique not just for its depth, but also for its distance from the shore. The flint could be as old as 11,000 BP (Long *et al*. 1986) and implications of such a find are discussed in Flemming (2003). If not secondarily derived, the find suggests human occupation of the Scottish shelf in pre-Holocene times, or a stone tool lost during a fishing expedition (Finlayson & Edwards 2003). Due to the proximity of this area to the early Holocene coastline, there is a high likelihood that pre-9,000 BP finds are to be made in the current offshore area which may consist of fish spears or harpoons like those found further south in the Leman and Ower Banks (Flemming 2004b).

Submerged peatlands are known from Shetland, offshore and in the intertidal zone, which may yield archaeological finds *in situ* and be useful in environmental reconstructions, though the extent of post-glacial offshore landscapes in Scottish waters and those in the north of England are poorly mapped to date (Ashmore 2003b, Lancaster 2012), though extensive 2D and some 3D survey coverage is available from industry-led studies which could be used to make landscape reconstructions in Regional Sea 1 (Fitch *et al.* 2011). In English waters, a submerged forest and peatland is known from Hartlepool Bay, within which a number of Neolithic finds including that of a human skeleton, wooden stakes and worked flints are known (Waughman 2005, Hazell 2008). More widely, Historic England maintain an Intertidal and Coastal Peat Database, which details numerous finds within coastal areas of England, and in the North Sea[7].

Prehistoric submarine archaeological remains back to a date of about 12,000 BP could occur with low probability anywhere in the northern region of Regional Sea 1 (Flemming 2004b), and Sturt *et al.* (2013) suggest that by 11,000 BP the marine transgression would have progressed to approximately 57.5˚N, limiting the date for occupation sites in the northern part of the region. The likelihood of earlier Palaeolithic remains surviving on the seabed further south increases due to a probable longer occupation episode following glacial retreat, for example a lower Palaeolithic find was made off the coast of Scarborough (Wessex Archaeology 2004a). The Mesolithic period is strongly represented in Scottish archaeology (e.g. see Melton 2008, Saville & Wickham-Jones 2012, Timpany *et al.* 2017, and Section A1i.3.3 below) though marine finds are few – artefacts have been located at Brown Bay near Newcastle in rock gullies. Note that for this find, the lack of a stable surficial layer of sediment indicates that the recovery of prehistoric items may not be restricted to sites encased in Holocene or Quaternary sediments (Spikins 2003 cited in Flemming 2004b).

[7] https://historicengland.org.uk/research/current/heritage-science/intertidal-peat-database/

In addition to the relatively earlier transgression in Regional Sea 1 compared to more southerly areas, the strong current conditions in Regional Sea 1, the exposure to North Atlantic storms and the thin sediment cover in many places also make some areas of the shelf likely poor prospects for the survival of prehistoric deposits *in situ*, other than in submerged caves and gullies. Later periods are represented offshore by maritime losses, either wrecks or overboard losses, as the marine transgression in Regional Sea 1 would have been complete by ~8,000 BP, or perhaps even earlier (see Sturt *et al.* 2013).

Offshore aggregate extraction is minimal in Scottish waters despite the available resource due to readily availability of onshore supplies. Though largely destructive to archaeological sites, aggregate extraction and other development-led archaeological finds have proved fruitful in the generation of knowledge about the Pleistocene offshore environment and its inhabitants (see Section A1i.4 below). The relative paucity of such material in Scottish and north east English waters may in part be a reflection of a lack of such development, though the offshore oil and gas industries, and more recently marine renewables, may contribute to the collection of data for archaeological prospecting (e.g. through acoustic surveys and coring, and adherence to industry guidance).

A1i.3.2 Wrecks

Table A1i.2 below summarises information on designated wrecks within Regional Sea 1, and these are also shown in Figure A1i.2.

Table A1i.2: Protected wrecks within Regional Sea 1

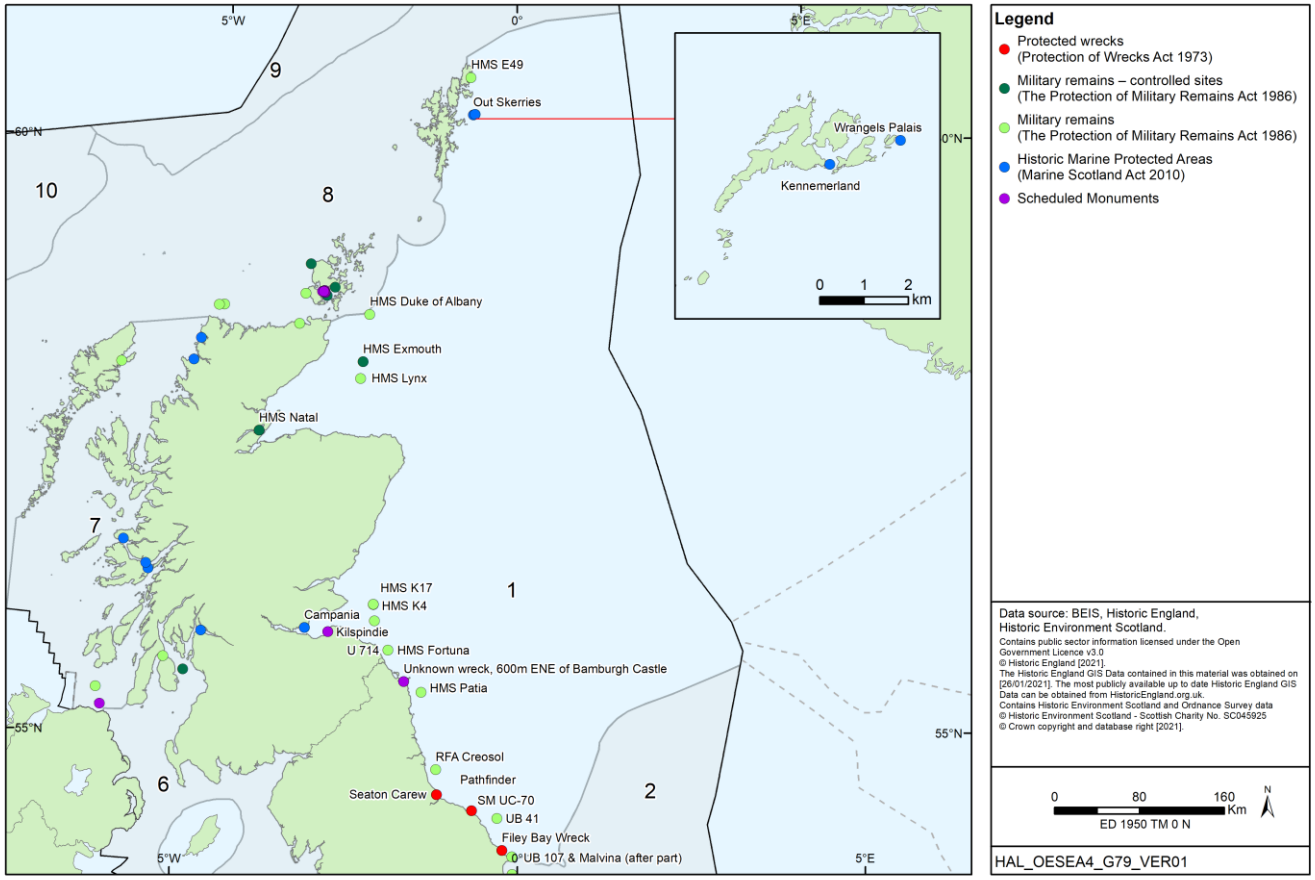
Wreck or site name	Date of sinking	Site summary	Position or Named Location
Marine (Scotland) Act 2010: Historic Marine Protected Areas			
Kennemerland	1687	A merchant ship of the Dutch East India Company lost at the South Mouth entrance to the harbour of Out Skerries in 1664. The vessel had left Texel (Holland) for Batavia (East Indies) with a variety of goods for private trade. A number of other wrecks with East India Company connections are present around Shetland, with the Kennemerland arguably the best preserved and most fully recorded site.	250m zone centred on 60˚25.167' N 00˚45.121' W
Wrangels Palais	1857	A Swedish-built Danish warship reported as lost at Lamda Stack close to Bound Skerry in July 1687. The vessel ran aground while patrolling between Shetland and Iceland as part of a wider squadron of vessels. Other wrecks with Swedish or Danish connections are found around Shetland, with Wrangels Palais representing the earliest and most fully recorded example.	100m zone centred on 60˚25.467' N 00˚43.388' W
Campania	1918	The wreck is a Cunard liner launched in 1892 and later converted in 1914 as a Fleet Air Arm carrier. The wreck lies at a depth of 22-25m, 1.7km SSE of the entrance to Burntisland Harbour, Fife. The ship represents the first of the steam-driven, steel-constructed transatlantic liners not to rely on auxiliary sails and a unique survival of a Clydebuilt liner converted to carry aircraft. The remains of the ship comprise a large iron feature ~120m in length orientated NE-SW and 20m in width. Sonar confirms substantial survival of the deck structure and fittings. In	150m zone centred on 56˚02.404' N 03˚13.497' W

Wreck or site name	Date of sinking	Site summary	Position or Named Location
		view of the size of the vessel and its location in a sediment-rich seabed, there remains considerable scope for the presence of preserved material.	
Ancient Monuments and Archaeological Areas Act 1979: Scheduled Ancient Monuments			
Kilspindie Hulk (1-8)	19th-20th c.	The site comprises the remains of eight sailing fishing vessels, dating from the late 19th to the early 20th century. They lie on intertidal mudflats on the south foreshore of Aberlady Bay, 240m east of Kilspindie.	56˚ 00′ 45.039″ N 02 52′ 00.015″ W; 56 00′ 46.619″ N 02 52′ 05.362″ W; 56 00′ 44.291″ N 02 52′ 05.195″ W; 56 00′ 46.129″ N 02 52′ 05.987″ W; 56 00′ 45.761″ N 02 52′ 07.710″ W; 56 00′ 45.365″ N 02 52′ 08.799″ W; 56 00′ 45.817″ N 02 52′ 08.982″ W; 56 00′ 46.419″ N 02 52′ 10.786″ W
Unknown wreck, 600m ENE of Bamburgh Castle	~18th/19th c.	The wreck of a pre-1840 unknown wooden sailing vessel thought to be later 18th century in origin. It is considered likely that given the nature of the timber and its provenance, that the vessel was a coastal trader.	NGR NU18927 35246
Protection of Wrecks Act 1973: Protected Wrecks			
Filey Bay Wreck	possibly 1779	Lying in a highly mobile sandy environment, the Filey Bay wreck was initially found in 1974 and was not designated until 2002. Though possibly being the remains of the French East Indiaman, Bonhomme Richard, positive identification is hindered by a lack of cannons or other distinguishing features, though the wreck does conform to a late 18th century style consistent with that of the vessel.	300m zone centred on 54˚ 11.502’ N 00˚ 13.481’ W
Seaton Carew	~19th century	The site contains the remains of an 18th century oak English collier brig, believed to have been beached at Seaton Carew during a storm though there is generally a lack of evidence relating to the site. A substantial portion (~33%) of the original hull survives.	100m zone centred on 54º 39.50’ N 01º 10.71’ W
Protection of Military Remains Act 1986: Controlled Sites			
HMS Natal	1915	An armoured “Warrior class” cruiser built by Vickers at Barrow and may be the last 'conventional' cruiser, powered by coal with an oil backup. Construction was completed in	100m exclusion zone centred on 57˚ 41.244’ N

Wreck or site name	Date of sinking	Site summary	Position or Named Location
		1907 and sank at anchor in Cromarty in December 1915, apparently as the result of an internal explosion.	04˚ 08.310' W
HMS Exmouth	1940	HMS Exmouth was built in 1934 and sunk on 21 January 1940, being torpedoed by U-22 whilst escorting the MS Cyprian Prince. The wreck was relocated in 2001 and subsequently investigated. No bell was found and no ship's name or pendant number was identified but features recognised included two detached and inverted mountings ('gun turrets'), torpedo tubes and boat davits in recognisable positions.	200m exclusion zone centred on 58˚ 18.467' N 02˚ 59.001' W
Protection of Military Remains Act 1986: Protected Sites*			
HMS Pathfinder	1914	Built by Cammell Laird, Birkenhead, completed in 1905 and torpedoed by German submarine U-21 September 1914. The wreck of HMS Pathfinder is located off Eyemouth, Berwickshire.	Eyemouth
HMS Lynx	1915	A K (Acasta) class vessel built in London and Glasgow to an Admiralty design. Completed in 1913 and mined off the Moray Firth in 1915.	Moray Firth
HMS Duke of Albany	1916	An armed boarding steamship sunk by UB-27 20 miles east of the Skerries in August 1916.	Orkney
RFA Creosol	1918	Torpedoed and sunk by German submarine UC-17.	Sunderland
HMS K4	1918	The wrecks of two British K-series submarines built by Vickers at Barrow-in-Furness. Sunk in the "Battle of May Island" January 1918.	Isle of May, Firth of Forth
HMS K17			
HMS Fortuna	1941	The vessel was requisitioned for use as auxiliary patrol vessel. Bombed and sunk by German aircraft off St Abb's head.	St Abb's Head
HMS Patia	1941	Remains of 1941 wreck of British aircraft catapult vessel which foundered 6 miles east of Beadnell Point after being bombed en route from the River Tyne for Belfast.	Northumbria
RFA Isleford	1942	The vessel was on passage from Lyness to Invergordon, and was employed as a naval armament vessel.	Wick
U-714	1945	The boat lies on its starboard side with damage apparent to the stern buoyancy tank. The vessel was sunk by HMS Natal off the Firth of Forth in March 1945.	Firth of Forth
HMS E49	1917	An E-class submarine lost by mining off Shetland.	Shetland
UB-41	1917	German submarine, torpedoed off Robin Hood's Bay.	Robin Hood's Bay
UB-75	1917	A German submarine, lost by mine off Bridlington	Bridlington
UB-107	1918	German submarine; nature of loss unknown.	Flamborough Head

Notes: *=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data is provided, only a named location. Source: Historic Marine Protected Area Records, the CANMORE database, the National Heritage List for England, the MCA Protected Wrecks gov.uk webpage, the *Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2019*, Colledge & Warlow (2010)

Figure A1i.2: Protected wrecks in Regional Sea 1



In addition to designated sites, a large quantity of wrecks is present in inshore and offshore waters in Regional Sea 1. Many of these are recorded by the UKHO and/or listed on monuments records which provide some information about their location, the period to which they date and any associated archaeological finds (Table A1i.3).

Table A1i.3: Maritime archaeological records categorised as 'wreck' or 'aircraft' for Scottish Council areas and English Counties relevant to Regional Sea 1

County/Council District	Number of wreck sites		Summary of wreck sites
	Craft	Aircraft	
Scotland			
Highland	3,191	143	The highest densities of wrecks are located around Firth of Forth and between Rattray Head and Kinnaird Head in Aberdeenshire, reflecting the greatest level of activity and navigational hazard respectively. Known build dates for vessels range between 1841 and 1942, however a number of ports in the region date to earlier periods, and the lack of earlier definitive dates does not preclude earlier wrecks and may be a reflection of the inheritance of UKHO data into the NMRS. Vessels are largely recorded as cargo steamships or fishing vessels, with nearly half of the latter category attributed to naval requisitions in the first and second world wars. Most
Moray	631	64	
Aberdeenshire	2,950	54	
Angus	906	58	
Fife	1,949	141	
Falkirk	80	-	
West Lothian	6	-	

County/Council District	Number of wreck sites		Summary of wreck sites
	Craft	Aircraft	
City of Edinburgh	368	2	recorded losses are recorded as due to accident rather than deliberate or military losses. Identified aircraft are generally from WWII, with earlier craft having smaller preservational prospects due to the fragility of their airframes.
East Lothian	933	32	
The Scottish Borders	550	12	
England			
North Yorkshire	1,638	2	Finds extend back to the Medieval period, though represent a small proportion of all wreck records, which are dominated by 19th and 20th century losses, and similar to areas further north, aircraft are generally attributable to WWII losses.
Durham	218	2	
Northumberland	1,372	40	
Tyneside*	1,167	9	

Notes: *includes North Tyneside, South Tyneside and Newcastle upon Tyne. The number of records includes those which do not have definitive positions and records which relate to wrecks once recorded but now lost, or else excavated. Source: Historic England Heritage Gateway database, the CANMORE database, Lancaster (2012)

A1i.3.3 Archaeological sites in the coastal zone

In a survey of Scotland's coastal archaeology (Dawson 2003) covering 20% of the Scottish coast, 37% of the coastal heritage encountered was under threat from erosion, tentatively extrapolated to a total of 12,400 potentially threatened sites for the whole of Scotland (Ashmore 2003b). Investigations of Scotland's coastal archaeological resource continue, particularly where erosion threatens the loss of sites prior to their investigation (for instance the SCAPE Trust and its related publications and projects such as SCHARP[8]). The number of sites encountered per km of coast in the study area relative to Regional Sea 1 varies from 1.9 (Shetland) to 4 (Highlands). The archaeological resource of the English section of the Regional Sea 1 coast is detailed in Fulford *et al*. (1997) and Murphy (2014).

Shetland contains a wealth of coastal archaeological sites dating back to prehistoric times, including Mesolithic and Neolithic finds (Melton & Nicholson 2004, Gillmore & Melton 2011, Montgomery *et al.* 2013), standing stones, burial chambers (cairns), Iron Age forts (brochs) (Wilson 2003a) and Norse (McGovern 1990) and later sites. Artefacts dating to the Mesolithic are few, and lithic deposits may be hidden below peat or in coastal sand and in offshore areas submerged by rising sea levels (Edwards 1996, Flemming 2003). The existence of Mesolithic peoples is also evidenced in the palaeoecological record for the islands (e.g. Edwards *et al*. 2005, 2009, Edwards 2009), with West Voe being a particularly important site (Melton & Nicholson 2004).

Surveys of the inner Moray Firth have uncovered evidence of Mesolithic shell middens in the Inverness area (Hale & Cressey 2003). The remains of a number of late Bronze Age and Iron Age marine crannogs in the Beauly Firth (e.g. Redcastle) represent almost 50% of the total number of known crannogs in intertidal waters (Hale 2000, cited in Hale & Cressey 2003). Fish traps built during the 17th-19th century to catch salmon are relatively common in the

[8] Scotland's Coastal Heritage at Risk Project (SCHARP), see Dawson (2013, 2014).

intertidal zone and are concentrated in the Beauly Firth and Cromarty Firth. Early 20th century monuments include WWI and WWII military complexes on the North and South Sutors, the remains of an airfield at Evanton and the RAF seaplane base at Alness Point (and related aircraft losses in the Moray Firth). The heavy military presence attests to the importance of the Cromarty Firth, especially as a naval base during both World Wars (Hale & Cressey 2003).

A survey of the Fife coast (Robertson 1996, Robertson & Miller 1997) found evidence of fossilised trees on the shore near Crail as well as prehistoric land exposures on the muddy foreshore of the Tay Estuary which may date to around 5,500 BP. A series of temporary camps discovered at Fife Ness and Tentsmuir provide evidence of Mesolithic settlement. Prehistoric shell and pottery middens as well as fishtraps may also be present. Evidence of Roman activity is limited to scattered finds (e.g. Boat Haven pottery and finds from Constantine's Cave). Pictish burial sites (e.g. Old Haiks Long Cist; Lundin Links) and carvings within cave systems (Constantine's Cave; Randerston Castle Cave; Kinkell Cave) are found in raised beach deposits to the south-east of St Andrews. Salmon fishing on the Tay has probably taken place since at least Roman times and evidence of structures associated with the industry are commonplace, particularly on the south shore of the Tay. The majority of 20th century coastal sites in Fife, and further north along the Angus coast, are military defences from WWI or II (Robertson 2003, Dawson *et al.* 2009). A survey of the Angus coastline emphasises the number of potentially unrecorded sites, with 52% of sites surveyed not previously recorded, 81% of which were located in the intertidal area (Dawson *et al.* 2009).

The majority of coastal sites found during a survey of the Firth of Forth (James 2003) were attributed to the post-medieval period and included industrial, commercial and domestic buildings, harbours, docks, piers, wartime defences, designed landscapes, wooden structures, wrecks, sea-wall defences, and outdoor swimming pools. Prehistoric sites found included a Mesolithic shell midden (Kinneil Kerse) and an antler implement; Neolithic pottery and a stone axe; Bronze Age burial chambers and Iron Age forts, caves, burial sites, middens and jewellery. A number of Roman forts and other structures, as well as a brooch and a Roman coin, have been described, as have Early Christian burial sites, chapels and monastic settlements. A number of medieval castles, religious sites, battle sites, harbours and settlements have also been recorded (James 1996, James 2003).

Lower Palaeolithic finds along the coast of Regional Sea 1 may be limited by glacial readvance (Wymer 1999), though isolated hand axes have been found at Redcar and Blackhall (Tolan-Smith 2008, cited in Murphy 2014). The area of English coast from the Tweed to Flamborough Head has numerous associated reports of submerged forest (e.g. at Cresswell, Hauxley, Seaburn, Hartlepool Bay, Hornsea, Owthorpe and Easington (Bradley *et al*. 1997) indicative of former landscapes which may have been previously occupied. Mesolithic activity is documented along the entire English north-east coast (Burn 2010), with finds recorded in surveys on the Durham and North Yorkshire coasts (Wessex Archaeology 2004a), though the Late Upper Palaeolithic and Mesolithic are poorly represented in North Yorkshire (Brigham 2014). Notable sites include those at Howick (Boomer *et al.* 2007, Waddington 2007) and Low Hauxley (Waddington 2010) displaying both evidence of occupation, including fossil human and animal footpints, and interaction with the Storegga event. Mesolithic scatters have also been found at Budle Bay, Crimdon Dene, Cresswell and Filpoke Beacon (Murphy 2014).

A prehistoric wattle screen has been exposed at Seaton Carew, south of Hartlepool which was embedded in peat and drowned forest (Buglass 1994 cited in Flemming 2002), as has a probable Neolithic or early Bronze Age fish trap (Annis 1994). Artefacts have been recovered from this beach for many years, with skeletal remains being discovered in 1971 from peat. Peat from this area yielded a date of 5,000-4,200 BP (Flemming 2002).

A significant array of dunes form the English coast from the Scottish border south to Hartlepool: these may have the potential to preserve prehistoric landscapes in buried soils, evidenced by other finds in analogous coasts in England (e.g. Newquay), and the later buried medieval site at Lindisfarne exemplifies this process (Bell 1997). Early Bronze Age material is present along the north Northumberland coast, contained in sand dunes which are exposing this material as they erode, and later, Neolithic finds are being eroded at Flamborough Head in the form of discoidal knives and transverse arrowheads (Bradley *et al*. 1997, also see Brigham *et al.* 2008). Bronze Age round barrows, cairns and other ritual structures are located on the northeast coast, including a cist cremation cemetery and associated cairns at Low Hauxley which is contained below eroding dunes (see Waddington 2010).

The pre-Roman and Roman Iron Age are virtually indistinguishable on the north-east English coast and no records of Roman Iron Age within the intertidal zone north of the Tyne have been recovered, despite that the Tyne would have been an important access route for troops and supplies, and the distribution of other finds point to the likelihood of port activities (Bradley *et al*. 1997). Iron Age multivallate forts are a feature of the coast between the Scottish Borders and Low Newton-by-the-Sea, with examples at Howick Hill, Fenham and Scremerston, and a range of other Iron Age features (crop marks, settlement enclosures) in Northumberland have been recorded on aerial photography (Murphy 2014). Further south, settlement sites tend to be inland from the coast, however finds in cliff sections at Cloughton and Reighton imply more extensive settlement landscape yet to be discovered (Brigham 2014, Murphy 2014).

Herd Sand at South Shields provides the source of at least 25 coins from the 1st and 2nd centuries. Several Roman signal stations which have either been severely eroded or are subject to current and probable future erosion, occur at Huntcliffe, Goldsborough, Ravenscar, Scarborough and Filey (Bradley *et al*. 1997). Finds south of the Tees also indicate the potential for Roman remains to be found in this location.

There is little archaeological evidence for the early Medieval period in the north east of England (Brigham 2014), however later Medieval sites have the greatest number for the north east coast, with 110 known locations for the Durham and North Yorkshire areas – the entire post-Roman period yields 145 individual records for the same area (Wessex Archaeology 2004a). Extensive Medieval and post-Medieval ridge-and-furrow has been identified in aerial surveys of the north-east most of which has been levelled or otherwise obscured by modern farming and building (Brigham 2014, Murphy 2014). In the post-Medieval period, the coast of the north east of England began to be characterised by agricultural enclosure and the spread of rural industries, and also alum and stone quarrying which led to permanent landscape change, though the area remains largely rural in nature (Brigham 2014).

A1i.4 Features of Regional Sea 2

A1i.4.1 Submerged heritage

Research by Gaffney *et al*. (2007, 2009) has highlighted how the reconstruction of the palaeolandscapes of the southern North Sea using 3D seismic data might be used to reveal the potential archaeological resource and develop a predictive methodology. For instance, the mapping operation revealed the Outer Silver Pit would have dominated the palaeolandscapes of the southern North Sea, featuring a significant drainage basin with resources including a lake or marine outlet with an extensive coastline, numerous estuaries and salt marsh (Fitch *et al*. 2007). The availability of resources suitable for human habitation in this area makes it a prime location for late Mesolithic archaeology and the study of possible maritime resource use.

While the Silver Pit itself is not regarded to be particularly prospective, Gaffney *et al.* (2007, 2009) indicate that, with caution, former lacustrine environments, marshland and coasts identified using the methods deployed in the North Sea Palaeolandscapes Project[9] could be used to support more detailed investigations (see Missiaen *et al.* 2021, and below). An overview of the topography of the palaeolandscape identified by Gaffney *et al.* (2007) is provided in Figure A1i.3.

Similar work has been undertaken as part of the Humber (Tappin *et al.* 2011), East Coast (Limpenny *et al.* 2011) and Outer Thames (Emu Ltd & University of Southampton. 2009) Regional Environmental Characterisations, which interpreted offshore channel systems and plot wrecks and other archaeological findspots within the relevant study areas.

To date no maritime archaeological artefacts of lower Palaeolithic origin (*ca.* 900-300kya) have been recovered from the southern North Sea (Hosfield 2007). Lower and Middle Palaeolithic material is likely to be present within fluvial terrace deposits off East Anglia and in the Thames Estuary (Wenban-Smith 2002), with evidence from coastal sites including at Happisburgh and Pakefield that maritime sites of such an age could survive offshore. The current method of recovery and collection of much marine archaeology (e.g. dredging or trawler by-catch) is coarse and produces an archaeological mix of poor spatio-temporal resolution (Glimmerveen *et al*. 2004, Hosfield 2007).

Limpenny *et al.* (2011) note that there have been 30 reported prehistoric finds made through the BMAPA protocol from aggregate areas of East Anglia which include worked flint and faunal remains. This includes a collection of 28 Palaeolithic hand axes from dredged material 11km off the coast of Great Yarmouth in licensed dredging area 240, which were accompanied by a series of bones including woolly mammoth, bison and reindeer. The finds were recovered from sediments which were probably associated with a buried channel feature, and are currently regarded as perhaps the most significant Ice-age artefacts from the North Sea to date, being dated to MIS 8/7 (250-200kya) (Tizzard *et al.* 2014).

Limpenny *et al.* (2011) also highlight earlier work on identifying the late Pleistocene and early Holocene landscapes off East Anglia, including the work of Fitch *et al.* (2005) who described a vast plain with a complex meandering river system which developed into an estuarine and intertidal environment in advance of the marine transgression in this area. Limpenny *et al.* (2011) further identified an early Mesolithic channel associated with the Yare, infilled with a transgressive sequence of marshland peats overlain with progressively more estuarine sediments associated with the start of the last marine transgression at approximately 5,970 BC. Palynological evidence indicates the channel would have flowed through marshland and open shrub woodland with birch, aspen and willow, with oak, elm and hazel dominating in outer saltmarsh areas.

Tappin *et al.* (2011) similarly notes that a combination of paleoenvironmental and dating evidence suggests that *in situ* Mesolithic deposits survive in the Humber REC area and can be identified in geophysical data, mainly in the form of palaeochannels of late glacial/early Holocene (or perhaps earlier) age, subsequently infilled with sediments. Tappin *et al.* (2011) also augment the characterisation of the North Sea Mesolithic landscape undertaken by Gaffney *et al.* (2007) largely confirming earlier interpretation where there was an overlap, but also providing more definition in the character of the nearshore area. In the area not already covered by Gaffney *et al.* (2007), 47 Holocene landscape areas and 120 areas with

[9] http://archaeologydataservice.ac.uk/archives/view/nspp_eh_2011/

archaeologically significant landscape features were identified, the most significant being a dense cluster of channels and landscapes in the south of the area.

Initial results from collaborative high resolution surveys (e.g. Missiaen *et al.* 2018) undertaken at Brown Bank in 2018 and 2019 (Missiaen *et al.* 2021) as part of the "Europe's Lost Frontiers" project show the presence of peat located on the banks of a Holocene channel, which demonstrated good preservation of organic material (e.g. wood, plant macrofossils) suggesting good preservation potential for archaeological material is also likely. Further work is required in these areas to identify any archaeological material, and the riverine setting and preservational conditions enhance the chance material will be found, and perhaps with better preservation of certain material (e.g. wood and bone) than would be found in some terrestrial deposits. A late Pleistocene/early Holocene vegetation history from two vibrocores taken through peat collected at the Dogger Bank and near the Lille Fisker Banke (Denmark), which included microcharcoal evidence, but no definitive indication of human activity were recorded (Krüger *et al.* 2017). Like much archaeological material recovered from the sea to date, finds would not be made *in situ* unless detailed excavation by diver (e.g. Momber *et al.* 2011) was possible, however, high resolution coring and grab sampling could also be performed. Missiaen *et al.* (2021) note that dredging carried out in May 2019 yielded several worked flakes from a study area off East Anglia from a channel known as the "Southern River", which approximately dates to the same period as that their own study (~8,900BP), and while still subject to investigation, represents the first early find in deeper waters resulting from prospection.

The above studies indicate both the nature of the former landscape of the North Sea and the high potential for *in situ* preservation and recovery of further Palaeolithic, or at least Mesolithic, material, and related organic material which can be used to characterise the environment and date former sites of occupation.

Notable offshore or intertidal areas in Regional Sea 2 which have provided evidence of occupation in the area or which are prospective areas for archaeological finds, are summarised in Table A1i.4.

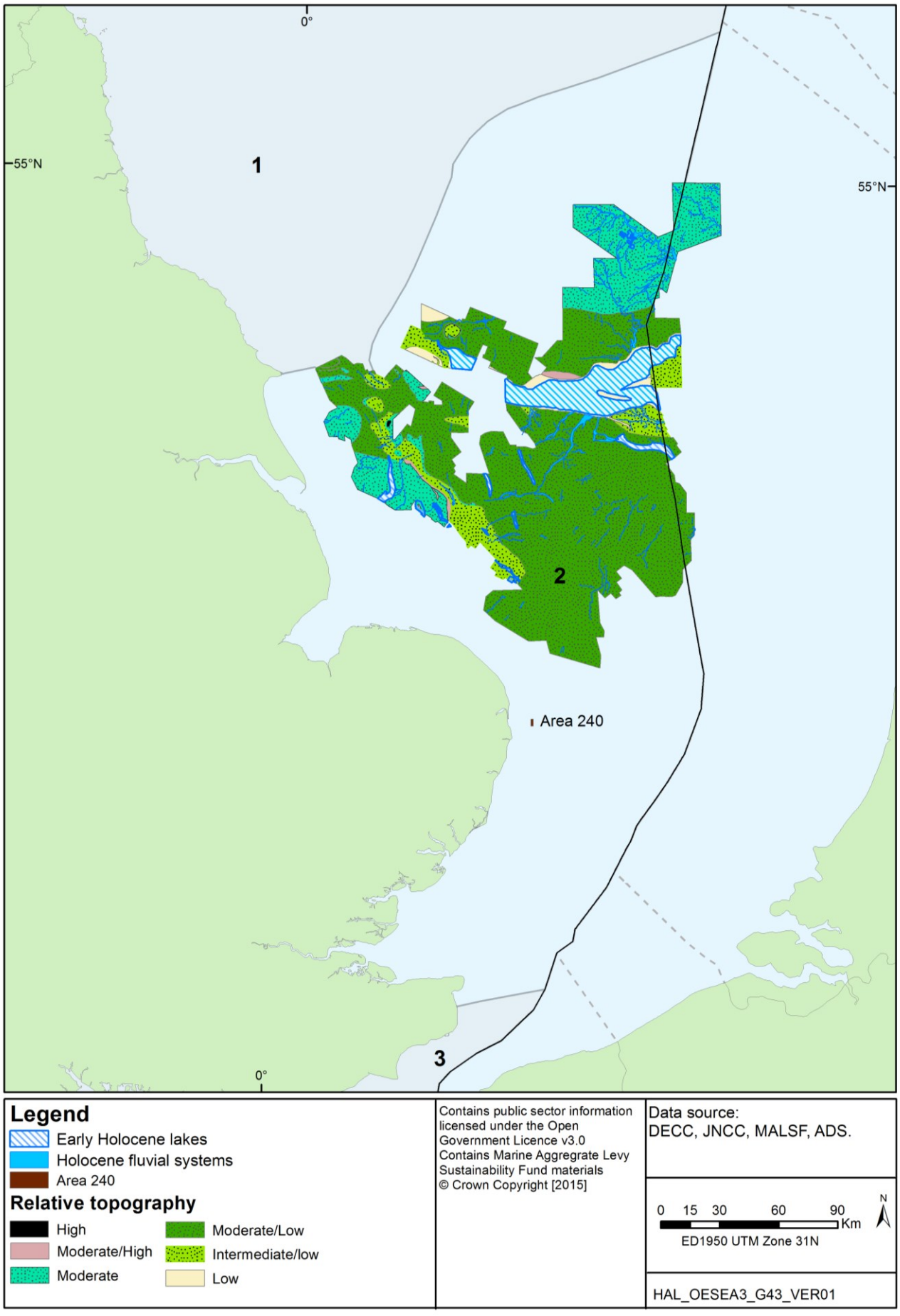
Table A1i.4: Known and prospective offshore and intertidal sites in Regional Sea 2

Site name	Summary
Dogger Bank	Flints, spear-heads and mammal remains have been dredged from the area known as the Dogger Bank, though the vast relict lagoon that was present to the south between 8,000-7,000 BP may provide a richer assemblage. No recent fossil bone or artefact finds have been made at this location. A core area in the southern North Sea for the recovery of 'moorlog', which have been instrumental in environmental reconstructions.
Yorkshire Coast	The highly eroding coastline between Flamborough Head and Spurn Head has revealed a substantial array of prehistoric artefacts, including a Neolithic polished axe at Grimston Garthe and at Withensea. Assuming coastal retreat has been the same for millennia, many kilometres of coast will have been lost, and Mesolithic, Neolithic and historic material are presumably scattered on the seabed.
Seahenge, Holme-next-the-Sea, Norfolk	A circle of 56 wooden posts surrounding an upturned oak stump exposed at Holme-next-the-Sea, Norfolk. Dated to *ca*. 4,100 years old.
Leman and Ower Banks	The submerged peat landscape here was probably used by Mesolithic people evidenced by finds of a barbed pointed weapon dredged from a depth of *ca.* 36m. The peat dated to *ca*. 8,500 BP and the tool dated to *ca*. 11,740 ±150 BP.

Site name	Summary
East Anglian coast wetlands and intertidal sites	Numerous sites in the marshlands, creeks and tidal mudflats of the Essex coast date to 7,600-3,500 BP, relating to Mesolithic and Neolithic peoples, with The Stumble, Blackwater Estuary, being a typical example.
Brown Bank	Thousands of fossil mammal bones recovered with evidence of working. Date to the early Pleistocene, and later Pleistocene and Devensian, most are from the latter period. The area is an erosional remnant of freshwater clays overlain by ~6m of modern, mobile sand surface. The bones and artefacts are likely confined to the clay. Most recently (see above), well-preserved formerly terresitral organic material has been recovered, which suggests the potential for good archaeological preservation.
Offshore East Anglia	Sited approximately 11km off the coast of Great Yarmouth, 75 Palaeolithic artefacts were recovered from Area 240 which include hand axes, flakes and cores, and a series of bones (including woolly mammoth, bison and reindeer). The finds were recovered from sediments deposited in an outer estuary or restricted shallow marine environment, which are probably associated with a buried channel feature. The area is offshore of early terrestrial sites of Pakefield and Happisburgh, and palaeographic and palaeoecological reconstructions aligned with archaeological evidence suggest the potential for further finds of prehistoric material.

Source: Flemming (2002, 2004a, 2004b), modified using: Wilkinson & Murphy (1995), Hazell (2008), Limpenny *et al.* (2011), Wilkinson *et al.* (2012), Murphy (2014), Missiaen *et al.* (2021)

Figure A1i.3: Palaeolandscapes of the southern North Sea and other locations mentioned in the text



A1i.4.2 Wrecks

Protected wrecks in Regional Sea 2 are listed in Table A1i.5 and shown in Figure A1i.4.

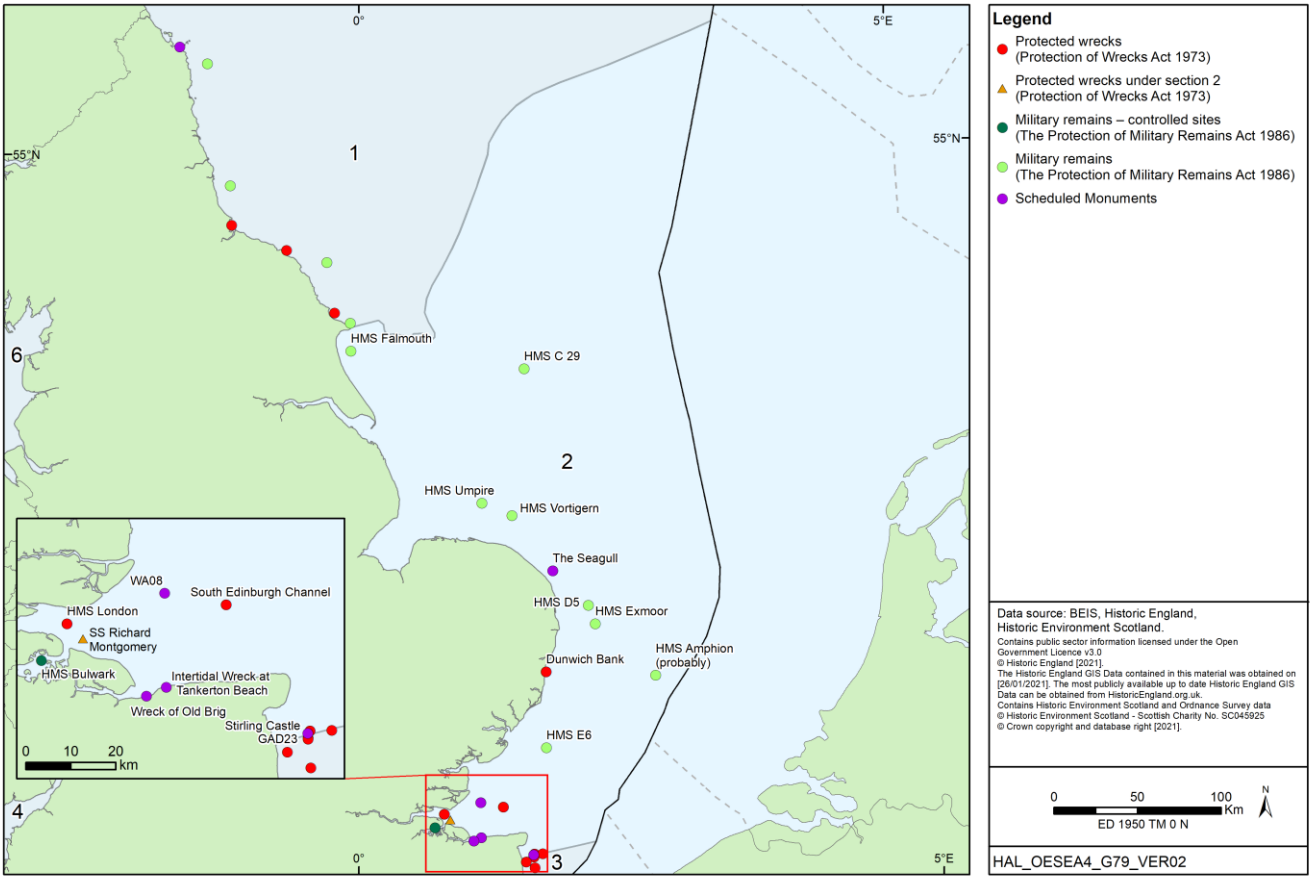
Table A1i.5: Protected wrecks within Regional Sea 2

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
Protection of Wrecks Act 1973: Protected Wrecks			
Dunwich Bank	*ca.* 16th c.	The remains of an armed cargo vessel which foundered in the area off Dunwich approximately between 1536 and 1600.	Area within 100m of 52º15′ 8.4″ N 01º38′ 31.8″ E
HMS London**	1665	The London, a second rate "Large Ship" built in Chatham in 1656 and sunk in 1665 by a massive explosion. Its wreck contains elements including structural timbers and cannon. Rediscovered in 2005 and designated in 2008, a two year investigation of the site commenced in 2014, with the recovery of a gun carriage in 2015.	Two areas centred on 51˚29'44.598'' N 00˚44'0.810'' E
Stirling Castle	1703	The remains of an English third-rate ship foundered after grounding on the Goodwin Sands during the "Great Storm" of November 1703. Thought to be Stirling Castle, a 70-gun warship built in 1678 at Deptford and one of twenty constructed on the order of Samuel Pepys as part of a programme to regenerate the English navy.	Area within 50m of 51°16.4561' N, 01°30.4121' E
South Edinburgh Channel	*ca.* late 18th c.	Remains of a wreck thought to be that of a Swedish cargo vessel dating from 1787 to the early nineteenth-century, which appears to have foundered in the South Edinburgh Channel. The site is that of an armed cargo vessel, laden with iron anchors, bars, sheet glass, luxury items, and plate money variously dated to the mid-eighteenth to the early nineteenth-centuries.	Area within 100m of 51º31′ 44″ N, 01º14′ 53″ E
SS Richard Montgomery	1944	A US Liberty Ship of 7146 gross tons built in 1943 by the St John's River Shipbuilding Company of Jacksonville, Florida and was one of over 2700 of these mass-produced vessels built to carry vital supplies for the war effort. The ship dragged anchor in August 1944 and grounded amidships on a sandbank running east from the Isle of Grain. The vessel contains ~1,400 tonnes of explosives. Works are due to take place in 2022 to remove the ships masts as these are placing strain on the vessel.	There is a no-entry exclusion of 500m defined by: 51° 28' 04" N 00° 47' 12" E 51° 27' 57" N 00° 47' 22" E 51° 27' 50" N 00° 47' 11" E 51° 27' 58" N 00° 47' 01" E
Ancient Monuments and Archaeological Areas Act 1979: Scheduled Monuments			
Intertidal Wreck at Tankerton Beach	*ca.* late 16th /early 17th c.	A 16th century or early 17th century small or medium sized merchant ship forming a primary source of evidence relating to indigenous Tudor/early Stuart shipbuilding techniques and potentially related to the late Medieval copperas industry along the north Kent coast.	NGR TR12464 67495

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
Wreck of Old Brig	*ca.* 17th c.	The remains of an 'Old Brig' is marked on a 1770 chart of Seasalter, showing that the wreck was noted to be old by the late eighteenth century. The hull is exceptionally well-preserved and is potentially related to the smuggling activity within the locality and its re-use as accommodation and storage connected with the local oyster fishery.	NGR TR0812 965374
The Seagull	1868	A rare example of a sail-assisted paddle steamer (a type of vessel that became obsolete in the mid-C19 century with the development of screw propeller driven vessels) built in 1848 in Belfast. The vessel had been used as a cargo transport for around 20 years before it sank in a collision in 1868.	NGR TG5078 728343
GAD23	mid-late 19th c.	Comprises the remains of a mid- to late-C19 wooden sailing ship carrying a cargo of coal, located 8.1km south-east of Ramsgate in between the Kellet Gut and the Gull Stream regions of the north-west Goodwin Sands. The vessel measures approximately 40m by 10m, lying at a depth of 16m.	NGR TR44199 58103
WA08	mid-19th to early 20th c.	An intact wooden sailing ship up to 38m long and probably three-masted. The ship was carrying a cargo of roofing slates when it sank and this remains in situ.	NGR TR11544 88404
Protection of Military Remains Act 1986: Controlled Sites			
HMS Bulwark	1914	A first-class armoured battleship sunk while at anchor in Sheerness harbour by an internal explosion.	Area within 100m of 50º25.392′ N, 00º39.172′ E
Protection of Military Remains Act 1986: Protected Sites*			
HMS Amphion	1914	A scout cruiser sunk by mine in the North Sea.	North Sea
HMS E50	1918	“E” class submarine sunk by mine in the North Sea.	South Dogger
HMS Exmoor	1941	A “Hunt” class destroyer sunk by E-boat torpedo in February 1941.	Lowestoft
HMS Umpire	1941	A “U” class submarine accidentally rammed and sunk by a trawler in the North Sea.	North Sea
HMS Vortigern	1942	A V-class destroyer sunk in 1942.	Cromer
HMS Falmouth	1916	A coal-fired Town Class light cruiser, lost by torpedo by the German High Seas Fleet.	Bridlington Bay
HMS C29	1915	C-class submarine lost by mine east of the present-day Ravenspurn North gas field.	Southern North Sea
HMS D5	1914	Hit a mine while chasing German raiders who bombarded Great Yarmouth.	Great Yarmouth
HMS Fitzroy	1942	Survey ship and later “Hunt” class minesweeper vessel. Sunk by mine.	Great Yarmouth
HMS E6	1915	An E-class submarine lost to a mine mine off Harwich.	Felixstowe

Notes: *=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data is provided, only a named location. **=wreck is listed on the Heritage at Risk Register. Source: the National Heritage List for England, the *Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2019*, MoD (2001), Colledge & Warlow (2010), Historic England (2015), Historic England website (accessed 30th April 2021): https://historicengland.org.uk/research/current/discover-and-understand/military/the-first-world-war/first-world-war-home-front/what-we-already-know/sea/hms-falmouth/, Royal Navy website (accessed 30th April 2021): https://www.royalnavy.mod.uk/news-and-latest-activity/news/2019/september/02/190902-tragic-iolaire-shipwreck-protected

Figure A1i.4: Protected wrecks in Regional Sea 2



There are a large number of other maritime sites classified as "wreck" in Regional Sea 2 but which do not receive statutory designation. A breakdown of maritime sites for each county relevant to Regional Sea 2 is provided in Table A1i.6, which also indicates the number and type of aircraft losses in each area.

Table A1i.6: Maritime archaeological records categorised as 'wreck' or 'aircraft' for English Counties relevant to Regional Sea 2

Area	Number of Wrecks		Summary of wreck sites
	Craft	Aircraft	
Lincolnshire	765	10	The earliest possible date for a wreck recorded in Lincolnshire is Roman, with pottery remains found during dredging off Chapel St Leonards. Records are then recorded from the Medieval period (19), and later Tudor (14), Stuart (3), Georgian (248) and Victorian (237) periods are also represented. 20th century wrecks (168) are dominated by first (36) and

Area	Number of Wrecks		Summary of wreck sites
	Craft	Aircraft	
			second (72) world war losses. All aircraft losses date to the second world war.
Norfolk	3,566	33	The earliest wrecks date to the Medieval (35), with records generally increasing through the Tudor (19), Elizabethan (11), Stuart (101), Georgian (1,476) and Victorian (1,037) periods. 20th century wrecks (699) are dominated by first (183) and second (223) world war losses. Most aircraft losses also date to the first (1) and second (26) world wars.
Suffolk	1,596	20	The earliest maritime record is the 1260 wreck of a German cargo vessel, scuttled in the port of Dunwich, and there are 21 records for the Medieval period. Georgian (502), Victorian (395) and 20th century (421) wrecks make up the remaining maritime shipwreck assemblage. Most aircraft losses date to the first (1) and second (18) world wars.
Essex	1,605	29	Wrecks date from the Medieval (6) period. Georgian (452), Victorian (437) and 20th century (395) wrecks make up the remaining maritime shipwreck assemblage. Most aircraft losses date to the second (22) world war.
Kent	4,896	90	The earliest remains recorded are considered to be Bronze Age (2), recovered at Dover and Langdon Bay. There are few records for the periods leading up to the Medieval (75), and like in most other counties, the post-Medieval period, particularly Georgian (1,514) and Victorian (1,328) times, have the most abundant records. 20th century wrecks account for 1,246 of the total number of records. Most aircraft losses date to the second (81) world war.

Source: Historic England Heritage Gateway. Notes: The number of records includes those which do not have definitive positions and records which relate to wrecks once recorded but now lost, or else excavated.

The high proportion of wrecks of 20th century origin, and particularly First and Second World War losses, are reflected by designations under the Protection of Military Remains Act, though these reflect a very small proportion of losses as recognised in the wider heritage record. A study by Firth (2014, 2015) on the East Coast War Channels (ECWC) of the First World War, provide context to many of the losses in Regional Sea 2. The ECWCs were defined routes swept of mines between the Thames and the Scottish border to provide a protection to civilian shipping, undertaken by a range of vessels including fishing vessels requisitioned by the Admiralty. The area contains a large number of wrecks primarily of British cargo vessels, and also vessels from a number of other nations, which were largely sunk by U-boats, particularly using torpedo from 1917 onwards. Coastal infrastructure relating to ports and wireless stations were also part of the ECWCs. Though comprising a range of specific wreck and other sites, the ECWC should be considered in a wider battlefield context comprising maritime and coastal heritage assets (Firth 2014, 2015). The East Coast (Limpenny *et al.* 2011) and Humber (Tappin *et al.* 2011) RECs identified known wrecks (e.g. SS Horseferry, SS Aruba, SS Cornmead, SS Stad Alkmaar, SS Southford) and previously uncharted wrecks, as well as not resolving some known sites possibly due to these being obscured by seabed sediments, with some of those of 20th century origin possibly associated with the ECWCs (Firth 2014).

A1i.4.3 Archaeological sites in the coastal zone

From Flamborough Head to Essex, the intertidal zone and immediate coastline have a substantial array of archaeological sites ranging from the prehistoric cultures of the Early

Middle Palaeolithic (White *et al*. 2006, Wymer & Robins 2006) to more recent post-medieval finds, and this range of material is reviewed extensively in Fulford *et al*. (1997) and Murphy (2014), and to some extent also in Glazebrook (1997). The coast in this region is an almost continuous archaeological resource, and the sheer number of sites makes it impractical to account for them all here, however, a high level summary is provided below.

Palaeolithic sites in the coastal zone of south-east England are rare and Late Upper Palaeolithic occupation sites such as Titchwell (Norfolk), and earlier evidence from Pakefield (Parfitt *et al.* 2005) and Happisburgh (Ashton & Lewis 2012, Ashton *et al.* 2014, Lewis *et al.* 2019a, b, Gibbard *et al.* 2019, also see Section A1i.2.1) are extremely important.

The Suffolk coastal cliffs provide important early exposures containing Palaeolithic material – the Dunwich cliffs and Stour are two localities where finds are prevalent (Good & Plouviez 2007). Early Mesolithic finds are concentrated mainly in East Hampshire and West Sussex, with late finds more widely distributed (Murphy 2014). Later Mesolithic cultures which dominated the landscape from the early Holocene may be evidenced in the array of submerged forests (Bradley *et al*. 1997) and peats at the coast (see Hazell 2008[10]) which may contain invaluable cultural and palaeoecological information – the Fenlands, Humber and Thames estuaries are key locations for these deposits – and these may be useful in evaluating the transition of these peoples to agriculture (Fulford & Champion 1997). Other estuarine areas may provide preservational environments for Mesolithic remains beneath their sediments such as at Nacton on the Orwell and the Stour (Murphy 2014). Bicket *et al.* (2016) note the potential for paleogeographic reconstructions of current nearshore areas, taken in context with coastal Mesolithic archaeology, to understand the relationship of such sites with Doggerland (see above) and early Holocene sea level rise.

Neolithic material has been recovered from the coastal areas of East Anglia (e.g. at the Stumble), the Suffolk coast (e.g. Freston, Kessingland) and the Kentish (e.g. the Kent Marshes and Minnis bay, Isle of Thanet) coast (Bradley *et al*. 1997), though tend to be stray finds from beaches (Murphy 2014).

Essex is an area of considerable potential but little is yet known about its prehistory (Bradley *et al*. 1997). The north Norfolk coast has been little studied, but it is recognised that Pleistocene deposits in this area have a high potential to contain archaeological information of Palaeolithic and Mesolithic age (Austin 2000), the most significant Mesolithic site being at Kelling Heath, now submerged in the North Sea, though other sites such as at Weybourne, provide additional evidence of Mesolithic activity (Murphy 2014). Despite a lack of extensive early finds, a high concentration of Neolithic axes has been found in the area (Bradley *et al*. 1997). The Holderness coast produces unstratified lithic scatters of Mesolithic and Neolithic age, but is also of interest as meres and other wetland types that would once have characterised Doggerland exist in cliff sections (Murphy 2014). The meres are considered to have remained open water into the Holocene, and sites such as Withow Mere, considered to have been approximately 1km across in the Medieval period, have produced bone projectile points, and remains of deer and elk, but is now almost entirely lost to erosion (Murphy 2014, Brigham & Jobling 2011, 2013).

Bronze Age barrows are a feature of the coast (e.g. Felixstowe and Shotley peninsulas). Though many are undated and could be attributed to other time periods (Good & Plouviez 2007). Many survive on the Suffolk coast as they have been built on sandy areas which are

[10] https://historicengland.org.uk/research/current-research/heritage-science/intertidal-peat-database/

unproductive for agriculture. Evidence of Bronze Age and Iron Age occupation in the intertidal zone has been identified in the Essex estuaries (Wilkinson & Murphy 1995), and the intertidal zone in general is regarded as having great potential for prehistoric finds (Brown & Murphy 1997). A timber circle hut at Holme-next-the-Sea is dated to 2,049 BC, while now in the intertidal area it was once part of a complex of timber structures when the coast was hundreds of metres to the north (Ashwin 2005, Brennand & Taylor 2003, Norfolk Archaeological Unit 2003, Ames & Robertson 2009 all cited in Murphy 2014). Brushwood structures dated to the 1-2,000 BC are located at Fenn Creek, South Woodham Ferrers, and indicate activity on the saltmarshes after they would have been uninhabitable (Murphy 2014).

Late Iron Age and Roman period Britain has a relative wealth of material which includes coins, ceramics and metalwork. Crop marks along the Holderness coast are probably Iron Age and ceramic and coin finds from this period are known from the coast and other sites include forts at Flamborough Head and Holkham (Murphy 2014). Holderness is comprised of glacial tills which are soft and easily erodible, resulting in a cliffline which has been retreating throughout the Holocene, with modern retreat rates being an average of 1.5m/year (Quinn *et al.* 2010). The position of the Holderness coast may have therefore been 1-2km to the east during the Roman period, and therefore former coastal occupation sites from this and earlier periods are likely to have been lost to the sea.

Little can be said about the nature of Roman settlement or its relationship with the sea and the exploitation of marine resources. Traces of salt production on the south-east coast are extensive (for instance Red Hills in north Essex), though how this related to any associated settlement is poorly understood. This activity dates from between the mid 1st century BC and ends at around the 2nd to 3rd century AD (Bradley *et al*. 1997, Fulford & Champion 1997) and is absent from areas to the west of Canvey Island (Bradley *et al*. 1997). Evidence of Roman pottery making is also prominent in addition to salt production in the North Kent Marshes (Bradley *et al*. 1997). The post-Roman period (Saxon and Medieval) is poorly represented at the coast. Some Medieval churches including those at Eccles-next-the-Sea, Happisburgh and Sidestrand have been lost to coastal erosion, and complement the losses of entire villages further north along Holderness (e.g. see Barkwith *et al.* 2014), and other evidence comes from agricultural features including field boundaries, enclosures and ridge-and-furrow (Murphy 2014).

There are numerous 20th century defence structures on the coast dating to WWI and WWII which include tank traps and pill boxes.

A number of sites are continuing to be lost to the sea due to coastal erosion in the form of cliff retreat or erosion of soft sediments. In a review of the damage to historic fortification in south-east England, Bromhead & Ibsen (2006) indicate that many Roman, Saxon (e.g. at Reculver, Richborough and Bradwell) and Norman forts are subject to continuing erosion at the coast, which may result in a significant redistribution of historic artefacts on the seafloor.

A1i.5 Features of Regional Sea 3

A1i.5.1 Submerged heritage

The English Channel has been subject to marine aggregate extraction, primarily to the west of the Solent (see Hitchcock & Bell 2004), but also in the wider channel area. Finds of faunal remains dominate assemblages, with some lithic scatters, none of which can at this time be unequivocally attributed to the Lower Palaeolithic. Hosfield (2007) argues that given terrestrial

site typology for secondarily derived Palaeolithic deposits, contexts dominated by the relict fluvial floodplain sediments associated with the now extinct Channel River (composed of (amongst others) outflows of the Thames, River Solent, Somme, Rhine, Seine and Arun, Gibbard & Lautridou 2003) may hold a substantial store of archaeological material (also see James *et al.* 2010). In addition, to the north of the Channel River, the Solent River (a watercourse which at its maximum extent may have been as large as the Thames) would have drained the Avon, Test and Itchen catchments along the north of the Isle of Wight (separated from the mainland only in the Late Pleistocene) and south to the main Channel River (Wymer 1999). Its position in the lee of the Isle of Wight places it in an excellent taphonomic position based on the conditions outlined by Flemming (2004) above.

The terrestrial areas of the Solent and Avon have the highest concentration of Palaeolithic sites in Britain (Wymer 1999). When combined with substantial coastal erosion it can be assumed that much of the previous coastal archaeology of the Isle of Wight and south coast has been lost to the seafloor – a process which continues today (see: Bromhead & Ibsen 2006), exacerbated by continued relative sea-level rise (e.g. Edwards 2001, Shennan & Horton 2002, Waller & Long 2003). Lithic deposits apparently of Pleistocene age were recovered by fishing activity in the Solent (Wessex Archaeology 2004a), though these are perhaps more likely attributed to the Mesolithic and/or Neolithic periods (Hosfield 2007, Murphy 2014).. Sample collection by dredging and trawling has an unavoidably coarse spatial resolution, and the destructive collection method provides a diamict of material which may not be able to be placed within a well constrained chronology.

The Mesolithic site at -11m OD (ordnance datum) off Bouldnor Cliff (Momber 2000, Momber *et al.* 2011) is the only submerged site in the Solent from this period to have been investigated and along with palaeogeographical reconstructions, indicate a high likelihood of further prehistoric finds. The site contained well preserved organic material leading to environmental reconstructions, which included DNA evidence of wheat at a date ~2,000 years earlier than other British sites, and suggest possible trade with the Neolithic front in southern Europe (Smith *et al.* 2015). Material recovered from the site is extremely well preserved, and includes worked timbers and a wooden platform, with the timber assemblage representing the most extensive collection of worked Mesolithic wood in the UK (Momber *et al.* 2021). Momber *et al.* (2021) note that Bouldnor Cliff indicates the nearshore sites can recreat new information about past land used and population dispersal that complements work being undertaken at deeper sites (e.g. see Section A1i.4).

Palynological reconstructions of the environment in the Solent during the Mesolithic suggest Langstone Harbour to have a low, predominantly grass covered plain with stands of hazel, birch, pine, oak and elm, comprising part of a wider coastal environment between Southampton Water and Brighton (James *et al.* 2010, also see Momber *et al.* 2011). Backponding after *ca.* 6,000BC due to sea-level rise led to peat formation, an expansion in wetland and saltmarsh and eventual submergence (Murphy 2014). A submerged peat terrace in the western Solent at similar depths to the Bouldnor Cliff site revealed lithics, worked wood, charcoal, string and a pike vertebrae (Murphy 2014). James *et al.* (2010) note that under the appropriate preservational conditions there is the potential for a large resource of prehistoric material to be present in the south coast REC area, but at present areas of greatest potential can be highlighted with no knowledge of associated archaeological material.

In addition to objects finding their way to the seabed via coastal retreat, sea-level rise in the early Holocene also means that there is substantial scope for a large amount of recoverable seafaring associated objects relating to cross-channel navigation and trade. Shipwrecks (see section A1i.5.2 below) in the form of initially hide covered and dugout vessels and later wooden

ships, are likely to be located in surficial sediments though destruction and/or redistribution by wave and tidal action may preclude their recovery. In addition to wreck and associated artefacts, fishing implements and sailing accessories such as oars may be recovered.

A1i.5.2 Wrecks

There are a large number of wrecks within Regional Sea 3 (Figure A1i.5), although only small number of these are charted and only 43 are afforded protection (Table A1i.7). Further wrecks have been identified and/or investigated in Regional Sea 3 through the South Coast REC (James *et al.* 2010) and the Wrecks on the Seabed project (Wessex Archaeology 2003-2006[11]). These studies reflect, much like the RECs undertaken in Regional Sea 2, both the number of non-designated wrecks and previously uncharted wrecks located in parts of the English Channel and Solent, and the difficulty in detecting some wrecks despite being charted (e.g. due to sediment movement).

Table A1i.7: Protected wrecks within Regional Sea 3

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
Protection of Wrecks Act 1973: Protected Wrecks			
Langdon Bay Wreck	12th c. BC	No remains of a vessel have been found, however Middle Bronze Age artefacts point to the possibility that the wreck of a cargo vessel of the same date lies within Langdon Bay.	Area within 150m of 51º 07.60' N 01º 20.80' E
Unknown wreck: Chesil Beach (Cannon Site)	*ca.* 17th c.	A wooden wreck site associated with cannon, galley bricks, concreted objects and large dressed stone blocks. The material provides an initial interpretation that this wreck comprises the remains of a C17 Dutch vessel	Area within 100m of 50.65043 N 0.39670 E
Studland Bay Wreck	*ca.* 1520	Remains of an armed cargo vessel, thought to have been Spanish. The ship was constructed in carvel fashion, and numerous wooden items, a cannon and cannon balls, together with large amounts of early 16th century pottery have been found.	Area within 75m of 50º 39.65' N 01º 54.79' W
Grace Dieu	1439	The remains of an English carrack which burnt in the River Hamble in 1439 after being struck by lightning. Built in 1418 for Henry V, as a large clinker-built carrack.	Area within 75m of 50˚53' 33.029'' N 01˚17' 19.223'' W
Mary Rose	1545	Henry VIII's flagship built in 1509, which sank off Southsea Castle on July 19, 1545. A large section of the remains were raised in 1982 and are displayed by the Mary Rose Trust.	Area within 300m of 50º 45.48' N 01º 06.10' W
Church Rocks	Late 16th/early 17th century	Armed cargo vessel, suggested as possibly being a Venetian trading galley, which stranded on Church Rocks, off Teignmouth.	Area centred on 50˚32' 56.919'' N 03˚29' 14.231'' W

[11] http://archaeologydataservice.ac.uk/archives/view/wrecks_eh_2006/

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
Yarmouth Roads	Post-Medieval	Remains of late 16th or early 17th century carrack, possibly of Spanish origin. Possibly the Santa Lucia.	Area within 50m of 50º 42.52' N 01º 29.597' W
Swash Channel	Early 17th c.	17th century Dutch or German armed cargo vessel. Laden with pottery, possibly from the Rhine.	Wreck lies in the area encompassed by the four points: 50º 39.897' N 01º 55.591' W; 50º 39.920' N 01º 55.514' W; 50º 39.823' N 01º 55.441' W; 50º 39.799' N 01º 55.518' W
West Bay	1627-1750	A cargo vessel though to date from 1627. Cannon from the site indicate that she may have been armed; a bronze gun is thought to date between 1627 and 1750 at the latest, however these could have been transported as scrap. Thought to have been laden with iron bars and with ballast thought to have originated in south-western England or northern France.	Area within 50 of 50º 42.244' N 02º 45.708' W
Unknown wreck (GAD 8), previously known as Goodwins Cannon Site	uncertain	The site appears to be the remains of an armed wooden sailing vessel dated to between 1650 and 1750. Additional evidence, both archaeological and documentary, is required in order to make any definitive claims regarding the identification of this site.	Area within 50m of 51˚ 13.967' N 01˚ 26.009' E
Anne	1678-1690	Remains of an English Third Rate ship of the line, also described as a frigate, which was deliberately beached and burnt on Pett Level, to prevent the French capturing her during the Battle of Beachy Head, 1690.	Area within 100m of 50º 53.45' N 00º 41.76' E
Rooswijk**	ca. 18th c.	Remains of a Dutch East Indiaman which foundered towards the north-eastern end of the Kellet Gut, after grounding on the Goodwin Sands. She was bound from Amsterdam and the Texel to Jakarta with coin, bullion and a general cargo.	Area within 150m of 51° 16.443' N, 01° 34.537' E
Norman's Bay	~1703	Possible remains of wreck of English or Dutch warship of the 17th or 18th centuries. Thought possibly to be either the remains of the third rate Resolution, lost in the Great Storm of 1703, or of any one of a number of Dutch vessels lost during the Battle of Beachy Head, 1690; an alternative candidate is an unidentified vessel lost in the same area in 1667.	Area within 100m of 50º 48.177' N 00º 24.638 'E

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
Hazardous**	1706	Remains of a British Third Rate ship of the line which was beached in Bracklesham Bay during a storm. Acting as an escort for a convoy en route from Chesapeake Bay to the Thames Estuary, she took shelter in St Helen's Roads, Isle of Wight, but was forced to beach in Bracklesham Bay. Originally a French Third or Fourth Rate ship of the line, she had been captured by the English three years previously and refitted for the Royal Navy.	Area within 150m of 50º 45.10' N 00º 51.47' W
Restoration	1703	The wreck is thought to be that of the Restoration sunk along with a number of other ships in the area during the "Great Storm" of 1703.	Area within 300m of 51˚ 15.60' N 01˚ 30.13' E
Northumberland**	1703	Believed to be the Northumberland, a 70-gun third rate ship of the line, built in 1679, was lost in the "Great Storm" of 1703.	Area within 300m of 51˚ 15.480' N 01˚ 30.016' E
Amsterdam	1749	Remains of a Dutch East Indiaman which was beached at Bulverhythe as the crew mutinied after running aground in Pevensey Bay during a gale in January 1749 en route to Java.	Area within 100m of 50º 50' 42''N 00º 31' 39''E
HMS Invincible**	1758	A British Third Rate ship of the line which stranded and capsized on the Horse and Dean Sand on departing for Louisburg, Canada in 1758.	Area within 100m of 50º 44.34' N 01º 02.23' W
Admiral Gardner	1809	Remains of an English East Indiaman which stranded in Trinity Bay, in the Goodwin Sands. She was outward-bound from Blackwall to Madras carrying anchors, chains, guns, shot, iron bars and East India Company copper tokens for local currency.	Area within 300m of 51º 12' 00" N, 01º 30' 33.6" E
Unknown Wreck off Thorness Bay	uncertain	The remains of a wooden sailing vessel located in shallow water off the Isle of Wight. The site consists of ship structure, comprising framing, planking, fixtures and fittings spread over an area 30m by 10m. Offers an almost complete assemblage of a mid- to late-19th c. merchant sailing ship.	Area within 75m of 50˚ 44.89' N 01˚ 21.37' W
HMS A1	1911	The first British designed and built submarine used by the Royal Navy. Rendered unfit for service by an explosion in 1910, she foundered the following year off the north-east coast of the Isle of Wight while being towed from Portsmouth to the Solent for use as a target craft.	Area within 300m of 50º 44.551' N 00º 55.279 W
Holland No.5	1912	The first commissioned submarine in the Royal Navy lost under tow. She was an experimental submarine; completed in 1903 of steel with a petrol engine.	Area within 200m of 50º 41.655' N 00º 30.867' E
The Needles Site	1753	Assurance. A 44-gun fifth rate frigate lost in 1753 while en route from Jamaica to Portsmouth.	Area within 200m of 50º 39.70' N 01º 35.43' W
	1811	HMS Pomone. A 38-gun fifth rate which foundered after grounding on the Needles while en route from Istanbul, Malta and Cagliari to Portsmouth with dispatches in 1811.	

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
Ancient Monuments and Archaeological Areas Act 1979: Scheduled Monuments			
Wooden Wreck on Camber Sands	*ca*. 19th c.	Remains of a substantial oak-built sailing vessel lying parallel to the beach in the intertidal zone on Camber Sands, Rother, East Sussex. A site visit by Historic England (October 2016) measured the exposed remains as being 47.2m long by 9.5m wide. The wreck may comprise a vessel built in North America has the potential to answer questions about the 19th century transatlantic timber trade.	NGR TQ97056 18289
The Axe Boat		A late medieval / post-medieval coastal trader of carvel construction.	NGR SY2527 090020
SMS Grosser Kurfurst	1878	An ironclad turret warship built for the German Kaiserliche Marine (Imperial Navy). It was laid down at the Imperial Dockyard in Wilhelmshaven in 1870, launched in 1875 and completed in May 1878. The warship sank during its maiden voyage in an accidental collision with the ironclad SMS König Wilhelm off Folkestone, Kent, in May 1878.	NGR TR2097 828544
Protection of Military Remains Act 1986: Controlled Sites			
MHS Formidable	1914	Battleship. Sunk by U-24 off Portland Bill.	300m exclusion zone centred on 50˚13.179' N 03˚04.071' W
UB-81	1917	Launched in 1917, she struck a mine and was then struck by a British patrol boat and subsequently sank.	250m exclusion zone centred on 50˚29.442' N 00˚58.351' W
HMS Affray	1951	Failed to surface following a training exercise off the Isle of Wight. Uncertain reason for loss.	300m exclusion zone centred on 49˚50.023'N 02˚34.533'W
Protection of Military Remains Act 1986: Protected Sites*			
HMS Fisguard II	1914	British training ship located approximately 2.85 nautical miles SSW of the Bill of Portland. At the time of loss she was under tow from Portsmouth for Scapa Flow when she shipped water in heavy weather, capsized and foundered with considerable loss of life.	Portland, Dorset
HMS Ghurka	1917	A destroyer mined of Dungeness.	Dungeness, Kent
SS Mendi	1917	Rammed in fog by the steamer SS Darro, she sank in February 1917 with the loss of 646 lives. Among their number were 607 servicemen of the 5th Battalion, South African Native Labour Corps bound for the Western front.	St Catherine's Point, Isle of Wight
HMS G8	1918	"G" class submarine. Sunk in the North Sea, reason unknown.	North Sea

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
HMS L24	1924	“L” class submarine sunk following a collision with the Resolution.	Portland, Dorset
HMS M2	1932	Originally constructed in 1915 as one of a series of submarine coastal monitors.	Portland, Dorset
U-12	1939		English Channel
HMS Acheron	1940	A destroyer, sunk December 1940 by mine.	Isle of Wight
HMS Delight	1940	A destroyer sunk by air attack.	Portland, Dorset
HMS Swordfish	1940	Submarine mined off the Isle of Wight.	St Catherine's Point, Isle of Wight
HMS Penylan	1942	“Hunt” class destroyer sunk by E-boats in the English Channel.	English Channel
SS Storaa	1943	Torpedoed off the Hastings coast by German E-boats while transporting steel. The other two vessels in her convoy were also torpedoed, namely the Dona Isabel and Foam Queen.	Hastings
HMS Blackwood	1944	DE “Captain” class frigate damaged by U-764 in the English Channel and later sank.	Dorset Coast, UK
HMS Boadicea	1944	A destroyer sunk by air attack.	Portland, Dorset
HMS Loyalty	1944	“Algerine” class vessel sank by U-480 in the English Channel.	Nab Light, Isle of Wight
HMHS Anglia	1915	Drafted as a hospital ship and sunk by mine.	Folkestone
HMS Moldavia	1918	A British passenger ship serving as HMS Moldavia, sunk by submarine.	English Channel
Chasseur 6 & 7	1940	French anti-submarine warships, lost in Weymouth Bay, English Channel.	Weymouth Bay
UB-31	1918	German submarine lost in the Dover Barrage in May 1918.	Dover
UB-78	1918	German submarine, possibly hit a mine which blew her stern off in the Channel.	English Channel
UB-109	1918	German submarine lost by mine in the English Channel.	Folkestone

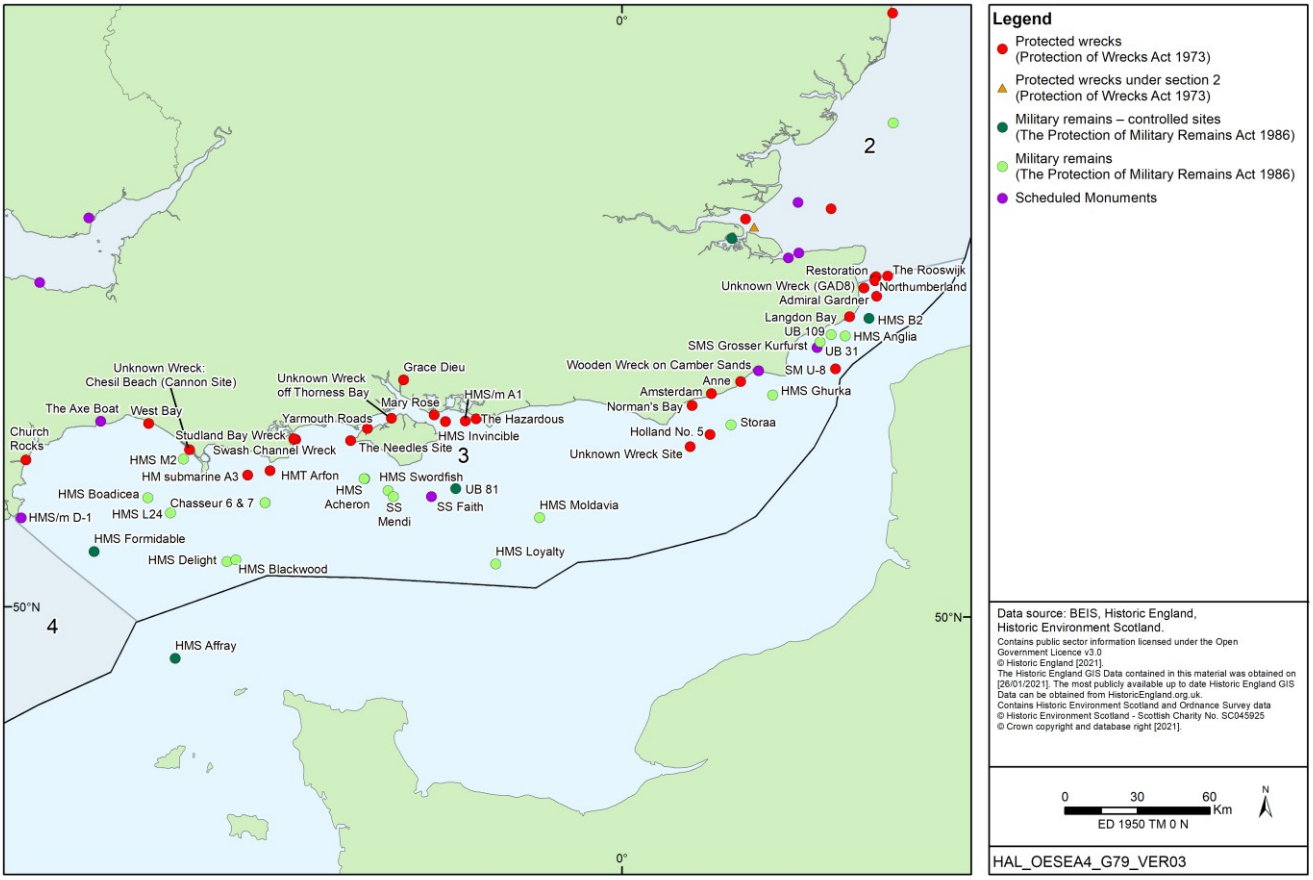
Notes: *=designated as a ‘protected site’ under the PMRA 1986 – no specific coordinate data is provided, only a named location. **=wreck is listed on the Heritage at Risk Register. Sources: the National Heritage List for England, Colledge & Warlow (2010), James *et al.* (2010), the *Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2019*

Table A1i.8: Maritime archaeological records categorised as 'wreck' or 'aircraft' for English Counties relevant to Regional Sea 3

Area	Number of losses		Summary of wreck sites
	Craft	Aircraft	
East Sussex	1,152	44	The earliest finds include a single prehistoric vessel at Hooe (though this is a terrestrial site), and a later Roman tile find off Hove. The number of records increase in the Medieval and later periods, peaking in Georgian (310) and Victorian (360) times. Modern (20th c. and later) wrecks account for 313 records.
West Sussex	551	33	The earliest Wreck record is for early Iron Age and/or Roman logboats, though these are associated with terrestrial waterways, albeit close to the coast. There are no other pre-Medieval marine records, and it is only for later Georgian (95) and Victorian (168) wrecks that records substantially increase. 20th century vessels (190) make up a substantial portion of the total shipwreck assemblage. The aircraft assemblage is dominated by world war two losses (27).
Hampshire	197	3	The record here starts in the Roman period with a single record for a find at Southampton. The number of records substantially increase for the Medieval (4) and post-Medieval periods (117), being dominated by Georgian (56) and later losses, peaking in the 20th century (66). The aircraft assemblage is dominated by world war two losses (2), with one additional, unidentified craft in Southampton Water.
Dorset	1,042	32	The earliest record is for a Palaeolithic craft, though this is located in the River Frome rather than in an intertidal or submarine area however indicates the longevity of the wreck record for this area. The next earliest record is for the Iron-Age, with few Roman (2) and later finds up until the Medieval period (14). Characteristically, Georgian (284), Victorian (319) and 20th century (337) records dominate the database. The aircraft assemblage is dominated by world war two losses (29).
Devon	2,077	16	The wreck record starts in the Bronze Age, though one other prehistoric record of uncertain age exists for a submarine forest at Thurlestone Sands. Other represented periods include Roman (3), Medieval (17), Tudor (12), Elizabethan (7), Stuart (33), with the record dominated by Georgian (534), Victorian (862) and 20th century (534) losses. Aircraft records are dominated by second world war (13) losses.

Notes: The number of records includes those which do not have definitive positions and records which relate to wrecks once recorded but now lost, or else excavated. Source: Historic England Heritage Gateway database

Figure A1i.5: Protected wrecks in Regional Sea 3



A1i.5.3 Archaeological sites in the coastal zone

For the Palaeolithic, Wymer (1999) provides a comprehensive overview and accompanying map data for Britain as a whole, and Fulford *et al*. (1997), Gale & Fenwick (1996) and Murphy (2014) provide an overview of coastal heritage sites in England. The following is a synthesis of the sections of these reports which are relevant to Regional Sea 3.

Relatively little is known about the prehistoric archaeology from Romney Marsh to Selsey Bill. Submerged forests are located between Hooe Level and Rye, and radiocarbon dating of a site at Hastings reveals a Neolithic date. Coastal erosion has revealed substantial bronze hoards and retreating cliffs are destroying many prehistoric (mainly Iron Age) sites. The area around the Solent holds more Palaeolithic sites than anywhere else in Britain, and occupation here took place in the Lower Palaeolithic (*ca.* 400-300kya) and perhaps earlier given the proximity of Boxgrove (dated to *ca.* 500kya) (Wymer 1999). 15,000 Palaeolithic artefacts are known to relate to the Solent, 8,500 of which are hand-axes (Wenban-Smith 2001), and a particular concentration of these has been found in and around the Bournemouth area, with locations such as Warsash near Southampton being particularly rich in finds (Wymer 1999). The Isle of Wight holds records for a Lower and Middle Palaeolithic occupation, the largest sites being at Priory Bay and Bleak Down, both producing substantial hand-axe finds. There are also less abundant finds to the east at Bembridge. There are many unstratified Mesolithic and Neolithic finds between Bouldnor and Hamstead which may partly be derived from offshore sources (Isle of Wight Archaeology & Historic Environment Service 2000, Tomalin *et al.* 2012). Murphy (2014) notes evidence of the Mesolithic is also concentrated in Dorset, particularly the Portland/Fleet and Southbourne/Hengitsbury headlands, and that Poole Harbour, Christchurch Harbour and the Fleet underwent embayment inundation and may include sediment sequences.

Research in Hampshire and West Sussex has revealed worked flint of (perhaps) Neolithic and later Bronze Age settlements – lithic scatters of Mesolithic and early Neolithic peoples are also present from Wootton Quarr. This location also holds a range of Neolithic and Late Bronze Age timber structures, including Neolithic trackways extending across the intertidal area, a Bronze Age long timber alignment building dating to 800BC at the mouth of Wootton Creek, and other smaller Bronze Age structures at Binstead (see Sturt & Van-de-Noort 2010, Tomalin *et al.* 2012).

Briquetage from the Middle Iron Age onwards is found scattered all along the coast (e.g. at Chidham in Chichester Harbour, Poole Harbour) which is indicative of salt production. Roman and Iron Age coins are found at a number of locations along the coast, consisting of both gold and silver metallurgy. Erosion at Selsey Bill has revealed substantial finds of high value, late Iron Age coins perhaps indicative of an oppidum (a late-Iron Age settlement with some urban qualities). Similarly, trading sites termed emporia are evidenced by high value finds, such as those located around Plymouth and Poole and possibly Selsey Bill, and major fortifications at Castle Dore and St Catherine's Point may also have been involved in trade of high-status goods for tin (Murphy 2014).

The Rapid Coastal Zone Assessment Survey for Dorset which includes Portland was subject to interpretation using the results of aerial survey as part of Historic England's National Mapping Programme (NMP). The project recorded 1,734 sites of which 1,303 were previously unrecorded (Royall 2014). The Island of Portland was involved in Late Bronze Age metal trade, and was probably a trading centre from the Iron Age, perhaps in wool, salt or finished artefacts made from Kimmeridge Shale (Taylor 2001). Many gold and silver coins and objects of status point to some degree of prosperity in the Late Iron Age here (Taylor 2001), however Royall (2014) notes that the early and later Medieval periods are generally poorly represented in Dorset, neighbouring Hampshire and southern England generally. Contemporaneous with the Iron Age was the Verne hill-fort, occupying the highest ground on the island, later destroyed by quarrying and the construction of a Victorian fortified citadel (Taylor 2001). Portland also has a much later industrial archaeology (post *ca.* 1750) totalling 400 sites of which less than half are currently recorded on the SMR (Stainer & Cox 2007). Royall (2014) indicates that post-Medieval sites have generally not been the focus of archaeological investigations in the Dorset area, with the NMP work for the area perhaps representing the first systematic appraisal.

A 'quarry' at Mixon Shoal lies well below the intertidal zone and may indicate the severity of erosion at Selsey Bill since Roman times. The Solent has comparatively few Iron Age or Roman finds. Of these there is the civitas capital at Chichester, the late Roman forts at Portchester and Bitterne. A villa at Gurnard, Isle of Wight has been eroding into the intertidal zone, and another at Wear Bay, Folkstone is threatened by erosion, and other Roman and Iron Age sites have been destroyed by cliff erosion. Limestone quarries at Wooten Quarr are responsible for a number of Roman structures on the Isle of Wight and mainland (e.g. the Roman fort at Portchester). First and Second century pottery was found offshore at Binstead and tile making is evidenced at Dell Quay, Chichester. Along the coast at Hengistbury head, substantial erosion has depleted the coastal resource (and presumably added to the submerged scatter of artefacts), and the harbour here was important for Iron Age cross channel trade. Poole Harbour is an important location for Iron Age/Roman archaeology, with an apparently substantial pottery and coincidental salt making industry.

On the southern coast there is relatively little intertidal evidence for the post-Roman period (Allen *et al*. 1997). In Suffolk, an eroded Saxon fort, possible monastery and Medieval castle are located at Walton, and other notable sites include a high status cemetery at Sutton Hoo

dating to the late 6th to early 7th centuries AD which overlooks the Deben Estuary (Murphy 2014). Harbours, quays and other coastal infrastructure from the historic to modern periods are accounted for in the HMR, and though often poorly recorded, there are thousands of such sites nationally (Murphy 2014).

The southern coast has a substantial array of defensive structures ranging from Napoleonic (1790-1815) to Second World War (1939-1945). Most of the defensive structures in the counties of East and West Sussex, Hampshire and Dorset date to the modern (i.e. post-1900) period, primarily consisting of pillboxes, tank traps and batteries.

A1i.6 Features of Regional Seas 4 & 5

A1i.6.1 Submerged heritage

The now extinct Channel River, evidenced by a substantial palaeo-valley network of channels covering the English Channel, may be a store for archaeological material in relict floodplain deposits, and faunal remains and lithic scatters which characterise finds further to the east (Hosfield 2007) may also reside in the western English Channel. Quaternary sediment infill of these relict channels may also have preserved some archaeological material. The last marine transgression may have substantially eroded and redistributed material deposited in the English Channel during the glacial low-stand, the preservation of these deposits *in situ* being controlled by local topographic and oceanic conditions. For the North Sea, Flemming (2004) states that even in areas subject to oceanographic conditions which are likely to have removed or destroyed the submerged archaeological record, isolated areas of protection can be generated by local topographic features at a scale of 20-100m.

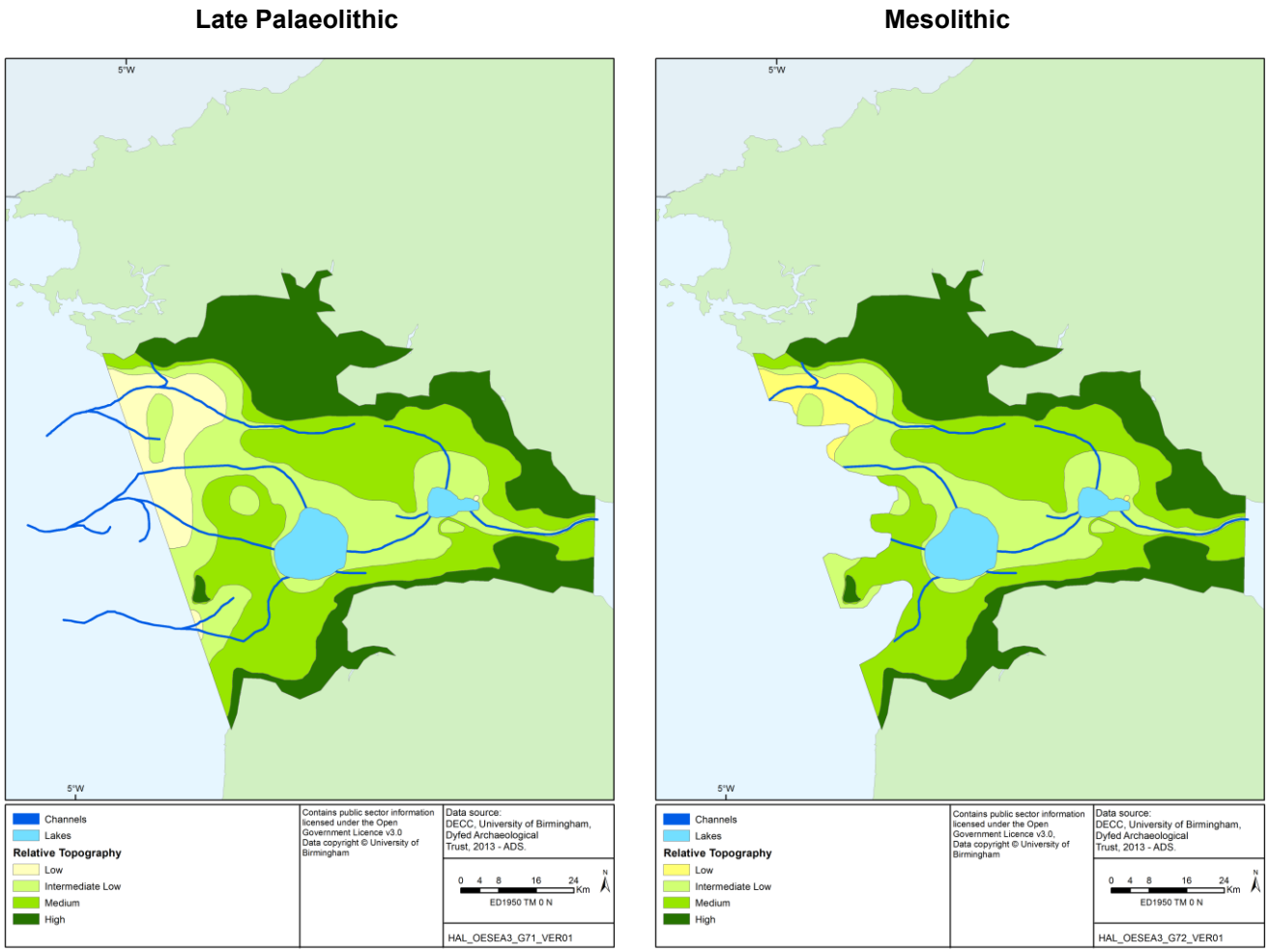
Several offshore finds of Bronze Age origin within the English Channel relevant to Regional Sea 4 are noted by Samson (2006, also see Parham *et al.* 2013). Sites are located 1.5km off Salcombe Bay, 600m to the east of this at Moor Sand, at Leas Foot beach, Devon, and 150m offshore of Chesil Beach. The artefacts are a mix of possible French and British types and include axes, swords and spearheads. It is proposed by Samson (2006) that many of these artefacts were intentionally redistributed by Bronze Age peoples, much like items were deposited in rivers and bogs in terrestrial situations, rather than having been lost while at sea or by natural transposition following cliff falls – though these would have undoubtedly added to the offshore record (Parham *et al.* 2013).

The Severn Estuary and Bristol Channel have a high potential yield of offshore archaeology. The large intertidal area of the Severn and the islands of Steep and Flat Holm, and Denny Island have probably provided protection for material deposited there for an extensive period of time. Like the English Channel, the Severn was free from water during glacial low stands, and the river was confined to a central channel, and a network of smaller channels associated with the Wye, Mathern Pill, Redfern, Usk and Rhymney developed which were later infilled with sands and gravels (Rippon 1996). There is low prospectivity of Palaeolithic sites being found in the Severn due to the paucity of finds elsewhere nearby, Mesolithic finds are more likely and these may extend across the entire area of the Severn. The Severn was studied as part of the West Coast Palaeolandscapes Project (Fitch & Gaffney 2011). Within the Severn, the landscape of the Upper Palaeolithic was largely tundra with a low diversity flora of herb and grassland, and later shrubs of juniper and willow as soils developed, and possibly some pioneer birch woodland. Vantage points from the high ground of which is now Somerset and South Wales and other areas such as Steep Holm would have provided good positions to hunt from. During the early Holocene, Mesolithic communities would have inhabited an area of

mixed deciduous woodland comprising hazel and elm, and a later closed canopy of oak, lime, alder and ash. Both in the Upper Palaeolithic and Mesolithic periods, the Severn would have had a number of large rivers, and also lakes (Fitch & Gaffney 2011). Late glacial and early Holocene reconstructions of the Severn environment are shown in Figure A1i.6.

By the Neolithic (*ca.* 6000 BP), the area would have been flooded by seawater and therefore archaeology from this and later periods in the offshore area is likely to be in the form of maritime craft and associated artefacts.

Figure A1i.6: Palaeolandscapes of the Severn



Source: Fitch & Gaffney (2011)

A1i.6.2 Wrecks

There are a large number of wrecks within Regional Sea 4 (Table A1i.10) including early Bronze Age finds, and later examples lost by a combination of weather-related events and conflict. Only some are charted and even fewer afforded protection (Table A1i.9, Figure A1i.7). The numerous losses associated with World War I and II are automatically considered as underwater cultural heritage, in line with the principles of the 2001 Convention on the Protection of the Underwater Cultural Heritage.

Numerous aircraft losses dating to WWII are likely to be represented off the south-west coast, though the current known resource listed in the SMR and Historic Environment Record (HER) is relatively small (Wessex Archaeology 2008a). Wessex Archaeology (2008b) indicates that there is a primarily coastal distribution of aircraft sites for the Isles of Scilly, south-west coast, and north along the Bristol Channel.

Table A1i.9: Protected wrecks within Regional Sea 4

Wreck name	Date of sinking	Summary of wreck sites	Location (WGS84) or approximate position
Protection of Wrecks Act 1973:Protected Wrecks			
Moor Sand	Middle Bronze Age	An assemblage of Middle Bronze Age weapons thought to represent part of a contemporary cargo and thereby indicative of a shipwreck. Dated to around the twelfth century BC, swords, palstaves, and other bronze materials have been recovered, thought to have been manufactured in France.	Area within 300m of 50° 12' 42'' N 03° 44' 20'' W
Salcombe Cannon Site	Mid 17th c.	Finds of cannon and timber fragments, which together with other finds (including a rich assemblage of gold artefacts) suggest a possible mid-seventeenth century wreck site, perhaps centred around 1636 to 1640.	Area within 250m of 50° 12.696' N 03° 44.679' E
Erme Ignot	Bronze Age	A scatter of tin ingots was found in 1991/2 near West Mary's Rocks. The range of shapes and weights suggest they were made before 1000 BC, but the method of working suggests that they may be as early as the Bronze Age.	Area within 250m of 50° 18.15' N 03° 57.41' W
Erme Estuary	Medieval and Bronze Age	Remains believed to be of more than one wreck on Mary Reef indicated by a cannon assemblage containing material ranging from the fifteenth- to the eighteenth centuries, one of which is dated after 1490 to 1550, another cannon being a Swedish finbanker dated 1690 to 1750.	Area within 250m of 50° 18.41' N 03° 57.19' W
Smalls	uncertain	The findspot of an important Viking sword guard of 11th century date, on the trade route between Viking Dublin and Denmark.	Area within 100m of 51˚ 43.18' N 05˚ 40.13' W
Gull Rock	15th/16th c.	Remains of a wreck thought to be of 15th to 16th century date indicated by an assemblage of cannon and shot on the site.	Area within 100m of 51° 11.11' N 04° 39.41' W
St Anthony	early 16th c.,	Remains of a Portuguese carrack which was beached on Loe Bar after breaking from her anchors, while en route from Lisbon to Antwerp with a general cargo (copper and silver, cloth, linen, cannon, pitch, tar, musical and navigational instruments, and candlesticks).	Area within 150m of 50° 03.336' N 05° 16.912' W
Cattewater	Early 16th c.	The keelson of what appears to be an early sixteenth-century vessel was recovered during dredging operations in 1973.	Area within 50m of 50° 21.690' N 04° 07.625' W
Bartholomew Ledges	16th c.	Remains of what is thought to be a mid-sixteenth to early-seventeenth century armed cargo vessel. It is thought to be of Iberian origin.	Area within 150m of 49° 54.364' N 06° 19.889' W
Rill Cove	early 17th c.	Remains of wreck of cargo vessel thought to be that of a Spanish cargo vessel.	Area within 100m of 49° 58' 31''N 05° 14' 26''W

Wreck name	Date of sinking	Summary of wreck sites	Location (WGS84) or approximate position
Loe Bar	possibly 1684	The remains of a seventeenth-century armed cargo vessel, thought to be identifiable with the English East Indiaman President, which stranded near Loe Bar in 1684. Homeward bound from India to London, she was carrying spices, indigo, drugs, Indian piece goods (i.e. textiles), pepper, and jewellery.	Area within 250m of 50° 3.778' N 05° 17.374' W
Schiedam	1684	Remains of an English transport vessel, which stranded at Jangye-ryn during a gale in 1684, en route from Tangier to England, carrying passengers, horses, stores, machinery and cannon. She had formerly been a Dutch fluit in the Dutch East India service until that same year.	Area within 75m of 50° 02.333' N 05° 16.400' W
Coronation (inshore and offshore)	1691	Inshore: inshore section of an English Second Rate warship which sprang a leak and capsized on returning to Plymouth from a Channel patrol.	Area within 250m of 50° 18.96' N 04° 11.98' W
		Offshore: offshore section of same vessel	Area within 150m of 50° 18.57' N 04° 11.57' W
Association	1707	Remains of 1707 wreck of British second rate ship of the line, which foundered after grounding on the Gilstone Rocks, homeward-bound to Portsmouth from Toulon and Gibraltar.	Area within 50m of 49° 51.73' N 06° 24.50' W
Tearing Ledge	1707	May be the remains of one of a number of ships belonging to Sir Cloudisley Shovell's fleet which struck the Western Rocks, Isles of Scilly, on 22-23 October 1707. Despite being designated as the 50-gun fifth-rate Romney, the wreck is most likely to be that of the Eagle, a 70-gun third-rate, or indeed parts of both.	Area within 200m of 49° 52.200' N 06° 26.483' W
Royal Anne	1721	Remains of a British galley which stranded on the Stag Rocks after being forced to return to Falmouth in severe weather conditions. She was outward-bound from Portsmouth to Barbados.	Area within 200m of 49° 57.48' N 05° 12.99' W
Hanover	1763	1763 wreck of an English brigantine which stranded in Hanover Cove (subsequently named after the wreck) in a gale en route from Lisbon to Falmouth.	Area within 250m of 50° 20.075' N 05° 10.823' W
HMS Colossus	1798	Stern section. Stranded on Southward Wells on her voyage from Naples to Portsmouth with Etruscan pottery.	Area within 800 x 300m at 49° 55.471' N 06° 20.505' W
Iona II	1864	Remains of 1864 wreck of American paddle steamer which foundered off Lundy in foggy conditions, having left the River Clyde for her first transatlantic voyage via Madeira to Kingston in Jamaica and/or Nassau.	Area within 50m of 51° 11.086 'N 04° 38.859 'W
Wheel Wreck	late 19th c.	Remains of wreck of cargo vessel thought to be of mid nineteenth-century date. Site comprises a cargo of mining equipment but there appears to be little evidence of the structure of the ship from which it came.	Area within 75m of 49° 56.445' N 06° 16.381' W

Wreck name	Date of sinking	Summary of wreck sites	Location (WGS84) or approximate position
HMT Arfon	1917	Well-preserved remains of a trawler requisitioned by the Royal Navy on the outbreak of war that struck a mine and sank on 30th April 1917 with the loss of ten lives.	Area within 50m of 50˚ 32.5' N 02˚ 03.5' W
Ancient Monuments and Archaeological Areas Act 1979: Scheduled Monuments			
Louisa	*ca.* 19th c.	The vessel represents a transitional period in shipbuilding between timber and iron. It is likely that the square-rigged Louisa was used originally used in the transatlantic timber trade bringing Canadian timber to Bristol and Bideford.	Scheduled area 60m x 40m centred on NGR ST 181 740
Wreck at Westward Ho!	late 18th c.	The wreck of a pre-1840 wooden sailing vessel thought to have been built in the mid- to late 18th century and wrecked at Westward Ho!	NGR SS 43130 29780
Wreck off Northam Burrows	mid 18th to early 19th c.	The wreck of a wooden sailing vessel, likely to be a Severn trow (a locally distinctive coastal sailing vessel of south-west England).	NGR SS43271 29956
Wreck at Minehead, possibly the Bristol Packet	1808	The remains of a wooden sailing vessel of late 18th to early 19th century date, located in the inter-tidal zone at Madbrain Sands, Minehead, Somerset, and believed to be the remains of the Bristol Packet, lost in 1808.	NGR SS98513 46734
SS Faith	1855	Remains of 1855 wreck of A cargo vessel just sold to the Turkish Government which foundered after springing a leak in heavy weather. Constructed of iron in 1852, she was propelled by both steam and sail, and had served as a Crimean War troopship.	NGR SZ63043 62480
HMS Montagu	1906	HMS Montagu (ex-Montague) was a five-year old 14,000 ton battleship that stranded in shallow water off Shutter Point, Lundy Island, without loss of life, on 30 May 1906. The Montagu is the only survivor of six Duncan class pre-Dreadnought battleships of the Royal Navy within north European waters.	NGR SS13114 43372
South Australian	1889	A composite-hull clipper ship that voyaged annually between London to South Australia for about 20 years. It was built at North Sands, Sunderland, 1868 and sank on 14th February 1889 while on a new passage from Cardiff to Rosario, Argentina, loaded with railway track and rail fishplates.	NGR SS18315 49245
Protection of Military Remains Act 1986: Controlled Sites			
HMS A7	1914	Failed to surface on exercise in Whitsand near Plymouth, cause unknown.	200m exclusion zone centred on 50˚ 18.518' N 04˚ 17.984' W
Protection of Military Remains Act 1986: Protected Sites*			
UB-65	1918	-	Padstow, Cornwall
HMS M1	1925	Originally constructed in 1915 as one of a series of submarine coastal monitors.	Start Point, Devon

Wreck name	Date of sinking	Summary of wreck sites	Location (WGS84) or approximate position
HMS Warwick	1944	"V/W" class destroyer sank by U-413 off Cornwall.	Trevose Head, Cornwall
HMS Mourne	1944	"River" class frigate sank by U-767 in the English Channel.	Lizard Point, Cornwall
U-1018	1945	German patrol submarine foundered after being depth-charged by HMS Loch Fada.	Penzance, Cornwall
HMT Kurd	1945	The wreck of British trawler which foundered after being mined while on Admiralty minesweeping duties.	Lizard Point, Cornwall
HMS Vervain	1945	"Flower" class vessel, sank by U-1208 south of Ireland.	Waterford, Ireland
SS Armenian	1915	A cargo ship torpedoed by U-24.	Off Cornwall
HMT Ullswater	1942	A trawler used on convoy escort duties in World War 2, torpedoed by E-boats	Plymouth
U-1063	1945	-	English Channel

Notes: *=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data is provided, only a named location. Source: the National Heritage List for England, the Coflein database, the *Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2019*, Colledge & Warlow (2010), MoD (2001)

Figure A1i.7: Protected wrecks in Regional Sea 4

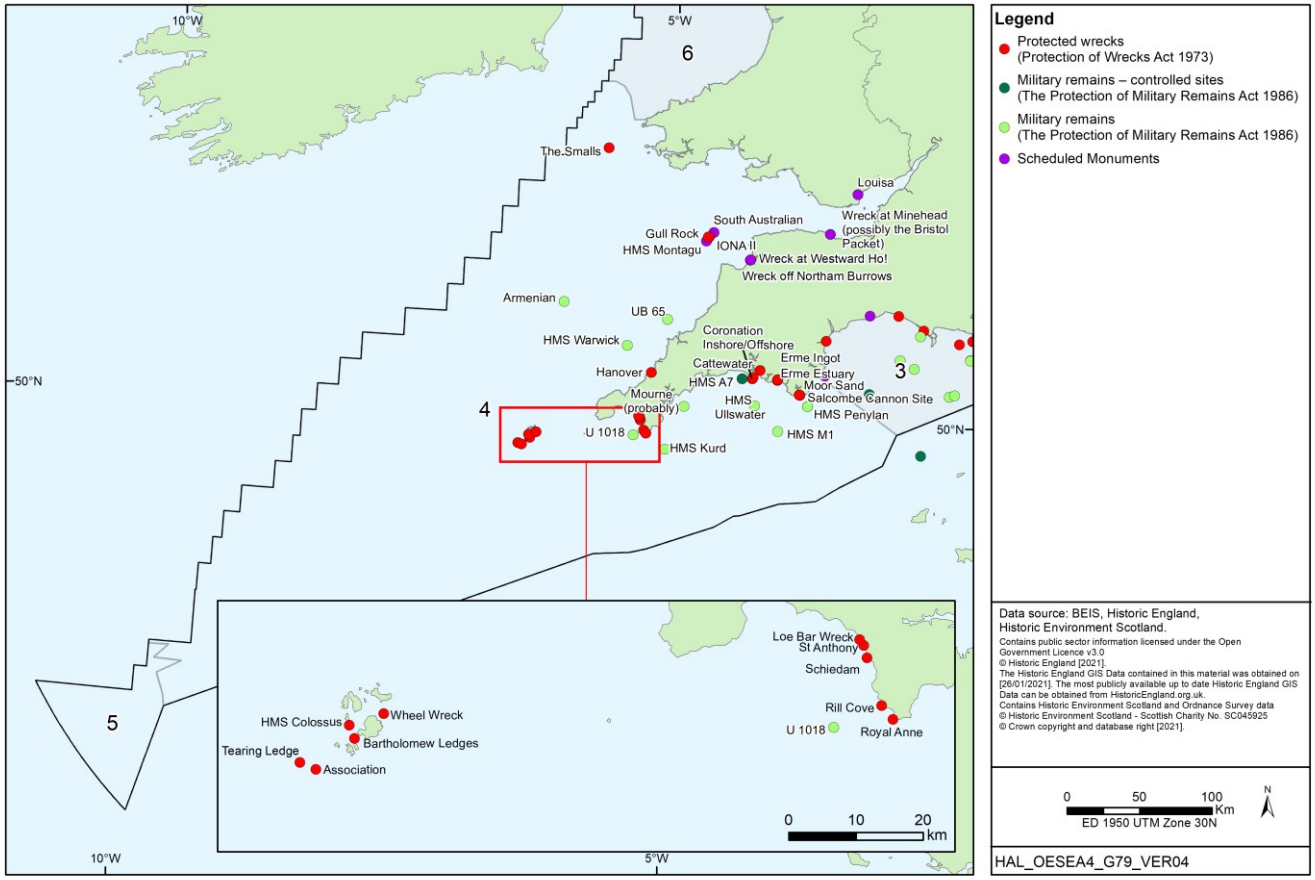


Table A1i.10: Maritime archaeological records categorised as 'wreck' or 'aircraft' for English Counties and Welsh Unitary Authorities relevant to Regional Sea 4

Area	Number of wrecks		Summary of wreck sites
	Craft	Aircraft	
Devon	2,077	16	The wreck record starts in the Bronze Age, though one other prehistoric record of uncertain age exists for a submarine forest at Thurlestone Sands. Other represented periods include Roman (3), Medieval (17), Tudor (12), Elizabethan (7), Stuart (33), with the record dominated by Georgian (534), Victorian (862) and 20th century (534) losses. Aircraft records are dominated by second world war (13) losses.
Cornwall	4,121	22	A single Bronze Age logboat represents the prehistoric wreck record. Later records include those from the Medieval (46), Tudor (90), Elizabethan (65), Stuart (131), with the record dominated by Georgian (1,041), Victorian (1,540) and 20th century (1,136) losses. Aircraft records are dominated by second world war (19) losses.
Somerset	192	3	The earliest finds are Iron Age logboats, found in terrestrial contexts. Medieval (4) vessels initiate the maritime record, with later periods represented: Tudor (8), Stuart (16), Georgian (33), Victorian (63) and 20th century (58). Aircraft records are dominated by second world war (2) losses.

Area	Number of wrecks		Summary of wreck sites
	Craft	Aircraft	
Isles of Scilly	798	19	The earliest wrecks date to the Medieval period (2), with the number of wrecks representing later periods progressively increasing, though declining in modern periods: Tudor (3), Elizabethan (1), Stuart (40), Georgian (333), Victorian (257) and 20th century (145). Aircraft crash sites date exclusively to the second world war.
Gloucestershire	104	-	Wreck records are few, starting in the Medieval period (2), and with later periods represented: Tudor (3), Stuart (1), Georgian (8), Victorian (13) and 20th century (14).
Wales*	129	1	Almost exclusively 19th and 20th century wrecks.

Source: Historic England Heritage Gateway, the Coflein database

Notes: *includes Newport, Cardiff, The Vale of Glamorgan, Bridgend, Neath Port Talbot, Swansea, Carmarthenshire and Pembrokeshire. The number of records includes those which do not have definitive positions and records which relate to wrecks once recorded but now lost, or else excavated.

A1i.6.3 Archaeological sites in the coastal zone

The Palaeolithic period is poorly represented on the southern coast and north from Land's End to Gloucester, partly due to the paucity of work that has been carried out there and partly due to the hard rocked nature of the south Devon and Cornwall coastlines (Bradley *et al*. 1997). Grant *et al.* (2019) suggest the potential for submerged archaeology to be present, for example due to Pleistocene fauna recovered from Bideford Bay . No finds dating to the Palaeolithic are known for the Isles of Scilly, however there is evidence of occasional visits from the mainland during the Mesolithic (Murphy 2014). A peat sequence from Oldbury-on-Severn dates animal and possibly human footprints to 5,310±70 BP, and evidence of the burning of reed swamp between 5,500-4,000 BC, and occupation up to at least 2,840-2,138 BC at which time peat development ceased, is also present in the area (Murphy 2014).

The extreme cliff coasts of Devon and Cornwall result in few finds, and some archaeology has probably been lost in cliff falls. The dominant signature of the Mesolithic in the area is lithic scatters, with key find spots in the areas of Croyde, Mortohoe, Westward Ho!, Gwithian, Penwith and the Constantine Bay (Trevose Head). Erosion threatens many early flint scatters, promontory forts and Iron Age cliff castles. Neolithic finds include those from the foreshore at Oldbury, Hills Flats and the shingle at Blackstone Rocks (Bradley *et al*. 1997). Later Bronze Age finds include an important site located in blown sands at Gwithian and Brean Down, which also has evidence for salt making. The Bronze Age is also represented in Cornwall and Devon by numerous sites of occupation or in the form of barrows (burial mounds) and field systems (Christie 1986, Hegarty *et al.* 2014). There are numerous submerged forests near Fowey, Looe, Falmouth, Porthleven, St Ives, Porlock and Minehead – the latter two have associated flint artefacts of undetermined age (Bradley *et al*. 1997).

The Isles of Scilly have been heavily influenced by sea-level rise and coastal erosion, and a great deal of the former terrestrial archaeological resource has been lost to the open sea. The problem with much of the prehistoric archaeology is the lack of a secure dating framework (Bradley *et al*. 1997). Some field walls which have received considerable interest may date from the Bronze Age to the Roman period. It has been traditionally conceived that the islands were not settled until the Neolithic period, though any coastal Mesolithic settlement would have rested on its contemporaneous coastline, being submerged in the early Holocene (Johns *et al*.

2004). There is some evidence in the form of lithic scatters from Old Quay, St Martin's and it is probable that Mesolithic people at least visited the area. The lithic assemblage has its closest typological affinity with northern France, Belgium and the Netherlands, rather than British microlith forms, and therefore provides some insights to maritime travel at the time (Anderson-Whymark *et al.* 2015). Neolithic finds include handaxes, flint arrowheads and a number of settlement sites (Porthkillier, St Agnes, Bonfire Carn, Bryher, Halangy Porth). The Bronze Age is more clearly represented with potentially 150 hut circles attributed to this period (though only few have been dated) lying within or by field systems. Numerous funerary and ceremonial sites are located on the islands, including more than 80 entrance graves and more than 400 simple cairns (Johns *et al*. 2004).

The south coast of Wales holds some of the oldest Palaeolithic sites in Britain. Occupation of Pontnewydd cave (Aldhouse-Green *et al*. 2012) has been dated to as early as 225,000 BP (MIS7) and indicates that Lower-Middle and later Palaeolithic people (*Homo neanderthalensis*) had occupied this area within (possibly) multiple interglacial periods. Occupations at 50 ka and 25 ka BP have been noted (Lynch *et al*. 2000) at Coygan Cave and Paviland Cave respectively. Hoyle's Mouth, Cathole on Gower, Nanna's Cave, Potter's Cave and Priory farm Cave all date to within the Palaeolithic period (Murphy 2002) and excavations at Eel Point reveal a human humerus dating to 24,470 ±110 BP, representing the oldest anatomically modern human in Britain (Schulting *et al*. 2005). More recent excavations at Foxhole Cave, south Wales, reveals occupation in the late Mesolithic and early Neolithic, and possibly earlier, in addition to a range of Pleistocene faunal remains (Schulting *et al.* 2013). Prehistoric peats and palaeochannels have been recorded in the banks of the Severn Estuary are also found to contain flint artefacts and evidence of prehistoric settlements (Mullin *et al*. 2009). Intertidal peats are found extensively throughout the south-west coast (e.g. Falmouth, Padstow, Westward Ho!) and the Severn Estuary; most of these probably date from the end of the marine transgression and provide an excellent environmental context for the preservation of archaeological remains and paleoenvironmental evidence (Bell 1997).

Intertidal sediments at Goldcliff East contain an important collection of human and animal footprints which are dated to as early as 7,500 cal BP. Over 270 human footprints have been recorded, many of which were made by children, along with animals including deer, aurochs, wolf or dog, and shore birds (Bell 2007, Scales 2007). Barr & Bell (2016) focus on Bronze Age intertidal ungulate footprint-tracks at Redwick and Goldcliff East and the Late Neolithic site of Oldbury, along with other data, to help interpret seasonal animal husbandry patterns. Other human footprint sites include those later Mesolithic examples at Uskmouth and Magor Pill (Aldhouse-Green 1993), and likely Neolithic examples Kenfig (Bennet *et al.* 2010).

A comprehensive review of Bronze Age activity in the Severn is provided in Bell (2013), who interprets seasonal exploitation of coastal wetlands for grazing, fishing and salt production, with an intensification of use in the middle Bronze Age (Murphy 2014).

During the later Medieval period, numerous towns grew along the coast and Milford Haven's natural harbour became a prominent centre and muster point for Irish invasion. Little evidence of maritime trade remains and there are no jetties and quays dating to this period (though this may be a reflection of continuous occupation). Numerous examples of Medieval and post-Medieval fish traps are present along the Severn Estuary coast, for instance in Swansea Bay. With the exception of Milford Haven, the Welsh coast, unlike southern England, was largely free from coastal defences until the Second World War, and defences from this period occur all along the southern Welsh coast from Pembrokeshire in the west to Monmouthshire in the east, most of which comprise sea defensive structures (e.g. pill boxes, anti-tank traps/cubes and observation posts) in addition to air fields, radar stations, anti-aircraft and coastal gun batteries

(Murphy 2002). Pillboxes and other 20th century fixed coastal defences are ubiquitous along England's southern and western coast, particularly those dating to the Second World War (see: Osborne 2004, 2008 for a review).

A1i.7 Features of Regional Sea 6

A1i.7.1 Submerged heritage

Coastal areas are likely to have featured as settlements for early people as part of a subsistence strategy which afforded both marine and terrestrial food sources in the Palaeolithic, Mesolithic and later periods, though little is known about the practical activities which took place on the prehistoric coastline (Allen *et al*. 1997). Additionally, much like in the English Channel and North Sea, exposed shelf areas of the Irish Sea are likely to have been occupied prior to the last marine transgression and therefore there is the possibility that sites dating back to the Palaeolithic period are present where suitable taphonomic conditions allow (Flemming 2005).

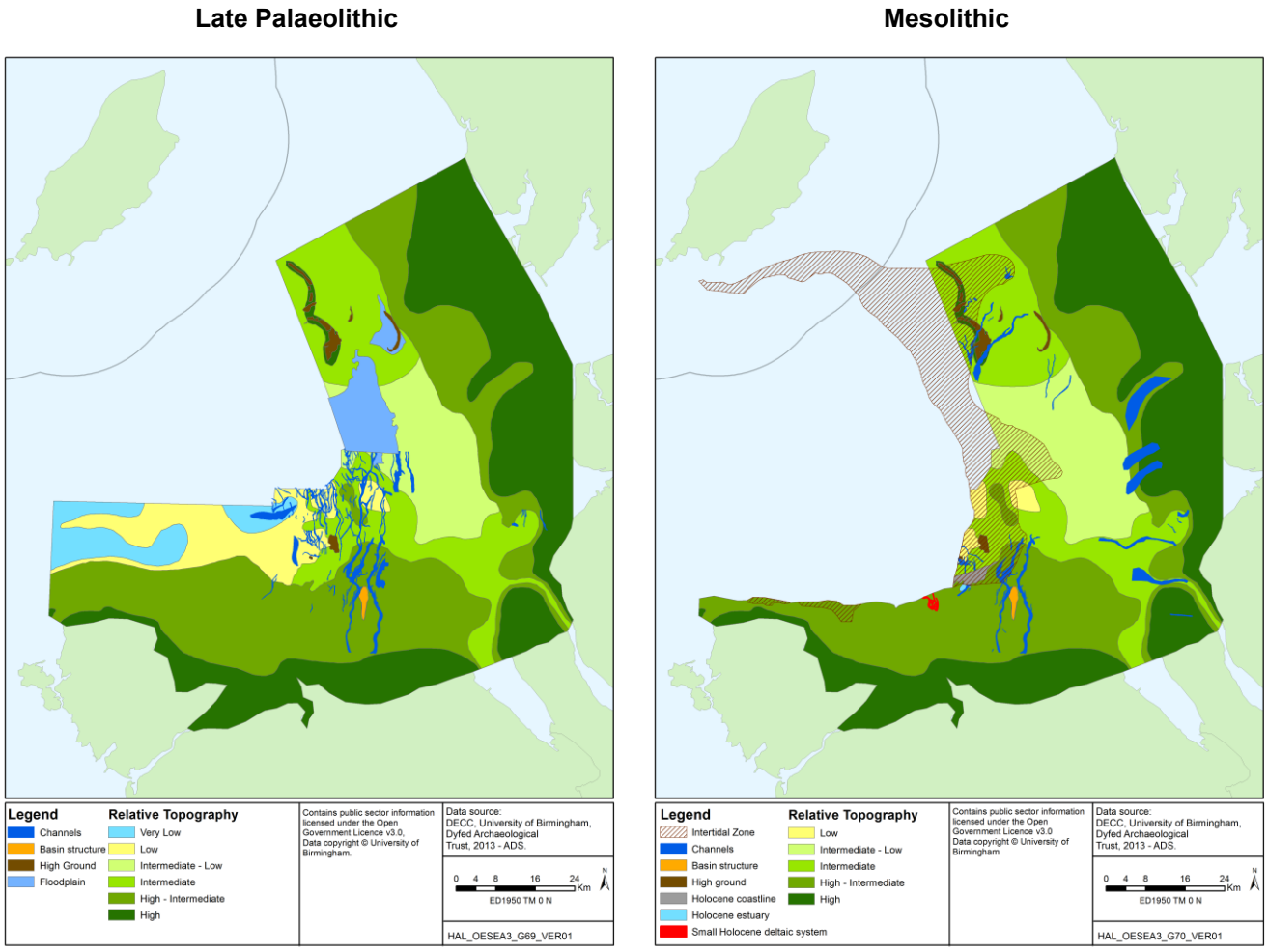
Evidence of post-glacial sea-level rise is provided by submerged forest and peat which was once part of the terrestrial landscape (e.g. Carmarthen Bay, Cardigan Bay, Llandudno, see Jones 2002). Loss of coastal areas would have been most significant up to the point at which eustatic sea-level change reduced, coinciding with the early Neolithic. If structural remains are to be found offshore, they are likely to be of this and earlier periods (e.g. Palaeolithic, Mesolithic).

Liverpool Bay was studied as part of the West Coast Palaeolandscapes Project (see Figure A1i.8), and the following summary is based on that in Fitch & Gaffney (2011), also see Gaffney & Fitch 2019). During the late glacial period, the area would have been characterised by peri-glacial conditions still with permafrost which would have limited soil and floral cover and development, with a landscape characterised by glacial landforms such as moraines and drumlins which would have provided elevated views advantageous to hunting. Kettle holes would have provided watering holes for humans and animals if not frozen, and rivers are likely to have had large braided channels and have been dynamic. Liverpool Bay continued to change rapidly during the Mesolithic, and though soils began to develop these were poor, with some woodland succeeding pioneering vegetation. Inundation by rising sea-levels would have proceeded rapidly, and outer areas would have had an extensive intertidal area. Rivers would have less energy at this time, and there are several channels which may be related to the course of the modern Mersey and Dee for which Mesolithic settlement has been associated, and river channels would have provided corridors to move through the former landscape of Liverpool Bay.

The visibility of Ireland from the mainland would have made it a target for early seafaring and therefore losses of Palaeolithic (possibly) and later craft, in the Irish Sea. Successive glaciations, marine transgression and subsequent oceanic and fluvial activity are likely to provide poor preservational conditions for Palaeolithic maritime and terrestrial artefacts, and their recovery potential is very low. Late-upper Palaeolithic peoples may have reached Ireland either via a land bridge (discussed above) or early seafaring, though these are unproven by any archaeological remains (Wessex Archaeology 2005, O'Sullivan & Breen 2007). The high energy, rocky coast around Northern Ireland and harsh climatic conditions reduce the preservation potential of wrecks, especially those constructed of wood (Quinn *et al* 2000).

In the Mesolithic, hide covered, or more likely dugout boats, may be potential finds in the marine/intertidal area. Near shore navigation or perhaps longer journeys to Ireland would have taken place in Mesolithic times (Pickard & Bonsall 2004) and the density of coastal Mesolithic archaeology in Northern Ireland (see: O'Sullivan & Breen 2007 for a review) is a probable indication of early Holocene seafaring. In addition, movements around Arran (Affleck *et al*. 1988), Kintyre (Finlayson & Edwards 2003) and the Isle of Man are evidenced by Mesolithic finds. Johnstone (1980) indicates that gadid remains point to deep-sea fishing from ocean-going craft at this time – though cod can equally be caught in coastal waters in winter months around the UK (also see Pickard & Bonsall 2004). The possibility of finding craft is conjectural, as none relating to the Mesolithic period have been found in Regional Sea 6 (Wessex Archaeology 2005). By the Neolithic, seafaring was being used for trade as well as subsistence and navigation and this is likely to have seen losses in the Irish Sea of artefacts and vessels. Dugout boat technology continued, inter alia, until the Bronze Age where sewn plank boats are likely to have become prevalent, though no remains are currently available for Regional Sea 6 (Wessex Archaeology 2005).

Figure A1i.8: Palaeolandscapes of Liverpool Bay



Source: Fitch & Gaffney (2011)

A1i.7.2 Wrecks

For the Welsh coastal area, a survey and desk study by Edwards (2002) indicated a total of 91 coastal (including intertidal and beach areas) wrecks, exclusive of those indicated on the HMR. For Northern Ireland, Quinn *et al*. (2000) and Breen *et al.* (2007) provide an overview. Despite a record of 2,600 wrecks having built up in recent years (NIEA 2011), there is a potentially large undeveloped wreck resource in these waters. Searches of country agency records

reveal a high number of recorded archaeological 'wreck' sites (Table A1i.12). Of these, 9 are protected (Table A1i.11, Figure A1i.9).

Material from Iron Age and Roman contexts indicates the probability that hide-covered boats were in use and that during the Roman period, despite there being no Roman occupation of Ireland, trade links were maintained between the western British coast and Ireland (for instance at Drumanagh coastal promontory, O'Sullivan & Breen 2007). Ireland was important during the Viking period and there would have been trade with the Wirral. Losses of Viking ships in addition to the continued use of logboats (for instance in Tyrone and Armagh) mean that these may now be part of a submerged archaeological resource. Vessels from the Medieval and later periods would have been associated with trade of (amongst others) fish, salt, slate and coal, in addition to later military campaigns of (for instance) the Norman and French invasions, for which there would be a substantial wreck resource (Wessex Archaeology 2005, see below).

Table A1i.11: Protected wrecks within Regional Sea 6

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
Protection of Wrecks Act 1973: Protected Wrecks			
Pwll Fanog	Medieval (late 15th century)	A slate carrying cargo vessel from around 14th or 15th century. The slates were from the Llanberis area, split with a gouge and stacked into the wooden vessel which survives beneath its heavy cargo. This gives important information about the North Wales slate industry in late medieval periods.	Area within 300m of 53˚ 12'46" N 04˚ 11'43" W
Royal Yacht Mary	1675	The 'first British yacht', built by the Dutch East India Company and given to King Charles II on his restoration	Area within 100m of 53˚ 25'16" N 04˚ 36'40" W
Tal-y-Bont	*ca.* 1702	A merchant vessel with a cargo of Carerra marble from Italy. Well armed with 18 main battery, 8 smaller cast iron and 10 wrought iron guns, the wreck has been partially excavated to reveal her bell, and a multitude of navigational and domestic artefacts. Sunk on the treacherous Sarn Badrig.	Area within 300m of 52º 46' 41" N 04º 07' 24" W
Resurgam	1880	The world's earliest extant powered submarine, Resurgam was designed by Rev Garrett in 1879 and built by J T Cochrane in Birkenhead. Sank 15 miles off Rhyl on the way to Portsmouth for naval trials.	Area within 300m of 53˚ 23.78' N 03˚ 33.18' W
Diamond	uncertain	A 19th century composite wreck built of wood with copper sheathing, but with iron strengthening to the frame, with two large water tanks. The recently discovered ship (close to the Tal-y-Bont wreck) is unexcavated, so her cargo and form and even her identity is uncertain.	Area within 300m of 52˚ 46.531' N 04˚ 11.025' W
SS Castillian**	1943	Ran aground on the East Platters. The main cargo of copper ore and explosives remains on the wreck site.	Area within 500m of 53° 25.0101' N 04° 35.918' W

Wreck name	Date of sinking	Summary of wreck sites	Position or Named Location
Ancient Monuments and Archaeological Areas Act 1979: Scheduled Monuments			
Paddle Steamer Lelia, Liverpool Bay	1865	One of a small group of marine and other heritage assets associated with British involvement in the American Civil War. Leaving Liverpool for Bermuda on its maiden voyage on 14th January 1865, the Lelia foundered in Liverpool Bay as a result of the force of the weather, with the loss of forty-seven lives.	NGR SJ08270 99882
Protection of Military Remains Act 1986: Controlled Sites			
HMS H5	1918	Sunk after collision with the British cargo ship SS Rutherglen off the north west coast of Wales.	300m exclusion zone centred on 53° 05.483' N 04° 41.975' W
HMS Dasher	1943	An escort carrier lost in the Clyde during exercises in World War II when a fuel explosion occurred during deck/landing operations.	300m exclusion zone centred on 55° 37.747' N 05° 00.953' W
Protection of Military Remains Act 1986: Protected Sites*			
U-87	1917	Lost by depth-chage, shelling and ramming following its torpedoing of a liner bound for Liverpool.	Irish Sea

Notes: *=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data is provided, only a named location. Source: Historic Marine Protected Area Records, the National Heritage List for England, the CANMORE database, the *Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2019*, Colledge & Warlow (2010), Cadw "Wrecks of Wales" webpage

Figure A1i.9: Protected wrecks in Regional Sea 6

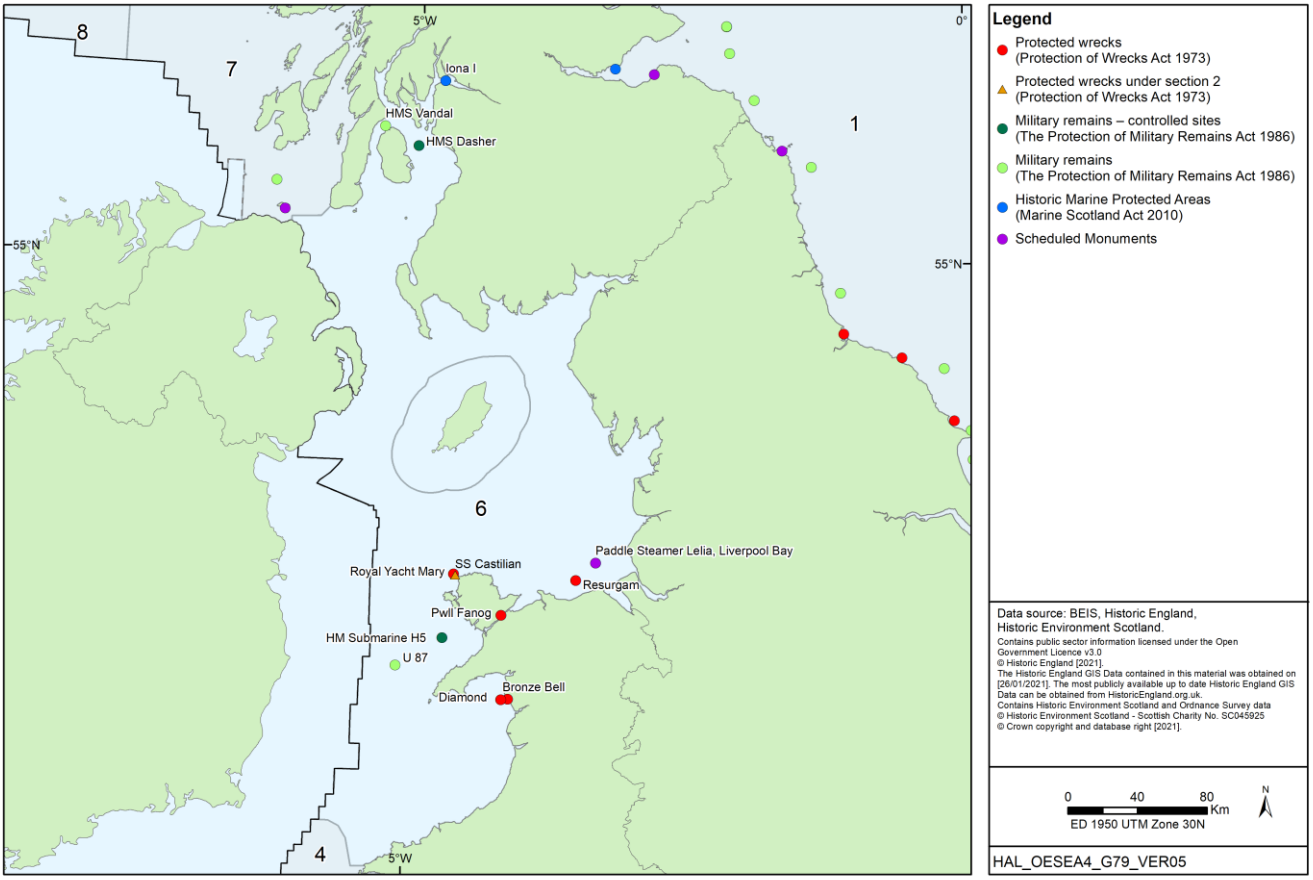


Table A1i.12: Maritime archaeological records categorised as 'wreck' or 'aircraft' for English Counties, Scottish Councils, Welsh Unitary Authorities and Northern Ireland relevant to Regional Sea 6

Area	Number of wrecks		Summary of wreck sites
	Craft	Aircraft	
Wales*	233	3	Wrecks largely comprise later 19th and 20th century losses.
Northern Ireland	2,600	?	Bias towards improved reporting post-1800. Oldest recorded wreck in Northern Irish waters is a Spanish vessel, *La Girona*, dating to 1588 (Regional Sea 6). Earlier wrecks are possible but are yet to be discovered.
Cheshire	162	0	The wreck record commences in the Roman or later Medieval period, interpreted from a number of logboats recorded in the area. The Medieval period is represented by relatively few vessels (5), with vessels attributed to one or more of the Georgian (50) and Victorian (40) periods making up much of the record. Later 20th century wrecks (40) appear to largely be losses through strandings and losses in poor weather conditions.
Lancashire	458	1	The earliest wrecks are interpreted to be Bronze Age logboats, with later wrecks attributed to the Georgian (166), Victorian (176) and 20th century (89) dominating the record.

Area	Number of wrecks		Summary of wreck sites
	Craft	Aircraft	
Cumbria	492	28	The earliest definitively dated wrecks in the area are from the Medieval period (6). Wrecks dating from the Georgian (184), Victorian (181) and 20th century (88) dominate the record. 20th century vessel losses tend to be due to losses through strandings, with the WWII record dominated by aircraft rather than shipping losses.
Dumfries and Galloway	2,225	87	The wreck record for the area reflects the dominance of the Clyde which has always presented hazards to shipping. Known build dates for vessels in south-west Scotland ranges from 1795-1950, however Glasgow is known to have been an important port from the Medieval period, so earlier wrecks are possible. Cargo steamships and fishing vessels dominate the wreck record, including those requisitioned by the Navy in WWII. Other 20th century wrecks can be more directly attributed to military activity, including a number of submarines of both British and German origin. Sailing vessels are also represented, most built in the period 1850-1913, though with a few dating to pre-1850.
South Ayrshire	980	89	
North Ayrshire	1,117	49	
Argyll & Bute	3,974	117	

Notes: *includes Pembrokeshire, Ceredigion, Gwynedd, Conwy, Denbighshire, Flintshire, Isle of Anglesey. The number of records includes those which do not have definitive positions and records which relate to wrecks once recorded but now lost, or else excavated. Source: Historic England Heritage Gateway, the Coflein database, the CANMORE database, NIEA (2011), Lancaster (2012)

A1i.7.3 Archaeological sites in the coastal zone

The following summary primarily from Bradley *et al*. (1997), Murphy (2002, 2014), Hodgson & Brennand (2004), Flemming (2005) and O'Sullivan & Breen (2007) provides an indication of the extent of the coastal archaeological resource of Regional Sea 6.

There are no lower and middle-Palaeolithic finds for north-west England, and only sparse evidence for the upper-Palaeolithic – many of these sites have a typology mixed with later artefacts (Hodgson & Brennand 2004). The most definitive sites are Kirkhead Cave (*ca.* 11,000-9500 BC) and High Furlong in the Fylde (13,500-11,500 cal BC) though excavations from other caves (Lindale Low, caves at Blenkett Wood, Bart's Shelter on the Furness Peninsula) have produced late upper-Palaeolithic finds (Hodgson & Brennand 2004). Palaeolithic finds from Wales for the Regional Sea 6 area are very few, but very early. Late Palaeolithic finds have been found in Kendrick's Cave, the Great Orme (Conwy), consisting of four burials and a decorated horse mandible, the latter dating to 10,000 ± 200 BP (Murphy 2002). Nearby at Ogof Tan y Bryn, flints dating to *ca.* 12,000 BP have been recovered. No definitive Palaeolithic record exists for Northern Ireland (Flemming 2005), and that for Scotland is inconclusive (Edwards 2004) or at least slight, with just two sites representing the period (Ballin *et al.* 2010, Saville & Wickham-Jones 2012).

The Mesolithic period is represented again at Kendrick's Cave and Ogof Tan y Bryn, in addition to Rhyl, Prestatyn and numerous locations on west Anglesey and the Lleyn Peninsula (Murphy 2002). This period is less well represented in the low-lying coast of Cardigan Bay (appearing at Borth and a few other locations) – this spatial disparity may be attributed to the nature of Holocene sea-level rise (Jones 2002). The Pembrokeshire area has a particularly abundant assemblage of Mesolithic material, though not all these sites are relevant to Regional Sea 6. Whitesands Bay and Nab Head provide evidence of Mesolithic occupation, the latter

site revealing over 40,000 (mostly) early Mesolithic artefacts (e.g. Tolan-Smith 2008), and some later (7,190±100 BP/7,300±100 BP) ones (Murphy 2002).

Submerged forest and intertidal/submerged peats are present on the coast (e.g. on the Wirral) and can reveal artefact remains and provide an environmental context for the study of early occupation and coastal exploitation. There are few structural Mesolithic remains in north-west England, and most finds are of lithic scatters (e.g. at Hilbre and Walney), and of late Mesolithic age (Murphy 2014). There is a considerable coastal concentration of finds which include the raised beaches at Esk and north of St Bees, preserved intertidal human and faunal footprints at Formby (e.g. see Roberts 2009, Burns 2021), microlith scatters at Monk Moors, Cumbria, and many others along the Wirral and Sefton coasts; indicative of coastal exploitation (Hodgson & Brennan 2004). For Northern Ireland, the earliest finds of human occupation date to within the Mesolithic from *ca.* 9500 BP, at Mount Sandel (Bayliss & Woodman 2009, Warren *et al.* 2014), and occupation certainly seems likely from at least this date.

For the English section of coast, submerged forests are widely distributed. Footprints of Neolithic or Bronze Age people and animals are located in the intertidal zone of Merseyside, which reveal insights into the gender, age and habits of these people, and further evidence from this age has been located along the coast, for instance at Walney Island and Drigg in Cumbria (Bradley *et al*. 1997). In Wales, Neolithic finds are typically single polished stone axes or lithic scatters – for instance around 70 artefacts of Neolithic/Bronze Age date are known from Rhyl. Murphy (2002) indicates that non-native plant and animal introductions and the distribution of distinctive north Wales hand axes made at Graiglwyd and Mynydd Thiw suggest that navigation was used in trade at this time. A number of megalithic tombs associated with the Neolithic occur on Anglesey, the Lleyn Peninsula and north Pembrokeshire coast. In Northern Ireland megalithic Tombs are highly concentrated in the north. Trade is evidenced by the wide distribution of Tievebullaigh and Rathlin stone axes across the UK. Log boats are absent from the Welsh Bronze Age record, though plank boats (Wessex Archaeology 2009) do appear, and the cultural similarities between the Welsh and Irish coasts suggest wide sea crossings (Murphy 2002). Substantial mining in the Bronze Age is evident at the Great Orme (Conwy) and Parys Mines (Anglesey) – the Great Orme holds the location of the largest known Bronze Age copper mine in Europe (Murphy 2002).

Iron Age coastal archaeology is dominated by defensive sites such as hillforts and promontory forts, 106 of which reside on the Welsh coast, though few of these have been investigated (Murphy 2002). Such defensive structures are located extensively along the north and west Pembrokeshire coastline (for instance at Porth y Rhaw and Clawdd y Milwr). Roman forts probably had quays, wharves and jetties which are yet to be discovered (Murphy 2002). There is little evidence for salt production and shipping in Iron Age Wales. The Roman period is typically represented by singular or scattered finds, which are concentrated on the southern coast and Severn Estuary area, in Regional Sea 4. A harbour may have been located at Prestatyn and mining may have taken place at Mynydd Parys (Anglesey) and the Great Orme (Gwynedd). Several Roman forts are also located in north Wales at Holyhead, Caenarfon and Pennal. The Iron Age in north-west England is poorly represented with only minimal metal and pottery finds (Hodgson & Brennand 2004), but also poorly investigated (Murphy 2014). Cropmark and ditched enclosures, and several hillforts (e.g. at Helsby and Swarthy Hill), date to the Iron Age along the Cumbrian coast, and a site at Moels on the Wirral peninsula may have been a beach trading site (Murphy 2014). In England, a Roman road extends along much of the Wirral coast with the most important site in this area also being Meols at the end of the Wirral peninsula, where coins from the mid-first to fourth centuries are present in the intertidal area amongst other Roman age artefacts (Bradley *et al*. 1997).

Archaeological evidence for the early Medieval and Viking periods is scare in Wales, partly due to the low level of archaeological investigation (Murphy 2002, also see Edwards 2011), though the presence of these people at the coast was probably influenced by trade with Ireland. Possibly the most important site is at Red Wharf Bay, Anglesey where a pre-Viking and Viking settlement was uncovered close to a possible site of equivalent age. Burial sites are the most prolific coastal finds, examples of which can be found at Towyn y Capel, Anglesey and St Bride's Head, Pembrokeshire. Continued activity into the Anglo-Saxon period was recorded at Roman forts at Lancaster, Carlisle, Ravenglass and Muncaster (Murphy 2014). The Medieval period in the north-west is noted by crop markings including ridge-and-furrow such as around south Ribble and Barrow in Furness, and terraces and lynchets especially around the mouth of the River Kent and Morecambe Bay (Murphy 2014).

More recent coastal phenomena include lighthouses, developed ports resulting from mineral trade, numerous lime-kilns, metal processing works, sea defence structures and ship building ports (Gwyn 2002, O'Sullivan & Breen 2007). 18th and 19th century defence structures are sparse in Wales but there are many more Second World War defences, with the pill-box being most prevalent (Gwyn 2002).

A1i.8 Features of Regional Sea 7

A1i.8.1 Submerged heritage

There is high likelihood that finds relating to the Mesolithic and Neolithic periods are present in shallow areas of the shelf down to *ca.* 45m below OD and where suitable taphonomic conditions are likely to have prevailed through the Holocene (however, see Bicket *et al.* 2017 for consideration of the Sound of Harris). Intertidal peats and submerged woodland such as those on the Hebrides attest to a once inhabitable terrestrial landscape having being submerged in relatively recent times. Unlike the North Sea region (e.g. Gaffney *et al*. 2007, 2009), there has been no systematic evaluation of the potential for the continental shelf area of the Malin and Hebrides Sea areas to contain prehistoric, submerged landscapes. A few smaller-scale studies have been undertaken and include those at Ramore Head, Northern Ireland, which has reconstructed the early to mid-Holocene environment there (Westley *et al.* 2014), and the Outer Hebrides Coastal Community Marine Archaeology Pilot Project (WA Coastal & Marine 2012, 2013) which combined a number of terrestrial, intertidal and marine archaeological techniques as part of a multidisciplinary approach to reconstructing Mesolithic and Neolithic landscapes (also see The Scottish Atlantic Maritime Past: Heritage, Investigation, Research & Education Project and related reports, e.g. Roberts *et al*. 2014).

At present, evidence for Palaeolithic presence in Scotland remains inconclusive (Edwards 2004), or at least slight, with just two sites representing the period (Ballin *et al.* 2010, Saville & Wickham-Jones 2012). The contentious site at the caves of Creag nan Uamh, Assynt which contains reindeer antler and other faunal remains was originally considered of Palaeolithic origin, though a reappraisal by Murray *et al*. (1993) argued that the site is more likely an animal den. Other potential early Holocene Palaeolithic finds include tanged points (tools) on Jura (Mercer 1980), a hazel decline and fire history indicative of early Holocene occupation on Islay (Edwards and Berridge 1994), and lithic and palaeoecological reconstructions of possibly later Younger Dryas age (Mithen *et al.* 2015). Though there is a lack of Palaeolithic finds that is not to say they never colonised such northerly areas, but that glacial processes have cleared evidence of this culture from the landscape. Whatever Palaeolithic remains do exit are likely to be below sea-level (Long *et al*. 1986) and it has been conjectured that there is the possibility of

finding late Palaeolithic maritime archaeology in the form of hide covered boats linked to migration and early seafaring (Wessex Archaeology 2006).

The earliest definitive finds for human settlement in Scotland and for the Regional Sea are that of Mesolithic peoples (see: Wickham-Jones 1990, Ashmore 2004, Wickham-Jones & Hardy 2004), evidence for which is found on numerous west coast islands (e.g. North Uist, Skye, Rum, Oronsay). There is high likelihood that finds relating to the Mesolithic and Neolithic periods are present in shallow areas of the shelf. Seafaring vessels may also be associated with Mesolithic people as the visibility of Ireland and the Western Isles (already isolated from Scotland) would mean that seafaring was probably associated with migration and travel (though infrequent over long distances), and also fishing (Wessex Archaeology 2006) – fish remains, for instance, on Oronsay and possibly Cuchendun, Co. Antrim testify to fishing. No vessels have been recovered in Scotland; however logboats from the late Mesolithic are present on the Lough Neagh shores, Co. Tyrone (*ca.* 7,500 BP).

Following sea-level rise, reaching modern levels by *ca.* 5,000 BP (Flemming 2004), submerged archaeology of subsequent cultures is largely going to consist of shipwreck and associated artefacts. Marine trade between Neolithic people can be seen in artefact and building typologies (for instance porcellanite of Irish origin is found throughout the western isles of Scotland: Wessex Archaeology 2006) and later Neolithic (*ca.* 5,000 BP) logboats have been excavated in Co. Antrim – such vessels seem to have continued use into the Bronze Age. Later Iron Age and medieval vessels (including Viking long boats) and more recent 19th and 20th century vessels are all potential finds in areas suitable for preservation. Areas where archaeological material is likely to survive on the seabed are isolated to shallow parts of the shelf, namely the Hawes Bank and the seabed around Coll and Tiree and between Islay, Jura, Colonsay and Oronsay in addition to sheltered areas to the east of the Hebrides and around Skye. There may also be an archaeological resource associated with the early Holocene presence of various islands between the Northern Irish coast and the Hebrides evidenced by Cooper *et al*. (2002).

A1i.8.2 Wrecks

The area to the west of the UK, The Minch, the area around Rathlin Island and north-west approaches was favoured by German U-boats as part of a strategy to blockade transatlantic convoy supplies, with heaviest losses occurring in June 1940-December 1941 during the battle of the Atlantic (Wessex Archaeology 2006). Wrecks associated with these losses will be located within Regional Sea 7 but also reach west into Regional Seas 8, 10 and 11. There are 5 protected wrecks located in waters covered by Regional Sea 7 (Table A1i.13, Figure A1i.10), and a range of other charted maritime losses are recorded by the UKHO, and also as maritime wreck on heritage listings (Table A1i.14).

Table A1i.13: Protected wrecks within Regional Sea 7

Wreck name	Date of loss	Summary of wreck sites	Position or Named Location
Protection of Wrecks Act 1973: Protected Wrecks: Protected Wrecks			
La Girona	1588	A Spanish Armada vessel which foundered at Lacada Point.	Area within 300m of 55° 14’ 51’’ N 06° 30’ 3’’ W

Wreck name	Date of loss	Summary of wreck sites	Position or Named Location
Marine (Scotland) Act 2010: Historic Marine Protected Areas			
Kinlochbervie	early 17th c.	The identity of the vessel is unknown but is considered likely to be that of a merchant ship probably originating from the Iberian peninsula lost during the 1590s or even after 1600.	Area within 300m of 58˚ 26.189' N 05˚ 06.507' W
Drumbeg	uncertain	Believed to be that of a 17th or 18th century merchant ship at the eastern channel entrance to Eddrachilis Bay	Area within 150m of 58˚ 15.135' N 05˚ 11.868' W
Mingary	*ca.* 17th c.	Believed to relate to a wrecking incident associated with the siege of Mingary Castle in 1644.	Area within 250m of 56˚ 41.488' N 06˚ 04.413' W
Duart Point	1653	Believed to be a small 17th century warship, probably the Swan, sent by Oliver Cromwell as part of a flotilla to capture Duart Castle, Mull.	Area within 75m of 56˚ 27.440' N 05˚ 39.386' W
Dartmouth	1690	The remains of a fifth rate frigate built in 1655. The ship broke anchor in Scallastle Bay and was wrecked in October 1690 on the isle of Eilean Rubha an Ridire.	Area within 50m of 56˚ 30.180' N 05˚ 42.015' W
Iona I	1862	Believed to be that of the Clydebuilt paddle steamer *Iona I*, which sank after collision off Port Matilda, near Gourock, the Upper Clyde Estuary. *Iona I* is of national importance as the well-preserved wreck of a Clydebuilt 19th-century passenger paddle steamer purchased by Confederate agents to run the blockade of Southern ports during the American Civil War.	Area of sea within a distance of 90m of 55° 58.076' N, longitude 04° 47.194' W
Protection of Military Remains Act 1986: Protected Sites*			
HMS Calgarian	1918	Hired as an armed merchant cruiser in 1914 and sunk by U-19 off Rathlin Island.	Rathlin Island, Northern Ireland
HMY Iolaire	1919	An Admiralty yacht that sank at the entrance to Stornoway Harbour, returning soldiers from First World War duty.	Isle of Lewis, Outer Hebrides
HMS Vandal	1943	A U-class submarine lost during initial exercises following commissioning.	North of the Isle of Arran

Notes: *=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data is provided, only a named location. Source: Historic Environment Scotland Portal, the CANMORE database, *The Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2019*, Colledge & Warlow (2010)

Figure A1i.10: Protected wrecks in Regional Sea 7

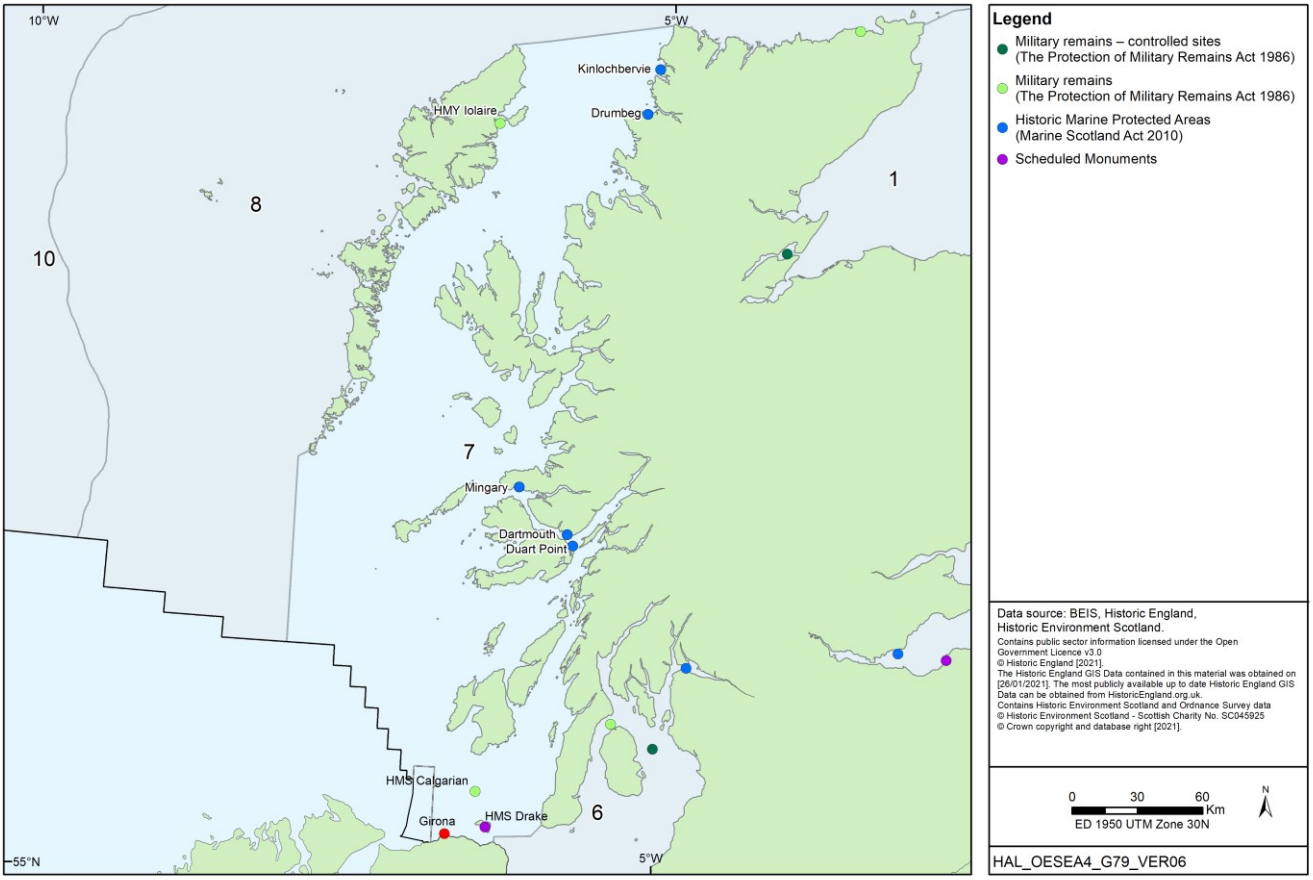


Table A1i.14: Maritime archaeological records categorised as 'wreck' or 'aircraft' for Northern Ireland and Scottish Council areas relevant to Regional Sea 7

Council District	Number of wreck sites		Summary of wreck sites
	Craft	Aircraft	
Western Isles	1,386	6	Records are dominated by 19th and 20th c. losses. Identified aircraft are generally from WWII, with earlier craft having smaller preservational prospects due to the fragility of their airframes.
Highland	3,339	143	
Argyll and Bute	3,974	117	
Northern Ireland	2,600	-	Bias towards improved reporting post-1800. Oldest recorded wreck in Northern Irish waters is a Spanish vessel, *La Girona*, dating to 1588. Earlier wrecks are possible but are yet to be discovered.

Notes: The number of records includes those which do not have definitive positions and records which relate to wrecks once recorded but now lost, or else excavated. Source: the CANMORE database, Lancaster (2012)

A1i.8.3 Archaeological sites in the coastal zone

The coastal archaeology of Regional Sea 7 has been systematically studied in the areas of the Outer Hebrides, Coll and Tiree and from Ullapool to Lochinver, summarised in Dawson (2003) and augmented by a series of coastal zone assessments since its publication (CFA Archaeology Ltd. 2005, 2007, SCAPE Trust & University of St Andrews 2007, EASE Archaeology 2005, 2007). Earlier summaries are found in Gale & Fenwick (1997a, b) excluding the Northern Irish coast. The coastal zone has a vast number of archaeological remains, many of which are protected as scheduled ancient monuments.

The earliest finds are those of Mesolithic origin, for instance at Kinloch on Rum (Wickham-Jones 1990), Islay (Mithen 1990), Lub Dubh-Aird, Upper Loch Torridon (WA Coastal & Marine 2013), middens on Oronsay (Mithen 1989) and An Corran on Skye (Saville & Miket 1994) and lithic/floral and faunal elements of cultural association at Mount Sandel, Co. Derry (Woodman 1985, Bayliss & Woodman 2009). Mesolithic settlement on Lewis is largely proven on the basis of palaeoecological evidence and reconstructed fire history (Edwards 1996, also see Bishop *et al.* 2015), though the archaeology relating to this and possibly earlier settlement may be substantially covered by peatlands which spread in the later Mesolithic and Neolithic periods (Edwards *et al*. 1995, Edwards 1996). The coastal survey of Church & Burgess (2003) indicates 178 (*ca.* 10%) of recorded sites were undifferentiated prehistoric, some of which may date from the Mesolithic. Later dating and investigation indicate two sites which relate to Mesolithic occupation of the Outer Hebrides at Northton, Toe Head Peninsula, Harris, and a shell midden on the beach of Tràigh na Beirigh, Cnip, Lewis (Blake *et al*. 2011). In Northern Ireland, Mesolithic sites are strongly associated with the northern coast (Co. Antrim, Co. Down, Co. Derry) though this may be a function of research focus (O'Sullivan & Breen 2007).

Neolithic settlement is evidenced by chambered cairns and settlement sites – the latter features on Barra and Harris (Gale & Fenwick 1997a). Neolithic settlement sites and cairns tend to have a greater density to the east, in Regional Sea 6 on Arran, Bute and the Clyde Basin (Gale & Fenwick 1997b). The coastal surveys of Church & Burgess (2003) and Long (2003) for Lewis and Lochinver to Ullapool respectively, indicate a relatively small number of Neolithic sites, perhaps due to their concealment in blanket peat, as with many Mesolithic sites. Numerous Neolithic farm sites also occupy the Co. Antrim and Co. Down coasts (O'Sullivan & Breen 2007).

Bronze Age material consists of chambered cairns, stone circles, stone-built housing continuing Neolithic traditions (e.g. Harris, North Uist, Lewis), and distinctive 'beaker' pottery. Bronze artefacts are only found in relatively high densities towards the end of the period (Gale & Fenwick 1997a). In the Iron Age the northern part of the area was densely settled which resulted in the creation of a great number of brochs, later replaced by the less distinct roundhouse (e.g. at Tungavale, Skye). To the south, hillforts are more prominent. Later Pictish, Roman and Medieval archaeology (including the Viking period) is less well developed for the area, though philological evidence indicates a significant Norse settlement influence (e.g. on Lewis). Cultural contact with Roman and Mediterranean cultures is also implied in finds (Gale & Fenwick 1997a, b).

During the historic period, social and economic changes included the development of sheep farming (and associated crofts), sea-fishing and maritime commerce – the latter two industries led to the coastal development of ports, harbours and lighthouses (Gale & Fenwick 1997a, b).

A1i.9 Features of Regional Sea 8

A1i.9.1 Submerged heritage

Re-colonisation of Regional Sea 8 is likely to be from *ca.* 12,000 BP and island environments, if not colonised by walking across areas of exposed shelf, are likely to have been settled later using early seafaring mechanisms such as hide-covered boats which may have also been used on the coast, and paddles or fishing gear associated with these have the potential to be recovered in the area (Wessex Archaeology 2006). Fitch *et al*. (2007) used 3D seismic data (though spatially restricted) to show that areas of the northern North Sea may have been suitable landscapes for late Palaeolithic peoples.

The occupation of high arctic areas such as Siberia (see: Pitulko 2001) as early as 8,400 BP indicates that cold temperatures were not necessarily a hindrance to settlement, and it has been postulated that people migrated north to Scotland during the melting of the Devensian ice sheet (Wickham-Jones 1996). The prediction of ice limits and shore lines is therefore important in understanding the possible relationship of early people with the availability of exploitable resources and their geographical distribution (see Clarke *et al.* 2012 and Sturt *et al.* 2013).

The diversity and age of structures and individual finds on the coasts of the northern and Western Isles and the reduced sea-level at the time of earliest occupation makes it distinctly possible that submarine archaeology exists in the area and certainly within the intertidal zone. Work on palaeolandscapes and submerged archaeology in Regional Sea 8 has concentrated on Orkney (e.g. The Rising Tide project), in the Bay of Firth and Loch of Stenness, where submerged circular features have been detected on multibeam sonar (Bates *et al.* 2012a, b), which are possibly attributable to the wider Neolithic heritage of the isles. It should be noted that evidence of Mesolithic occupation of Orkney (e.g. Lee & Woodward 2009) and Shetland (e.g. Melton 2008) indicates the possibility of there being submerged archaeology from earlier periods. Strong current conditions, exposure to full North Atlantic storm conditions, thin sediment cover in many places, and areas of exposed bedrock, make the exposed areas of the Regional Sea 8 shelf likely poor prospects for the survival of prehistoric deposits *in situ* other than in submerged caves. Typical winter wave conditions in the north-east section of Regional Sea 8 are considerable, and can influence the seabed to a depth of 70-120m (significantly so at 35-60m) and much of this area has been stripped of fine sediments, leaving gravel and coarse sand as the prevailing substrate (Flemming 2003). Cohesive Quaternary sediments which are resistant to erosion may contain material such as bones or flints in coarse gravel or bedrock gullies.

In order to focus any search for material or to postulate where materials may be, consideration must be given to the seabed topography and the areas likely to have suitable taphonomic conditions for the preservation of remains *in situ*. The research of Fitch *et al*. (2005) and Gaffney *et al*. (2007) on reconstructing the palaeogeography or palaeolandscapes of regions of the north has led to a better understanding of the Palaeolithic and Mesolithic landscape of the continental shelf, possible areas of resource exploitation and therefore ‘hotspots’ for archaeological finds in certain areas. Seismic survey is important in the detection of the prehistoric submarine environment, as bathymetric studies only reveal the modern topography which has been heavily influenced by Holocene sedimentation and erosion (Wickham-Jones & Dawson 2006).

A1i.9.2 Wrecks

Of particular importance in the shipwreck resource of Regional Sea 8 (evidenced by the high number of protected military remains and German fleet losses) is Scapa Flow, Orkney, which saw losses in World Wars I and II due to its strategic importance, and the scuttling of the German High Seas Fleet in 1919, which was interned at the site at the time. Several non-designated wrecks are present in Regional Sea 8 which were noted by Wessex Archaeology (2006), and these are listed in Table A1i.16. Numerous other known wrecks are located off the north and west coasts of Scotland, and the north in particular was of strategic importance to those traversing Britain en route to the continent, Americas and other British ports, for instance during periods in the 18th century when neighbouring nations on the Channel were frequently at war, the route through the Northern Isles was preferred (Lancaster 2012). Off the north of Scotland, Lancaster (2012) notes that for wrecks which have known build dates, these range between 1661 and 1949, though earlier wrecks are known on the basis of reporting or archaeological evidence.

There are 10 protected wrecks located in waters covered by Regional Sea 8 (Table A1i.15, Figure A1i.11).

Table A1i.15: Protected wrecks within Regional Sea 8

Wreck name	Date of loss	Summary of wreck sites	Position or Named Location
Ancient Monuments and Archaeological Areas Act 1979: Scheduled Ancient Monuments			
Brummer	WWI	German mine-laying cruiser.	58˚ 53.815' N 03˚ 09.207' W
Dresden	WWI	A light Dresden II class cruiser, torpedoed by a British submarine.	58˚ 52.943' N 03˚ 08.455' W
Karlsruhe	WWI	Second class or light cruiser of the four-strong Konigsberg II class. Scuttled in Scapa Flow in 1919.	58˚ 53.350' N 03˚ 11.352' W
Koln	WWI	A light Dresden II class cruiser and sister ship of the Dresden.	58˚ 53.830' N 03˚ 09.181' W
Konig	WWI	Konig class built to counter British dreadnought class vessels. Capsized in Scapa Flow after suffering heavy damage.	58˚ 53.198' N 03˚ 09.181' W
Kronprinz Wilhelm	WWI	The last ship completed of the four-strong Konig class. The ship was scuttled in Scapa Flow in 1919.	58˚ 53.622' N 03˚ 09.904' W
Markgraf	WWI	Scuttled in Scapa Flow in 1919.	58˚ 53.475' N 03˚ 10.010' W
Protection of Military Remains Act 1986: Controlled Sites			
HMS Hampshire	1916	Armoured cruiser sunk by mine off Orkney.	300m exclusion zone centred on 59˚ 07.065' N 03˚ 23.843' W
HMS Vanguard	1917	Battleship sunk by internal explosion in Scapa Flow.	200m exclusion zone centred on 58˚ 51.400' N 03˚ 06.405' W

Wreck name	Date of loss	Summary of wreck sites	Position or Named Location
HMS Royal Oak	1939	Battleship sunk in Scapa Flow by U-47.	200m exclusion zone centred on 58˚ 55.848' N 02˚ 59.001' W
Protection of Military Remains Act 1986: Protected Sites*			
HMT Beech	1941	A trawler, previously the Lord Dawson, was purchased by the Admiralty in 1939 and used as a minesweeper. Bombed and sunk by aircraft in Scrabster Bay.	Caithness
HMS Bullen	1944	"Captain" class vessel torpedoed off north west Scotland by U-775.	North West, Scotland
HMS Pheasant	1917	An Admiralty M-class destroyer sunk apparently by a mine off Orkney.	Orkney

Notes: *=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data is provided, only a named location. Source: Historic Marine Protected Area Records, the CANMORE database, the *Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2019*, Colledge & Warlow (2010), Lancaster (2012)

Table A1i.16: Other wrecks located in Regional Sea 8

Wreck name	Date of loss	Summary of wreck sites	Named Location
Adelaar	1728	On her third voyage to the Indies with the intention of obtaining tea, spices. Struck a reef off Greian Head on the island of Barra, Outer Hebrides. The site was extensively salvaged at the time, having carried 500 8-mark bars of silver, six bars of gold, 32,000 silver ducatons, and 45,000 copper 2-stuyver coins.	Ceann Àird Ghrèin, Barra
Victor	1936	A 4-masted schooner. The location assigned to this record is essentially tentative. It remains uncertain whether or not a partial or complete wreck and/or fragments survive.	Between Shillay and Shillay Beg
St Kilda	-	A number of 19th and 20th century vessels are recorded within the village bay of St Kilda or just offshore around most islands, including Hirta, Soay and Boreray. Wrecks include those of trawlers and cargo vessels.	St Kilda

Source: Wessex Archaeology (2006), the CANMORE database

A1i.9.3 Archaeological sites in the coastal zone

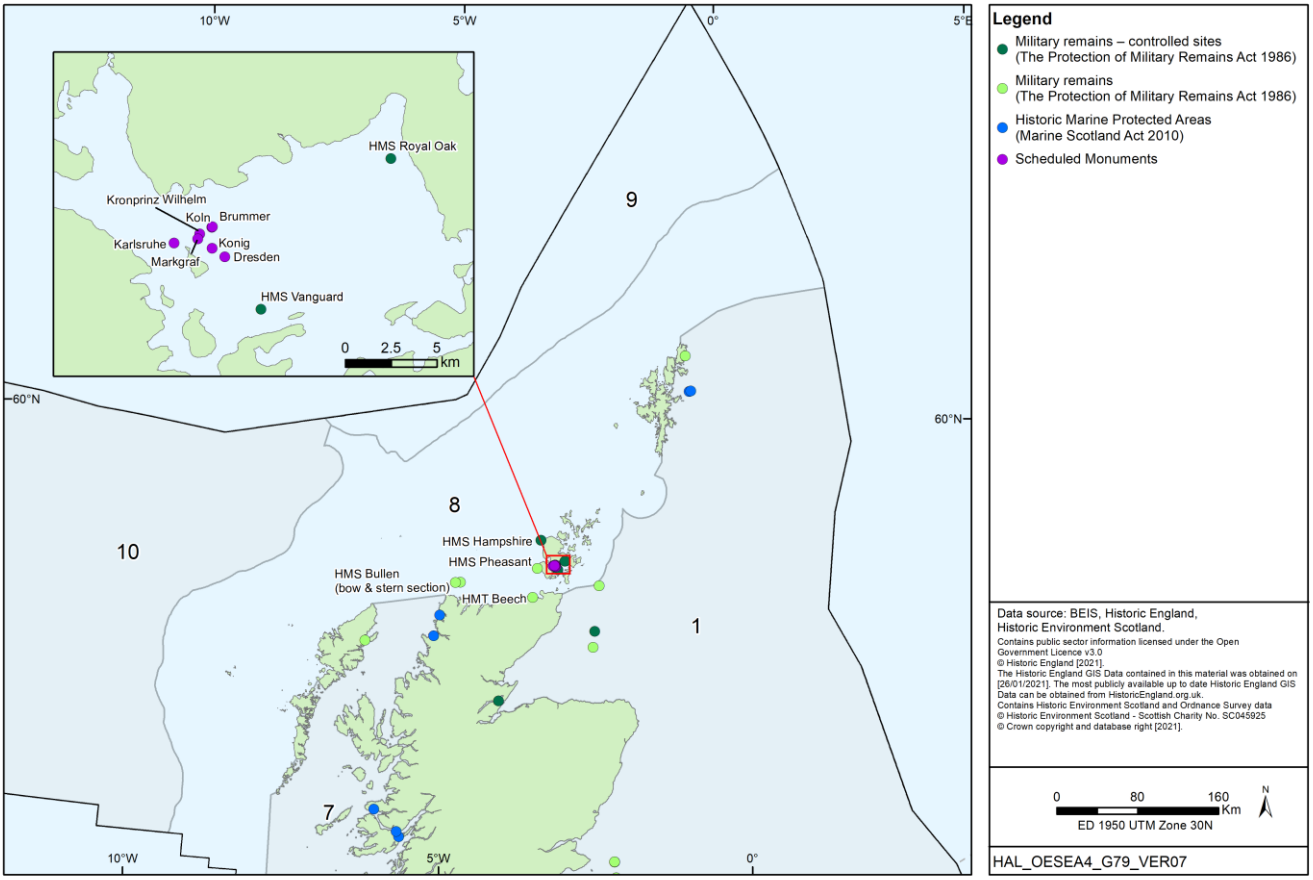
In the northern region of Shetland relatively little survey work has been conducted and archaeology has been either been part of academically- or rescue-led excavations (Wilson 2003a). The survey conducted by Wilson (2003a) revealed 846 coastal archaeological sites on, or extremely close to, the shore of Shetland of which 181 are prehistoric (earlier than 2,000 years BP) and 37 date to 6,000-5,000 years BP. The survey area did not cover the entirety of the coast and therefore it must be assumed that there are many more sites to add to these

figures. There is a strong coastal distribution of sites of all ages on Shetland (Mesolithic, Neolithic, Bronze Age, Iron Age, Norse, Medieval and later) and in many localities this is under threat.

On Orkney, a survey by Wilson (2003b) of selected coastal areas located 843 sites, many of which cover multiple cultural periods. Orkney has been extensively studied and contains some of the most important Scottish prehistoric sites (Wilson 2003b). The record for the islands is, like most other localities, going to increase with more surveys and for many sites there is a difficulty in discriminating their chronological position without resorting to excavation. There are geological controls not only in the loss of material to the sea, but also in obscuring areas of potential research, for instance on Sanday much material is probably concealed beneath aeolian sand deposits (Wilson 2003b). Prehistoric sites include settlements such as the Neolithic farming complex at Knap of Howar which dates to between 2,800 and 3,800 years BC (Ritchie 1983) and the settlement of Skara Brae, which are part of a wider Neolithic settlement history recognised in a World Heritage Site designation. Defensive structures (such as the Broch of Mousa, the most complete example of an Iron Age broch) and tombs and burial grounds (such as the Quoyness Cairn on Sanday which dates as far back as 2,900 BP) are also located in the area.

A survey conducted by Brady *et al*. (2003) reports 485 sites in the area between Kyle of Durness to Torrisdale Bay, 78% of which were newly recorded and did not form part of the NMRS – only 22 sites have some form of protection. The Canmore database reveals hundreds more sites listed as Scheduled Ancient Monuments or as registered on the NMRS or the Scottish Sites and Monuments Record (SSMR). Given the significant difference in the number of recorded sites in the recent survey by Brady *et al*. (2003) and those in the NMRS, it is clear that many unrecorded sites remain present along the coast of Regional Sea 8. The surveyed area had relatively few prehistoric sites (5.6% of recorded sites), the earliest being Mesolithic, at Smoo Cave, with later Neolithic/Bronze Age cairns and Iron Age hut-circles, brochs and promontory forts. Fluctuating sea-levels may have already destroyed or certainly inundated some settlements, though few (0.8%) sites are currently threatened by sea encroachment. The majority of sites (41.6%) encompass the Pictish to post-Medieval period which includes Norse material, with the remaining finds being characteristic of the 18th to 19th centuries (12.3%) or later modern structures (25.2%) associated with WWII activity. 23.2% of sites are currently threatened from coastal erosion, 53 of the sites being in the intertidal zone and a further 64 at the high tide mark.

Figure A1i.11: Protected wrecks in Regional Sea 8



Results for a survey of Lewis (see Burgess & Church 1997 for a comprehensive review) are synthesised in Church & Burgess (2003) and augmented by later survey work by on North Uist (CFA Archaeology Ltd. 2005, 2007), and Benbecula and South Uist (EASE Archaeology 2005, 2007). The survey of Burgess & Church (1997) comprised the intertidal zone and a strip 50-200m wide inland from Aird Drollageo in the west, north and east to Ranish, and the following is a summary of the report. Though the survey did not cover the entirety of the coast, it provides a suitable outline of expected archaeological finds in the coastal strip for the island and any disparity between actual site numbers and those numbers currently recorded in the NMRS. A total of 1,825 sites were recorded spanning from the prehistoric period (also see text for Regional Sea 8) to modern times. Though sites were generally characterised to within one period, a more precise age could not be distinguished without further work for some, and a large proportion (541) of the sites could not be attached to any particular cultural period. 50% of prehistoric sites are eroding, with those of the later Norse and Medieval periods being more stable. The surveys on Benbecula and South Uist (EASE Archaeology 2005) revealed a lower density of sites to that of the Northern Isles and Inner Hebrides at 1km^2, and the west coast of the Isles which has a 1.56/km^2 (EASE Archaeology 2007). The majority of sites in this survey and on North Uist (CFA Archaeology Ltd. 2005) were of 18th and 19th century remains some of which were of limited archaeological interest, and approximately half were at risk from coastal erosion. The proportion of new sites recorded both in surveys (87.5% on Benbecula and South Uist and 51.2% on North Uist) indicates the potential for a significant quantity of sites to be found which will add to the archaeological knowledge of the Outer Hebrides.

Further south on Barra, 220 sites were recorded in a survey of the entire coast (Branigan 2003) and 960 sites are recorded for the whole island (Branigan & Foster 2000) – the coast therefore apparently has a considerable wealth of archaeology per unit area compared with the

interior. Most sites could be ascribed to periods described as early prehistoric (8%), later prehistoric (18%), Medieval (4%) and modern (84.5%) making up 24 functional or typological categories (e.g. shielings, clearance cairns, kelp ovens etc.).

A1i.10 Features of Regional Seas 9, 10 & 11

The area to the north of Shetland and Orkney encompassed by Regional Sea 9 was at the margin of 'Doggerland' at its maximum extent. To the north and east, the bathymetry of the North Sea region becomes deeper, especially towards the Faroe-Shetland Channel and the Norwegian Trench, reducing the likelihood of peri-glacial settlement and therefore any associated artefactual remains. Assuming a reduced sea level of between 135-125m at the LGM (see: Dix *et al*. 2004), none of Regional Seas 9, 10 or 11 would have been available for occupation, precluding the possibility of any early finds. Submarine archaeology in this region is likely to consist of wreck sites (ship, boat or aircraft) which could range from very early wooden or even skin hulled vessels to later steel hulled vessels (e.g. the SS Norge lost after running aground at Rockall in 1904) including WWI and WWII losses.

Regional Seas 9, 10 and 11 do not contain any coastline or former submerged coastline which may preserve archaeological remains. Designation of archaeological remains is unlikely as these Regional Seas lie out with the 12nm limit over which Scottish Ministers have control, and within which Historic Marine Protected Areas may be designated. In continental shelf and slope areas such as this, obligations under UNCLOS Articles 149 and 303 are more pertinent (see Appendix 2 for more information).

A1i.11 Evolution of the baseline

The prospects of recovering material of Palaeolithic to Neolithic provenance on the UKCS to the east of the UK (and to a lesser extent to the west and north) are high within areas suitable for preservation of such material (e.g. see Gaffney *et al.* 2007, Fitch & Gaffney 2011), and for these periods and later in coastal areas where suitable taphonomic conditions are present (see Section A1i.2). In addition to academic-led investigations of sites, the identification of data gaps (e.g. through individual regional research frameworks) and sites through programmes such as rapid coastal zone assessment and development-led discoveries, will continue to add to the understanding of the coastal archaeological resource and palaeolandscapes of the UKCS. A number of industry guidance documents provide a framework for development-led work to take place (see: JNAPC 2006, Wessex Archaeology 2007, COWRIE 2008, Gribble & Leather 2011, English Heritage 2013, Historic England 2021).

A1i.12 Environmental issues

Archaeological sites in offshore areas of the Scottish continental shelf and north of the Dogger Bank are even less well known than the more intensively studied southern North Sea, though there is a chance that material of Palaeolithic or early Mesolithic provenance exists. Problems associated with the likely taphonomy of offshore sites preclude their recovery on economic grounds, and also the likelihood of making any finds at all.

Offshore, commercial salvage and attrition as a result of recreational diving are localised threats to the shipwreck resource, and it is not clear how much has been salvaged from wrecks on the UKCS, though it is likely that it is under reported (Wessex Archaeology 2009).

The greatest risk to coastal sites is erosion (Fulford *et al*. 1997, Murphy 2014), and inundation and loss of site access or integrity may be exacerbated by rising sea-levels associated with the projected effects of climate change. Coastal sites at risk are identified through, for example, Historic England's National Heritage Protection Programme, the SCAPE Trust in Scotland, and other initiatives such as the Coastal and Intertidal Zone Archaeological Network (CITiZAN). In many cases erosion is geologically controlled, such as at Holderness and in the Fife area, though there are also land-management issues such as the impact of grazing animals (e.g. sheep) and rabbits on Orkney and Shetland (Ashmore 2003a). Coastal defences may provide some protection from erosion, but these have their own associated problems, such as starving other areas of coast of sediment and therefore generating erosion elsewhere (Ashmore 2003b, see Appendix 1b), and in some areas, managed realignment could also mean the loss of landscapes with heritage assets that need to be recorded before they are lost (Murphy 2014). The resulting situation is one which requires surveying of coastal sites and surveying at a suitable frequency so that the condition of sites might be monitored and any important artefacts recorded and/or recovered.

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