

coast suggest occupation as early as MIS 15 (575kya) (Wenban-Smith 2002), indicating the potential for even earlier settlement episodes. These finds are all of Palaeolithic provenance, a period extending from initial habitation (albeit 700 or 500kya) to the end of the last glaciation. These people were superseded by Mesolithic cultures in the early Holocene up to ca. 6,000 BP, when Neolithic farming practices became prominent.

The early Holocene occupation of the North Sea plain is poorly understood due to a paucity of archaeological finds (Chapman & Lillie 2004). Despite evidence of earlier occupation, submarine archaeology across most of the UKCS has a theoretical maximum age of ca. 100,000 BP, coinciding with the start of the Devensian glaciation. Following this period, there would not be a significant glacial readvance after the LGM (ca. 18kya) and only one marine transgression separated the migration and settlement of the continental shelf area and modern sea-levels (see Shennan *et al.* 2000 and Shennan & Horton 2002 for a consideration of Holocene relative sea-level changes). Most finds in UK waters though, are of late-glacial to early-Holocene age (12-11kya). The primary focus of much research has been the Mesolithic to Bronze Age eras, which are relatively recent and may only be covered in shallow Holocene deposits. Less attention has been given to earlier Palaeolithic artefacts as these are likely to be buried much deeper (Bates *et al.* 2007).

As sea-levels rose, sites would have been inundated and in many places destroyed (Dix *et al.* 2002). The subsequent taphonomy of sites and artefacts is important in their preservation. 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. Several type-areas have been identified by Flemming (2004a, b) 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.

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).

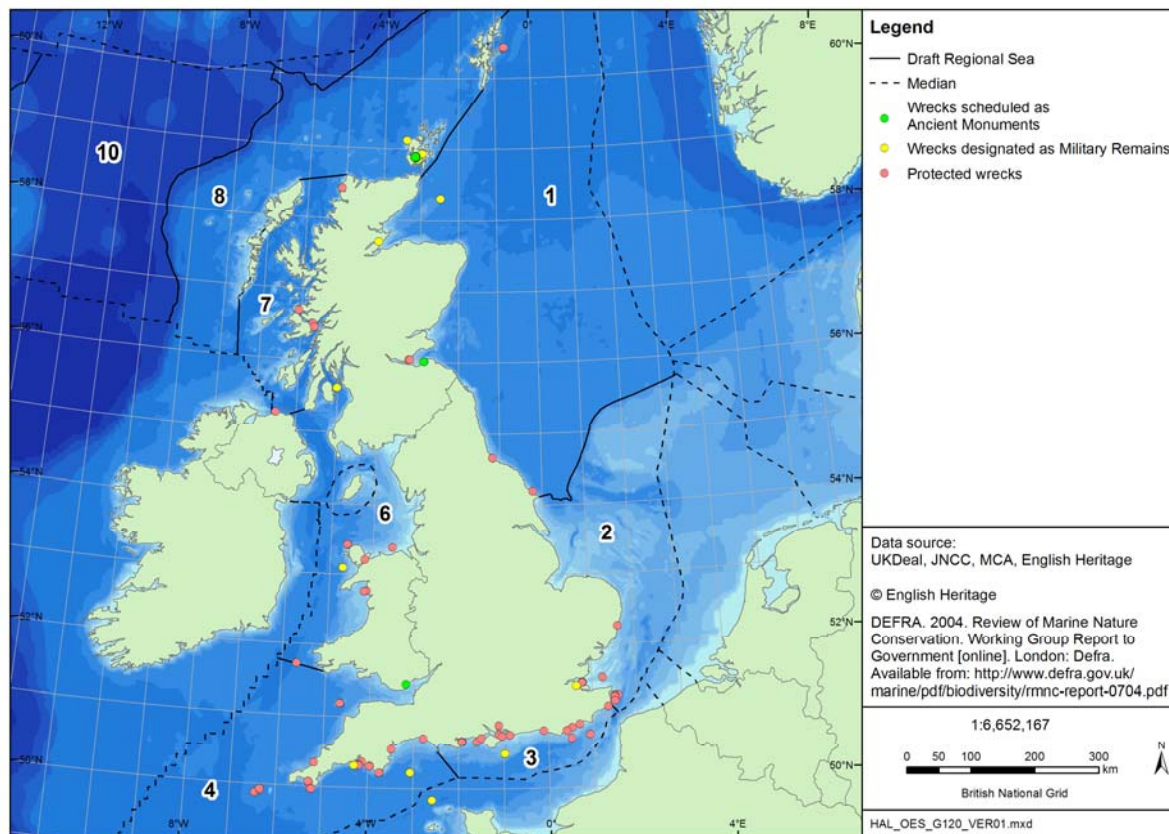
The strategic importance of the sea; the concentration of much of the North Sea fishing fleet in coastal ports; the importance of maritime trade routes in the area and the treacherous nature of many nearshore waters, has lead to a large number of ship and aircraft wrecks in UK waters, though information on the number, type and location of these is limited. The ALSF funded *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. The methodology and associated mapping output is available via the Archaeological Data Service website.

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 ca. 4,000, though a more realistic figure may be ca. 6,000 (Oxley 2001). Wessex Archaeology (2008d) put 'best guesses' of the wreck resource at between 100,000 and 500,000 for the UKCS. Few of these sites have had their condition or archaeological provenance assessed. 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 2008d). 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). As a corollary, there may be many undiscovered wreck sites in areas which do not meet these criteria. Figure A3i.2 indicates the protected wreck resource for UK waters and individual reference is made to each wreck in the discussion of their respective Regional Sea.

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 period between 1939 and 1945, aircraft losses at sea span 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, recent guidance has been published on the actions to be taken on discovery of military aircraft at sea (Wessex Archaeology 2008a, b), and the discovery of development-led contexts has become an increasing concern in recent years. 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 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 2008d). 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 2008d) – 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).

Figure A3i.2 – Historic Protected Wrecks in UK waters



Wessex Archaeology (2008d) 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.

A number of principal information sources were used in this compilation, which have been, where appropriate, used in conjunction with a number of peer reviewed publications. The technical reports prepared by Flemming (2003, 2004, 2005), Wickham-Jones & Dawson (2006) and Wessex Archaeology (2005, 2006) for previous SEA programmes are relevant to the current study. Wessex Archaeology (2008d) produced an updated technical report on UKCS archaeology for the current Offshore Energy SEA, which has been used to supplement this section where relevant. Some limited information is also provided in the Scottish Marine Renewables SEA (Scottish Executive 2007). Surveys and reviews

conducted by Historic Scotland (e.g. Dawson 2003), English Heritage (e.g. Fulford *et al.* 1997, Flemming 2004, the National Mapping Programme, Rapid Coastal Zone Assessment Surveys), Wessex Archaeology (e.g. Wessex Archaeology 2004) and Cadw (Davidson 2000) have been used where relevant. Perhaps the most pertinent piece of literature to date has been that of Gaffney *et al.* (2007) on the Mesolithic landscapes of the southern North Sea. This research highlights a number of themes including the largely undeveloped archaeological resource of the North Sea, its interaction with activities involving the seafloor, and how predictive methodologies might be developed to assess the archaeological prospectivity of certain areas. The accompanying technical report prepared by Wessex Archaeology (2008d) was also used in the compilation of this work.

Attention is brought to numerous initiatives, for instance the Council for Scottish Archaeology (CSA) 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'. At the moment this work does not extend below the LWM due to health and safety considerations. This work is grant-aided by Historic Scotland (Ashmore 2003b) and is currently jointly managed by The Scottish Coastal Archaeology and the Problem of Erosion (SCAPE) Trust in association with the University of St. Andrews (SCAPE 2008) – information is disseminated via the 'Shorewatch' website. SCAPE has also been conducting coastal zone assessment surveys since 1996 for a number of regions in association with Historic Scotland and other organisations such as the Centre for Field Archaeology.

Similarly, English Heritage has been undertaking a series of Rapid Coastal Zone Assessment Surveys (RCZAS) since the 1990s which has the broad aims of identifying materials of late Palaeolithic or later age in the coastal zone so that they might be added to the NMR and SMR and considered in relation to Shoreline Management Plans (SMP). A series of reports are available from the English Heritage RCZAS website.

The University of York project, 'Submerged Prehistoric Landscape Archaeology', funded by the Leverhulme trust began in 2007 and seeks to model submerged sites in the North Sea Basin and is focussed on the investigation of two underwater sites, Bouldnor Cliff in the Solent, and Browns Bay on the Northumberland coast, where the status of the site remains to be explored. Such academic work will continue to enhance the baseline in future.

More generally, the National Monuments Record (NMR) of England, Scotland, 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:

- England: <http://www.english-heritage.org.uk/server/show/nav.1530>
- Scotland: <http://www.rchams.gov.uk>
- Wales: <http://www.rchamw.gov.uk>
- Northern Ireland: http://www.ni-environment.gov.uk/built/mbr_intro.htm

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.

A3i.2 REGIONAL SEA 1: KNOWN & LIKELY SUBMERGED SITES

A3i.2.1 Context

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 and the infilling of sea-bed features by modern sediments, which impairs any ability to assess the prehistoric landscape or fluvial drainage patterns (Flemming 2004b).

The discovery of a single flint scraper 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-9000 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 are poorly mapped (Ashmore 2003b). Known submerged prehistoric sites in Orkney, Shetland, Viking Bank, the Yorkshire coast and Denmark (Fischer 2004) show that prehistoric sites from the last 5-10,000 years can survive marine transgression. However, the strong current conditions in Regional Sea 1, the exposure to North Atlantic storms, the thin sediment cover in many places and the large areas of exposed bedrock make some areas of the shelf statistically poor prospects for the survival of prehistoric deposits *in situ*, other than in submerged caves and gullies. Within sheltered sea lochs and enclosed bays of the east coast of Shetland, Orkney and Fair Isle, survival is quite likely in submerged gullies and locally thick sediments. Deposits in open shelf gullies are likely to have been transported and re-deposited (Flemming 2004b).

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). Further south, the likelihood of earlier Palaeolithic remains surviving on the seabed increases due to a probable longer occupation episode following glacial retreat, and a recent survey by Wessex Archaeology (2004) revealed a lower Palaeolithic find off the coast of Scarborough (Wessex Archaeology 2004). Mesolithic artefacts have been located at Brown Bay near Newcastle in rock gullies. 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).

Offshore aggregate extraction is minimal in Scottish waters, being limited to sand extraction for beach replenishment and fill for land reclamation (SCF 2004), and unlike the cooperation between aggregate extraction and archaeological finds in southeastern England, no such relationship exists in Scotland. 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. The relative paucity of such material in Scottish waters may in part be a reflection of a lack of such development, though the offshore oil and gas industries may be able to provide some data for archaeological prospecting (e.g. acoustic surveys, coring and grab samples).

A3i.2.2 Wrecks

Table A3i.1 below summarises information gathered from the NMRs of Scotland and England for areas relevant to Regional Sea 1.

Table A3i.1 – Maritime archaeological records categorised as ‘wreck’ for English Counties and Scottish Council areas relevant to Regional Sea 1

County/Council district	Total No. Sites recorded as ‘wreck’	Summary of wreck sites
North Yorkshire	1,641	Records for these areas extend only from the Medieval period, accounting for 37 entries. Records for substantially increase for the Georgian and Victorian period onwards, accounting for 37 and 33% of the total number of entries respectively. Modern vessels (post-1900) account for ca. 24% of records.
Durham	211	
Northumberland	1,316	
The Scottish Borders	323	Summaries for Scotland are restricted to the number of records, as the CANMORE database cannot deliver chronologically restricted results.
East Lothian	623	
City of Edinburgh	318	
West Lothian	3	
Falkirk	58	
Fife	1,135	
Angus	563	
Aberdeenshire	352	
Moray	297	
Highland	2,055	

Source: English Heritage pastscape website, rcahms canmore database

There are 8 historic, protected wrecks in waters covered by Regional Sea 1 (Table A3i.2).

Table A3i.2 – Protected wrecks within Regional Sea 1

Wreck name	Date of sinking	Specific Location (WGS 84)	Protection status	Other relevant information
The Burntisland or <i>Blessing</i>	1633	56° 02' 24.42" N 03° 14' 51.36" W	PWA	Firth of Forth, Fife
Kennermerland	1664	60° 25' 12" N 0° 45' 0" W	PWA	Out Skerries, Shetland 250m exclusion zone
Wrangles Palais	1687	60° 25' 30" N 0° 43' 16.2" W	PWA	Out Skerries, Shetland 100m exclusion zone
HMS Natal	1915	57 41.244' N 04 05.310' W	PMRA†	Cromarty 100m exclusion
Campania	1918	56° 02' 24.48" N 03° 13' 24.72" W	PWA	Firth of Forth, Fife
HMS Exmouth	1940	58 18.467' N 02 28.938' W	PMRA†	Grampian 750m exclusion
Seaton Carew	ca. 19 th century	54° 39' 30" N 01° 10' 42.6" W	PWA	Seaton Carew, Teeside 100m exclusion zone

Wreck name	Date of sinking	Specific Location (WGS 84)	Protection status	Other relevant information
Kilspindie Hulk (1-8)	19th-20th century	56 00' 45.039" N 02 52' 00.015" W	SAM	Kilspindie, Aberlady Bay, Lothian
		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		
HMS K4	1918	-	PMRA‡	Isle of May, Firth of Forth
HMS K17	1918	-	PMRA‡	Isle of May, Firth of Forth
U714	1945	-	PMRA‡	Firth of Forth

Key: PWA=Protection of Wrecks Act 1973; MRA=Protection of Military Remains Act 1986; SAM=Scheduled Ancient Monument

†=designated as a 'controlled site' under the PMRA 1986; ‡=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data.

Source: MCA website, EH website, the Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2008

A3i.2.3 Archaeological Sites in the Coastal Zone

The most recent survey of Scotland's coastal archaeology (Dawson 2003) covered 20% of the Scottish coast, revealing that 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). The number of sites encountered per km in the study area relative Regional Sea 1 varies from 1.9 (Shetland) to 4 (Highlands). For the English section of the coast contained within Regional Sea 1, the work of Fulford *et al.* (1997) and more recent investigations carried out by Wessex Archaeology (2004) discuss the archaeological resource.

Shetland contains a wealth of coastal archaeological sites dating back to prehistoric times, including Mesolithic and Neolithic finds (Melton & Nicholson 2004), standing stones, burial chambers (cairns), Iron Age forts (brochs) (Wilson 2003a) and Norse (McGovern 1990) and later sites. Artefacts dating to the Mesolithic are largely absent, 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 such peoples is evidenced in the palaeoecological record for the islands (e.g. Edwards *et al.* 2005).

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 represent almost 50% of the total number of known crannogs in intertidal waters (Hale 2000, cited in Hale & Cressey 2003). Fishtraps built during the 17th-19th century to catch salmon are relatively common in the 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. The heavy military presence attests to the importance of the Cromarty Firth, especially as a naval base during both world wars (Hale & Cressey 2003).

The Fife survey 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 southeast 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 were military defences from WWI or II (Robertson 2003).

The majority of coastal sites found during a survey of the Firth of Forth 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 2003).

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, Othorpe and Easington (Bradley *et al.* 1997). 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 report by Tees Archaeology (Waughman 2005) provides an overview of the submerged archaeology of Hartlepool Bay. A recent (2004) Wessex Archaeology survey of a section of the north east coast indicated that the Durham and North Yorkshire coasts have 27 known prehistoric (Including Mesolithic) finds, though many of these are undated. 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).

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). 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 indicates the potential for Roman remains to be found in this location also. 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 2004).

A3i.3 REGIONAL SEA 2: KNOWN & LIKELY SUBMERGED SITES

A3i.3.1 Context

To date no maritime archaeological artefacts of lower Palaeolithic origin (ca. 500-300kya) 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). The current method of recovery and collection (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). This method of recovery has however recently uncovered a collection of 28 Neanderthal hand axes from dredged material 13km off the coast of Great Yarmouth which are currently regarded as perhaps the most significant find of Ice-age artefacts from the North Sea to date, and their typology places them at a date of ca. 100kya (Wessex Archaeology 2008c). Six 'sites' are currently known either offshore or in intertidal areas for Regional Sea 2 and are indicated in Table A3i.3.

Table A3i.3 – Known 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 8000-7000 BP may provide a richer assemblage. No recent fossil bone or artefact finds have been made at this location.
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.
Sea Henge, Holme next to Sea, Norfolk	A circle of 56 wooden posts surrounding an upturned oak stump exposed at Holme next to Sea, Norfolk. Dated to ca. 4100 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. 8500 BP and the tool dated to ca. 11740 ±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 7600-3500 BP, relating to Mesolithic and Neolithic peoples (Wilkinson & Murphy 1995).
Brown Ridge	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 ca. 6m of modern, mobile sand surface. The bones and artefacts are likely confined to the clay.

Source: Flemming (2002), (2004a), (2004b).

Recent research by Gaffney *et al.* (2007) 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, 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. The application of this methodology elsewhere is limited by available spatial data, exacerbated by the poor response of 3D seismic in shallow waters, rendering the modern nearshore of the UK unsuitable for such studies (Fitch *et al.* 2007).

A3i.3.2 Wrecks

There are a large number of wrecks within Regional Sea 2, with the NMR indicating ca. 13,000 'wreck' sites under the maritime category for counties relevant to Regional Sea 2 – note that some of these are located in terrestrial fluvial environments (e.g. river terraces). A breakdown of maritime sites for each county is provided in Table A3i.4.

Table A3i.4 – Maritime archaeological records categorised as 'wreck' for English Counties relevant to Regional Sea 2

County	# sites recorded as 'wreck'	Summary of wreck sites
Lincolnshire	738	Early (Stone-age, Bronze- and Iron-Age) logboats have been recovered but only from terrestrial fluvial environments. Records are relatively few until the Georgian (296), Victorian (222) and modern (158) eras.
Norfolk	3,477	Unlike Lincolnshire, no wreck pre-dates the Anglo-Saxon period, which is represented by a singular, coastal find. Like other regions, records for wrecks increase in the Medieval (35) and post-Medieval (2738) period. Modern finds account for 662 of the records
Suffolk	1,549	The earliest submerged marine vessels being Medieval in age. Records increase substantially in the Georgian (577), Victorian (380) and modern (402) periods.
Essex	1712	Wrecks are few (a single, terrestrial, Roman find) until the Medieval (6) and post-Medieval period. Georgian (535), Victorian (491) and modern (411) wrecks make up most of the maritime shipwreck assemblage.

County	# sites recorded as 'wreck'	Summary of wreck sites
Kent	5,460	The earliest remains are considered Bronze Age (2) at Dover and Langdon Bay. There are few records for the periods leaving up to the Medieval (75), and like in most other counties, the post-Medieval period, particularly Georgian (1643) and Victorian (1423) times, have the most abundant record. Modern wrecks account for 1453 of the total number of records.

Source: English Heritage pastscape website

There are 10 historic, protected, wrecks in Regional Sea 2 (Table A3i.5).

Table A3i.5 – Protected wrecks within Regional Sea 2

Wreck name	Date of sinking	Location	Protection status	Other relevant information
Dunwich Bank	ca. 16 th century	52° 15' 8.4" N, 01° 38' 31.8" E	PWA	Southwold, Suffolk. 100m exclusion zone
Rooswijk	ca. 18 th century	51° 16.443' N, 01° 34.537' E	PWA	Goodwin Sands, Kent
Stirling Castle	1703	51° 16.4561' N, 01° 30.4121' E	PWA	Goodwin Sands, Kent. 50m exclusion zone
Restoration	1703	51° 15.6302' N, 01° 30.0262' E	PWA	
Northumberland	1703	51° 15.481' N, 01° 30.016' E	PWA	
Bonhomme Richard	1779	54° 11.488' N, 00° 13.3774' E	PWA	Filey Bay, Yorkshire. 300m exclusion zone
South Edinburgh Channel	ca. Late 18 th century	51° 31' 44" N, 01° 14' 53" E	PWA	Thames Estuary, Kent. 100m exclusion zone
Admiral Gardner	1809	51° 12' 00" N, 01° 30' 33.6" E	PWA	Goodwin Sands, Kent. 150m exclusion zone
HMS Bulwark	WWI	50° 25.392' N, 00° 39.172' E,	PMRA†	Sheerness, Kent. 100m exclusion
HMS Exmoor	1941	n/a	PMRA‡	Off Lowestoft
HMS Vortigern	1942	n/a	PMRA‡	Off Cromer
SS Richard Montgomery*	1944	Centred on: 51° 27' 57" N, 00° 47' 12" E	PWA	Medway. Exclusion zone identified by straight lines joining the following points: 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

Notes: PWA=Protection of Wrecks Act 1973; PMRA=Military Remains Act 1986; †=designated as a 'controlled site' under the PMRA 1986; ‡=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data. *=designated under Section 2 of the PWA as a dangerous site

Source: MCA website, EH website, the Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2008.

A3i.3.3 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) to more recent post-medieval finds, and this range of material is reviewed extensively in Fulford *et al.* (1997) 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.

Palaeolithic sites in the coastal zone of southwest England are rare and Late Upper Palaeolithic occupation sites such as Titchwell (Norfolk) are extremely important (Fulford & Champion 1997). 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). Despite a lack of extensive early finds, a high concentration of Neolithic axes has been found in the area (Bradley *et al.* 1997). 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). 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 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). Neolithic material has been recovered from the coastal areas of East Anglia (e.g. at the Stumble), from The Tweed to Flamborough Head (e.g. Withow Gap, Skipsea), 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).

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 unproductive for agriculture. Evidence of Bronze Age occupation in the inter-tidal zone has been identified in the Essex river, and the inter-tidal zone in general is regarded as having great potential for prehistoric finds (Brown & Murphy 1997). Late Iron Age and Roman period Britain has a relative wealth of material which includes coins and metalwork. 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 southeast 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.

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 southeast England, Bromhead and 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.

A3i.4 REGIONAL SEA 3: KNOWN & LIKELY SUBMERGED SITES

A3i.4.1 Context

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. 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 2004), though these are perhaps more likely attributed to the Mesolithic and/or Neolithic periods (Hosfield 2007), and finds such as that at -11m OD off Bouldnor Cliff (Momber 2000) indicate a high likelihood of further prehistoric finds. 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.

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 x.x.x 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.

A3i.4.2 Wrecks

There are a large number of wrecks within Regional Sea 3 (Table A3i.6), although only small number of these are charted and 19 are afforded protection (Table A3i.7).

Table A3i.6 – Maritime archaeological records categorised as ‘wreck’ for English Counties relevant to Regional Sea 3

County	Total No. Sites recorded as ‘wreck’	Summary of wreck sites
East Sussex	1,228	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 (413) and Victorian (393) times. Modern wrecks account for 288 records.
West Sussex	504	Wreck ranges from Bronze Age and Iron Age logboats, though these are associated with terrestrial waterways. There are no pre-Medieval marine records, and it is only for Georgian (105) and Victorian (169) wrecks that records substantially increase, with modern vessels making up 36% (181) of the total shipwreck assemblage.
Hampshire	373	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 and post-Medieval periods, peaking with Georgian losses (154).
Dorset	1,071	The earliest record is for a Palaeolithic craft, though this is located in the River Frome rather than in an intertidal or submarine area. The next earliest record is for the Iron-Age, with few Roman (2) and later finds up until the Medieval period (15). Characteristically, Georgian (345), Victorian (332) and Modern (301) records dominate the database.

Source: English Heritage pastscape website

Table A3i.7 – Protected wrecks within Regional Sea 3

Wreck name	Date of sinking	Location (WGS84)	Protection status	Other relevant information
Langdon Bay Wreck	12th century BC	51° 07' 36"N 01° 20' 48"E	PWA	500m seaward of white cliffs, East of Dover Harbour, Kent 150m exclusion zone
Studland Bay Wreck	ca. 1520	50° 39' 39"N 01° 54' 47.4"W	PWA	Studland, Poole Bay, Dorset 50m exclusion zone
Mary Rose	1545	50° 45' 48"N 01° 06' 10"W	PWA	Off Spithead, Portsmouth, Solent
West Bay	1627-1750	50° 42.244'N 02° 46.708'W	PWA	Outer Pollock Reef, West Bay, Dorset 50m exclusion zone
Anne	1678-1690	50° 53' 22"N 00° 41' 46"E	PWA	Pett Level, near Cliff End, Rye Bay, East Sussex 75m exclusion zone

Wreck name	Date of sinking	Location (WGS84)	Protection status	Other relevant information
Brighton Marina Wreck	16th century/possibly late 15th century	50° 48' 36.5"N 00° 06' 29"W	PWA	100m east of marina wall, Brighton
Swash Channel Wreck	Early 17 th century	See right	PWA	Swash Channel, Poole Bay, Dorset. Wreck lies in the area encompassed by the four points: 50° 39.8971'N, 001° 55.5905'W; 50° 39.9201'N, 001° 55.5137'W; 50° 39.8225'N, 001° 55.4414'W; 50° 39.7994'N, 001° 55.5182'W
Yarmouth Roads Wreck	Post-Medieval	50° 42' 31.2"N 01° 29' 35.8"W	PWA	Yarmouth, Isle of Wight 50m exclusion zone
Norman's Bay Wreck (~ HMS Resolution)	~ 1703	50° 48.1767'N 00° 24.6380'E	PWA	Norman's Bay, West Sussex 100m exclusion zone
Hazardous	1706	50° 45' 6"N 00° 51' 28.2"W	PWA	Bracklesham Bay, West Sussex 75m exclusion zone
Assurance/Pomone	1738/1811	50° 39' 42"N 01° 35' 27"W	PWA	The Needles, Isle of Wight 75m exclusion zone
Amsterdam	1749	50° 50' 42"N 00° 31' 39"E	PWA	Bulverhythe, near Hastings 100m exclusion zone
Invincible	1758	50° 44' 20"N 001° 02' 13"W	PWA	Horse Tail Sand, Hampshire 100m exclusion zone
HM Submarine A1	1911	50° 44' 31.2"N 00° 55' 11.4"E	PWA	Bracklesham Bay, West Sussex 300m exclusion zone
Holland V Submarine	1912	50° 41.649' N 00° 30.867' E	PWA	Royal Sovereign Bank, English Channel 200m exclusion zone
HMS M2	1932	-	PMRA‡	Of Portland, Dorset
HMS Swordfish	1940	-	PMRA‡	Of St Catherine's Point, Isle of Wight
HMS Boadicea	1944	-	PMRA‡	Off Portland, Dorset

Key: PWA=Protection of Wrecks Act 1973; PMRA=Military Remains Act 1986

‡=designated as a 'controlled site' under the PMRA 1986; †=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data.

Source: MCA website, EH website, the Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2008

A3i.4.3 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) and Gale & Fenwick (1997) 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. 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 Wooton Quarr. This location also holds the only definitive Neolithic timber structures and wooden structures from the Late Bronze Age. 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). Iron Age pottery and ‘floors’ have also been identified in this area, with the latter reportedly destroyed. 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 other Roman and Iron Age sites have been destroyed by cliff erosion. Limestone quarries at Wooton 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 inter-tidal 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. Harbours, quays and other coastal infrastructure from the historic period are accounted for in the HMR.

More recently, the southern coast has a substantial array of defensive structures ranging from Napoleonic (1790-1815) to Second World War (1939-1945). A search of the National Monuments Record for England reveals that most of the defensive structures in the counties

of East and West Sussex, Hampshire and Dorset (2230 of 2986, or *ca.* 75%; [EH *pastscape* website]) are modern (i.e. post-1900), primarily consisting of pillboxes, tank traps and batteries.

A3i.5 REGIONAL SEAS 4 & 5: KNOWN & LIKELY SUBMERGED SITES

A3i.5.1 Context

The English Heritage *pastscape* service was consulted in order to determine the abundance of recorded maritime sites in Regional Seas 4 and 5. The majority of records for relevant counties are wrecks (*ca.* 74%; Table A3i.8), a minority of which are designated under the Protection of Wrecks Act 1973 (Table A3i.9).

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). 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.

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 1986). 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 with the exception of the central channel, up to the date of marine encroachment (Jamieson *et al.* 2007). 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.

A3i.5.2 Wrecks

There are a large number of wrecks within Regional Sea 4 (Table A3i.8) though only some are charted and even fewer afforded protection (Table A3i.9). Numerous aircraft losses dating to WWII are likely to be represented off the southwest coast, though the current known resource listed in the SMR and HER is relatively small (Wessex Archaeology 2008a). The gazetteer in Jamieson *et al.* (2007) indicates 14 known aircraft sites for the Severn area alone which are currently recorded on the English Heritage NMR. Wessex Archaeology (2008b) indicates that there is a primarily coastal distribution of aircraft sites for the Isles of Scilly, southwest coast, and north along the Bristol Channel.

Table A3i.8 – Maritime archaeological records categorised as ‘wreck’ for English Counties relevant to Regional Sea 4

County	Total No. Sites recorded as ‘wreck’	No. of sites recorded as ‘aircraft’	Summary
Devon	2,774	93	The number of ‘wreck’ categories of maritime finds in Regional Sea 4 declines in a westerly direction, with ca. 90% of maritime finds being wreck in Devon, declining to just ca. 27% in Gloucestershire, presumably a reflection on vessel traffic and trade, though whether this partly reflects research focus is not known. The earliest finds are Bronze Age and are relatively few (3), located in Devon. The number of wrecks increases from the Medieval period, peaking in Georgian and Victorian times. Modern (post 1900) wrecks also feature widely.
Cornwall	3,912	71	
Somerset	179	29	
Gloucestershire	28	15	

Source: English Heritage pastscape website

Table A3i.9 – Protected wrecks within Regional Sea 4

Wreck name	Date of sinking	Location (WGS 84)	Protection status	Other relevant information
Moor Sand	Middle Bronze Age	50° 12' 42"N 03° 44' 20"W	PWA	Off Prawle Point, South Coast of Devon 300m exclusion zone
Gull Rock	15 th /16 th century	51° 11' 6.6"N 04° 39' 24.6"W	PWA	East of Lundy Island, North Devon coast 100m exclusion zone
Erme Ingot	Bronze Age	50° 18' 9"N 03° 57' 24.6"W	PWA	Bigbury Bay, Devon 100m exclusion zone
Erme Estuary	Medieval and Bronze Age	50° 18' 24.6"N 03° 57' 11.4"W	PWA	Bigbury Bay, Devon 250m exclusion zone
Bartholomew Ledges	16 th century	49° 54.364'N 06° 19.889'W	PWA	St. Mary's Sound, Isles of Scilly, Cornwall 150m exclusion zone
Cattewater	Early 16 th century	50° 21' 41.4"N 04° 07' 37.5"W	PWA	Estuary of the River Plym, Plymouth 50m exclusion zone

Wreck name	Date of sinking	Location (WGS 84)	Protection status	Other relevant information
St Anthony	Early 16 th century	50° 03.335826'N 05° 16.911581'W	PWA	Gunwalloe Cove, St Michaels Bay, Cornwall 150m exclusion zone
Church Rocks	Late 16 th /early 17 th century	50° 32' 55"N 03° 29' 10"W	PWA	East of Teignmouth, Devon
Rill Cove	Early 17 th century	49° 58' 31"N 05° 14' 26"W	PWA	Kynance, The Lizard, Cornwall 100m exclusion zone
Salcombe Cannon Site	Mid 17 th century	50° 12' 41.76"N 03° 44' 40.74"E	PWA	Prawle Point Salcombe, Devon 300m exclusion zone
Schiedam	1684	50° 02' 13.8"N 05° 16' 24"W	PWA	Off Gunwalloe, Cornwall 75m exclusion zone
Loe Bar	Possibly 1684	50° 3' 46.68"N 05° 17' 22.44"W	PWA	Penwith, Cornwall 250m exclusion zone
Coronation (inshore & offshore)	1691	50° 18' 57"N 04° 11' 34"W 50° 18' 34.2"N 04° 11' 58.8"W	PWA	Penlee Point, Plymouth 100m exclusion zone
Tearing Ledge	1707	49° 52' 12"N 06° 26' 29"W	PWA	Bishop Rock, Isles of Scilly 200m exclusion zone
Royal Anne	1721	49° 57.48'N 05° 12.99'W	PWA	Stag Rocks, The Lizard, Cornwall 200m exclusion zone
Hanover	1763	50° 20' 4.5"N 05° 10' 49.38"W	PWA	Perranporth, Cornwall 250m exclusion zone
HMS Colossus	1798	49° 55.471'N 006° 20.505'W	PWA	Isles of Scilly 300m exclusion zone
Iona II	1864	51° 11.0861'N 04° 38.8594'W	PWA	Lundy, North Devon 50m exclusion zone
Wheel Wreck	Late 19 th century	<i>Coordinates currently unavailable</i>	PWA	Little Ganinick, Isles of Scilly
Louisa	ca. 19 th century	-	SAM	Scheduled area 60m x 40m centred on NGR ST 181 740
UB-65	1918	-	PMRA‡	Off Padstow, Cornwall
HMS M1	1925	-	PMRA‡	Off Start Point
HMS Warwick	1944	-	PMRA‡	Off Trevoze Head, Cornwall

Key: PWA=Protection of Wrecks Act 1973; PMRA=Military Remains Act 1986, SAM=Scheduled Ancient Monument

‡=designated as a 'controlled site' under the PMRA 1986; †=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data.

Source: MCA website, EH website, the Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2008

A3i.5.3 Archaeological Sites in the Coastal Zone

The Palaeolithic period is poorly represented on the southern coast, on the Isles of Scilly and north, from Land's End to Gloucester, partly due to the paucity of work that has been carried out here and partly due to the hard rock nature of the south Devon and Cornwall coastlines (Bradley *et al.* 1997). The Bronze Age is represented in Cornwall by numerous sites of occupation or in the form of barrows (burial mounds) and field systems (Christie 1986). Iron Age and Roman salt production is evidenced by briquetage – key sites include those at Purbeck and Chesil Beach where there is evidence of ovens. The Island of

Portland to the south of Chesil Beach 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). 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).

For a recent review of the coastal archaeology of the Isles of Scilly, see the Rapid Coastal Zone Assessment Survey carried out for English Heritage (Johns *et al.* 2004). 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, perhaps seasonally. 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 (15) 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 extreme cliff coasts of Devon and Cornwall result in few finds, and some archaeology has probably been lost in cliff falls. Erosion still threatens many early flint scatters, promontory forts and Iron Age cliff castles. Early prehistory is represented by Neolithic finds from the foreshore at Oldbury, Hills Flats and the shingle at Blackstone Rocks (Bradley *et al.* 1997). Later Bronze Age finds include a metalworking site at Preston Sands and an important site located in blown sands at Gwithian and Brean Down, and the latter also has evidence for salt making. 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 peats and alluvium in the banks of the Severn Estuary are also found to contain flint artefacts and evidence of prehistoric settlements (Jamieson *et al.* 2007). 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 palaeoenvironmental evidence (Bell 1997).

The south coast of Wales holds some of the oldest Palaeolithic sites in Britain. 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 25 ka BP, representing the oldest anatomically modern human in Britain (Schulting *et al.* 2005).

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).

A3i.6 REGIONAL SEA 6: KNOWN & LIKELY SUBMERGED SITES

A3i.6.1 Context

Flemming (2005) provides an assessment of areas conforming to advantageous taphonomic conditions in Regional Sea 6, which may in turn be potential stores of archaeological material (Table A3i.10).

Table A3i.10 – Offshore site prospectivity for Regional Sea 6 derived from BGS sediment maps

Area	Arial extent	Prospectivity
Isle of Man	54°-55°N, 4°-6°W	Favourable prospectivity in shallow water sites such as Luce Bay, Belfast Lough and south east of the Isle of Man
Lake District	54°-55°N, 3°-4°W	Poor prospectivity except close inshore
Liverpool Bay	53°-54°N, 3°-4°W	Poor prospectivity, the chance of some buried sites
Anglesey	53°-54°N, 4°-6°30'W	A strongly prospective area. Submerged caves may be possible sources of material
Cardigan Bay	52°-53°N, 3°50'-6°30'W	Moderate prospectivity in exposed periglacial features

Source: Fleming (2005)

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). In Regional Sea 6, late Holocene sea level adjustment ranges from a positive 1.6mm yr⁻¹ centred on Mull and Jura in the north, to negative 0.5mm yr⁻¹ on the Pembrokeshire coast (Shennan & Horton 2002). The prospect of locating former coastal settlements/structures in the marine and intertidal zones is therefore more likely in the area to the south of the Liverpool Bay area, south of which negative isostatic adjustment has contributed to the loss of sections of the littoral zone. Evidence of such 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 [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 Neolithica. If structural remains are to be found offshore, they are likely to be of this and earlier periods (e.g. Palaeolithic, Mesolithic).

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. 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).

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).

A3i.6.2 Wrecks

For the Welsh coastal area, a recent survey and desk study by Edwards (2002) indicates 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) conducted a geophysical research programme and imaged 80 19th and 20th century wrecks in seven areas of the Northern Irish coast indicating that there is a potentially large undeveloped wreck resource in these waters. Searches of the NMR for Scotland, England and Wales present a total record of 1,058, 1,084 and 33 archaeological 'wreck' sites for these areas respectively, mostly of Georgian, Victorian and later age. Of these, there are 11 protected (Table A3i.11).

Table A3i.11 – Protected wrecks within Regional Sea 6

Wreck name	Date of sinking	Location (WGS84)	Protection status	Other relevant information
The Smalls	1100	51° 43.202'N 05° 40.1937'W	PWA	St. George's Channel 100m exclusion zone
Pwll Fanog	Medieval (late 15 th century)	53° 12.7813'N 04° 11.7915'W	PWA	Menai Strait 150m exclusion zone

Wreck name	Date of sinking	Location (WGS84)	Protection status	Other relevant information
Mary	1675	53° 25.2798'N 04° 36.7393'W	PWA	North of Anglesey 100m exclusion zone
Tal-y-Bont/ Bronze Bell	1677	52° 46.7472'N 04° 07.6045'W	PWA	Cardigan Bay 300m exclusion zone
HMS Racehorse	1822	-	PWA (IOM)	South east coast of the Isle of Man
Resurgam	1880	53° 23.7940'N 03° 33.2590'W	PWA	Liverpool Bay 300m exclusion zone
HM Submarine H5	1918	53° 05.483'N 04° 41.975'W	PMRA†	Caernarfon Bay 300m exclusion zone
SS Castillian*	1943	53° 25.0107'N 004° 35.9176'W	PWA	North of Anglesey 500m exclusion zone
HMS Vandal	1943	-	PMRA‡	Off Lochranza, Isle of Arran
The 'Diamond'	ca. 19 th century	52° 46.531'N 04° 11.025'W	PWA	Cardigan Bay 200m exclusion zone
HMS Dasher	WWII	55° 37.747'N 05° 00.953'W	PMRA†	Strathclyde 300m exclusion zone

Key: PWA=Protection of Wrecks Act 1973; PMRA=Military Remains Act 1986

†=designated as a 'controlled site' under the PMRA 1986; ‡=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data.

*=designated under Section 2 of the PWA as a dangerous site

Source: MCA (2008), the Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2008

A3i.6.3 Archaeological Sites in the Coastal Zone

The following summary from (primarily) Bradley *et al.* (1997), Murphy (2002), 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 England's North West, 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 more recent 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. Occupation of Pontnewydd cave (Green *et al.* 1981, Green 1984) has been dated to as early as 225 ka BP and indicates that Lower-Middle and later Palaeolithic people (*Homo neanderthalensis*) had occupied this area within (possibly) multiple interglacials. 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 Palaeolithic record exists for Northern Ireland (Flemming 2005).

These latter sites fringe the Mesolithic period, which 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 Lleyen 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's Bay and Nab Head provide evidence of Mesolithic occupation, the latter site revealing over 40,000 (mostly) early

Mesolithic artefacts, and some later (7190 ± 100 BP/ 7300 ± 100 BP) ones (Murphy 2002). Submerged forest and intertidal/submerged peats are present on the coast 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. There is a considerable coastal concentration of finds which include the raised beaches at Esk and north of St. Bees, preserved intertidal footprints at Formby, 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 Woodpark, County Sligo.

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, 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 (McGrail 1996) 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, out with Regional Sea 6. 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, Caernarfon and Pennal. The Iron Age in North West England is poorly represented with only minimal metal and pottery finds (Hodgson & Brennan 2004). In England, a Roman road extends along much of the Wirral coast with the most important site in this area 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 scarce in Wales, partly due to the low level of archaeological investigation (Murphy 2002), 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. 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. Fish traps are a significant feature of the coast.

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).

A3i.7 REGIONAL SEA 7: KNOWN & LIKELY SUBMERGED SITES

A3i.7.1 Context

Relative eustatic and isostatic sea-level change has meant that areas submerged in the modern environment would have previously been dry land and such areas potentially hold significant archaeological resources. 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. 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), 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.

There is, at present, no conclusive evidence for Palaeolithic presence in Scotland (Edwards 2004) and therefore within Regional Sea 7. 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) argues that the site is more likely an animal den. Other potential early Holocene Palaeolithic finds include Tanged points on Jura (Mercer 1980) and a hazel decline and fire history indicative of early Holocene occupation on Islay (Edwards and Berridge 1994). 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 exist 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). 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

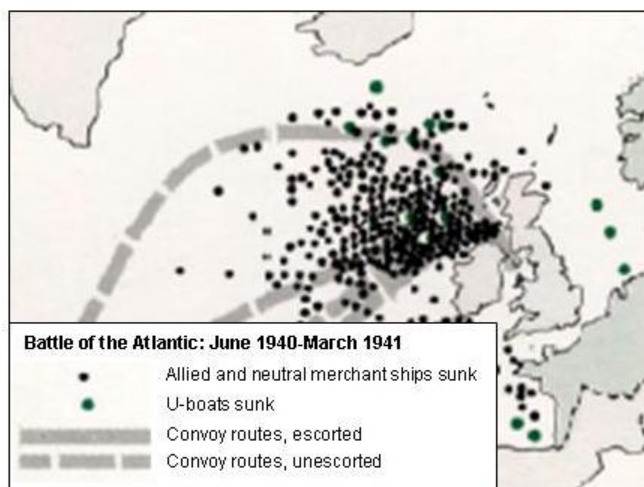
associated artefacts. Marine trade between Neolithic people can be seen in artefact and building typologies (for instance porcellanite of Irish origin is found throughout the western isles of Scotland: Wessex Archaeology 2006) and later Neolithic (ca. 5,000 BP) logboats have been excavated in Co. Antrim – 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 Oronosay 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 recently evidenced by Cooper *et al.* (2002).

A3i.7.2 Wrecks

The Northern Ireland shipwreck database records over 3,000 wrecks, while for Scottish waters, the RCAHMS database reports over 14,400 maritime sites – these reported sites are only a portion of the entire wreck resource. For the previous SEA programme, Wessex Archaeology (2006) identified known allied and merchant ships sunk within UK waters and the wider North Sea and Atlantic Ocean during the Battle of the Atlantic, 1940-41 (after Waddell 1991)– many of these wrecks are located within Regional Sea 7 but also reach west into Regional Seas 10 and 11 (Figure A3i.3).

Figure A3i.3 – Allied merchant ship and U-boat losses 1940-41



Source: Wessex Archaeology (2006), after Waddell (1991)

There are 5 historic, protected wrecks located in waters covered by Regional Sea 7 (Table A3i.12). At the time of writing (October 2008), the *Irishman*, a paddle steamer built on the Clyde in 1834 and lost off Skye in 1862, is being considered for designation following further site assessment (DCMS 2008).

Table A3i.12 – Protected wrecks locations within Regional Sea 7

Wreck name	Date of sinking	Location (WGS 84)	Protection status	Other relevant information
La Girona	1588	55° 14' 51" N 06° 30' 3" W	PWA	Lacanda Point, Co Antrim 300m exclusion zone

Wreck name	Date of sinking	Location (WGS 84)	Protection status	Other relevant information
Mingary Castle Wreck	ca. 17 th century	56° 41' 30" N 06° 04' 21" W	PWA	Sound of Mull, Argyll & Bute 250m exclusion zone See: Wessex Archaeology (2007)
Kinlochbervie Wreck	Early 17 th century	58° 26' 12.80" N 05° 06' 25.79" W	PWA	Kinlochbervie, Sutherland 100m exclusion zone
Duart Point Wreck	1653	56° 27' 27" N 05° 39' 19.2" W	PWA	Sound of Mull, Argyll & Bute 75m exclusion zone
Dartmouth	1690	56° 30' 11.4" N 5° 41' 57" W	PWA	Sound of Mull, Argyll & Bute 50m exclusion zone
Adelaar	1728		N/A	Lies to the west of Barra See: Wessex Archaeology (2006), Martin (2005)
SS Norge	1904		N/A	Location unknown See: Wessex Archaeology (2006)
HMS Bullen	1944		PMRA‡	North West Scotland: Cape Wrath

Key: PWA=Protection of Wrecks Act 1973; PMRA=Military Remains Act 1986

‡=designated as a 'controlled site' under the PMRA 1986; †=designated as a 'protected site' under the PMRA 1986 – no specific coordinate data.

Source: Martin (2005), Wessex Archaeology (2006), MCA website, the Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2008

A3i.7.3 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, most recently summarised in Dawson (2003). 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 giants causeway and causeway coast is a designated World Heritage Site (WHS), and though this designation does not currently cover Cultural Heritage, it may do if the designation is reviewed.

The earliest finds are those of Mesolithic origin, for instance at Kinloch on Rum (Wickham-Jones 1990), Islay (Mithen 1990), 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). Mesolithic settlement on Lewis is still tenuous, largely proven on the basis of palaeoecological evidence and reconstructed fire history (Edwards 1996), 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 Mesolithica. 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, outside Regional Sea 7 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).

A3i.8 REGIONAL SEA 8: KNOWN & LIKELY SUBMERGED SITES

A3i.8.1 Context

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) uses 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 more importantly for this study, their geographical distribution.

Research (carried out by Heriot Watt University and the Orkney Diving Centre) to detect submerged Neolithic or Mesolithic sites in Orkney is in its early stages. Discoveries include what appears to be a collapsed cave on the west coast of Mainland Orkney and a submerged stone structure in the Bay of Firth. Orkney is also one of the areas included in a University of Newcastle upon Tyne project to search for submerged early postglacial sites using GIS based predictive models.

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.

Strong current conditions, exposure to full North Atlantic storm conditions, thin sediment cover in many places, and large areas of exposed bedrock, make the exposed areas of the Regional Sea 8 shelf statistically 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*. Recent studies (e.g. Fitch *et al.* 2005, Gaffney *et al.* 2007) have looked at reconstructing the palaeogeography or palaeolandscapes of regions of the North Sea from 3D seismic data, and such research should lead 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. 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). Such research has the potential to be useful in planning, and maps indicating the likelihood of archaeological finds or threat and uncertainty mapping (see Fitch *et al.* 2007, p. 116-117) can be used to analyse information gaps and areas which might be threatened by development (Fitch *et al.* 2007).

A3i.8.2 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 recent survey (Wilson 2003b) of selected coastal areas on Orkney 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 back to 4,600 years BCA. Defensive structures (such as Broch Mousa, the most complete example of an Iron Age broch) and tombs and burial grounds (such as the Quoyness Cairn on the Orkney Isle of Sanday which dates as far back as 2,900 BP) are also located in the area.

A recent survey conducted by Brady *et al.* (2003) reports 485 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 RCAHMS database reveals hundreds more sites listed as Scheduled Ancient Monuments or as registered on the National Monuments Record of Scotland (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, project-specific site surveys will be necessary to identify all archaeological sensitivities in an area. 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 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 18-19th 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.

Results for a survey of Lewis (see Burgess & Church 1997 for a comprehensive review) are synthesised in Church & Burgess (2003). The survey comprised the intertidal zone and a strip 50-200m wide inland from Aird Drollageo in the west, north and east to Ranish. The following is a summary of this report. Though this does 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 to modern times. Though sites were generally characterised to within one period, a more precise age could not be distinguished without further work, and more than a third (541) of the sites could not be attached to any particular cultural period. 50 percent of prehistoric sites are eroding, with those of the later Norse and medieval periods being more stable.

Further south on Barra 220 sites (compared with 22 on RCAHMS) 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 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.).

A3i.8.3 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 many losses in World Wars I and II due to its strategic importance. There are 10 historic, protected wrecks located in waters covered by Regional Sea 8 (Table A3i.13).

Table A3i.13 – Protected wrecks within Regional Sea 8

Wreck name	Date of sinking	Location (WGS 84)	Protection status	Other relevant information
HMS Hampshire	WWI	59 07.065N 03 23.843W	PMRA	300m exclusion zone.
HMS Vanguard	WWI	58 51.400N 03 06.405W	PMRA	200m exclusion zone.

Wreck name	Date of sinking	Location (WGS 84)	Protection status	Other relevant information
Brummer	WWI	58 53.815'N 03 09.207'W	SAM	500m diameter exclusion area encompassing the debris field.
Dresden	WWI	58 52.943'N 03 08.455'W	SAM	
Karlsruhe	WWI	58 53.350'N 03 11.352'W	SAM	
Koln	WWI	58 53.830'N 03 09.181'W	SAM	
Konig	WWI	58 53.198'N 03 09.181'W	SAM	
Kronprinz Wilhelm	WWI	58 53.622'N 03 09.904'W	SAM	
Markgraf	WWI	58 53.475'N 03 10.010'W	SAM	200m exclusion zone.
HMS Royal Oak	WWII	58 55.848N 02 59.001W	PMRA	

Key: PMRA=Protection of Military Remains Act 1986; SAM=Scheduled Ancient Monument
Source: MCA website

A3i.9 REGIONAL SEAS 9, 10 & 11: POTENTIALLY SUBMERGED SITES

A3i.9.1 Context

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.* 2002), none of Regional Sea 9, 10 or 11 would have been available for occupation, precluding the possibility of any 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 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 Regional Seas 9, 10 and 11 lie out with the 12nm limit over which Scottish Ministers have control. In continental shelf and slope areas such as this, the UK government has ultimate control, and obligations under UNCLOS Articles 149 and 303 are more pertinent.

A3i.10 RELEVANT LEGAL FRAMEWORK FOR HERITAGE PROTECTION

The principal focus of maritime archaeology in the UK has in the past been that of shipwreck which is well integrated into the licensing process for seabed development (Wenban-Smith 2002), however the archaeological resource in UK territorial waters (particularly those of the North Sea region) and the wider continental shelf is much more diverse and includes submerged landscapes and settlements of past cultures and military aircraft (Roberts & Trow 2002). The current legislation regarding the protection of archaeological remains comprises

of international and national law, the latter of which is currently undergoing a period of reform.

A3i.10.1 Relevant Acts and Conventions

Historic Scotland, English Heritage, Cadw and the Environment and Heritage Service (Northern Ireland) are the relevant bodies responsible for archaeology and built environment which extends to offshore areas within the 12nm territorial limit, outside of which UK jurisdiction applies. These bodies may well still maintain an interest in any finds outside the 12nm limit (*cf.* Flemming *et al.* 2004). For the purposes of environmental assessment, attention is drawn to directive 2001/42/EC which states under Article 5 (Environmental Report), 'the likely significant effects on the environment, including on issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors [should be accounted for]' (Annex 1). Relevant regulatory framework (outlined below) is implemented by the above bodies to control disturbance of the archaeological resource in planning procedures.

The European Convention on the Protection of the Archaeological Heritage, or *Valetta Convention* (hereafter referred to as VC), came into force in 2001 and seeks to protect archaeological heritage which includes, 'structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water.' (Art. 1; para. 3). Under article 2 of the convention, provisions are made for an inventory of sites, as are 'archaeological reserves' and mandatory reporting (already covered for wrecks under PWA). Articles 3 and 4 outline means to ensure appropriate site investigation, and storage, conservation and protection of sites respectively. Many of the tenets outlined in the document mirror the suggested approach of the UN Convention on the Protection of Underwater Cultural Heritage (CUPCH); for instance preferred *in situ* preservation and mandatory reporting of finds. In addition, an integrated approach to planning policies is required to ensure that archaeological concerns are raised during development planning and in environmental impact assessment (Art. 5). The convention also introduces themes of; *inter alia*, methodical scientific study and information dissemination.

In England, the National Heritage Act of May 2002 has given English Heritage responsibility for maritime archaeology out to the extent of the 12 nautical mile territorial limit. This amends the National Heritage Act 1983 and Ancient Monuments and Archaeological Areas Act 1979 to include sites on and under the seabed (Oxley 2004). In the UK, other than an obligation to report wrecks sites, there is no state ownership of antiquities and no mandatory reporting of archaeological finds, the latter being a situation which should be rectified by any implementation of the VC (Flemming 2004). This situation is different in Northern Ireland where all archaeological objects must be reported.

Historic Scotland, the Secretary of State for Culture, Media and Sport and the National Assembly for Wales are the responsible agencies for scheduling monuments in Scotland, England and Wales respectively. 'Scheduling' is the process through which nationally important sites and monuments are given legal protection by being placed on a list, or 'schedule'. Scheduled monuments are protected by the Ancient Monuments and Archaeological Areas Act 1979, and scheduling is the only legal protection specifically for archaeological sites. The current scheduling legislation affords protection for deliberately created structures (e.g. buildings), features and remains, whether these are terrestrial, coastal or lying on the seabed. This legal provision is not compatible with Palaeolithic or Mesolithic sites which are dominated by lithic artefacts rather than structural remains

(Wenban-Smith 2002). This situation will change following the implementation of proposed legislation (see below).

In Northern Ireland, monuments are scheduled under the Historical Monuments and Archaeological Objects (NI) Order 1995 (Art. 1), which provides a legal framework for archaeological sites and objects including those on or in the seabed. The order not only provides protection for sites in territorial waters, but grants powers to conduct archaeological investigations and limits surveying (Arts. 29, 41) for archaeological sites and objects to those licensed to do so (Art. 32) – unless objects are incidentally discovered, which must then be delivered or reported to the relevant authority (Art. 42).

A3i.10.2 United Nations Convention on the Law of the Sea and Convention on the Protection of Underwater Cultural Heritage

Provision for the international protection of archaeological and historical objects located on the sea floor has been in force since the adoption of the 1982 United Nations Convention on the Law of the Sea (UNCLOS), covered under Articles 149 and 303 (see Brown 1996), however in many cases the detail of this legislation was woefully inadequate (Scovazzi 2003). More recently the Convention on the Protection of Underwater Cultural Heritage (CPUCH) has set out to provide an international tool for the protection of submarine archaeology in internal, territorial and archipelagic waters, and those areas outside any given territorial jurisdiction. CPUCH includes those archaeological, historical or cultural items which have been, “partly or completely under water, periodically or continuously, for at least 100 years” (CPUCH: Article 1a) which includes not only shipwrecks but buildings, artefacts, human remains, aircraft, cargo and prehistoric items (Art. 1; paras. 1-3). The protection comes initially in the form of maintaining the artefacts *in situ* unless considered at threat (Art. 5; para. 5). The convention received acceptance or ratification of the minimum number of 20 states on 2nd October 2008 and enters into force on 2nd January 2009. At present (October 2008) the UK is not a signatory.

A3i.10.3 The Protection of Wrecks Act 1973 and Protection of Military Remains Act 1986

Unless CPUCH is properly ratified, the protection of shipwrecks in UK territorial waters will continue to be covered by the Protection of Wrecks Act (PWA) 1973, administered by each UK country’s relevant authority (English Heritage, Historic Scotland, the Environment and Heritage Service in Northern Ireland (EHSNI) or Cadw). Wrecks or wreck sites may be considered to merit designation if they contribute to the understanding of the past on account of their historical, archaeological or artistic importance. Restricted areas may include part of the surrounding seabed deemed necessary to secure protection of the wreck. Under the Merchant Shipping Act (1995), finders of wrecks which include archaeological material are obliged to declare this to the Marine and Coastguard Agency’s (MCA) Receiver of Wrecks (Roberts & Trow 2002). Designation of wrecks and submerged prehistoric sites is also possible under a third act, the Ancient Monuments and Archaeological Areas Act 1979 (AMAA 1979), which applies to England, Scotland and Wales, but not Northern Ireland.

Submerged military sites on or in the seabed (PMRA: Art. 1; para. 6b) may be protected by the Protection of Military Remains Act (1986). The act seeks to designate any vessel or aircraft (as a protected place or designated control area) which appears to have become sunk or stranded while in military service whether before or after the passing of the act (Art. 1; para. 2). Vessel designations are restricted to those sunk after 4th August 1914 (Art. 1; para. 3a), while controlled sites have a maximum age of 200 years, providing they are

located in the UK or UK waters (Art. 1; para. 4c). A designation of 'protected place' can be given to any named vessel even if its geographical location is not known (though the general location of these is usually accounted for). This act has the principal concern of protecting the sanctity of military vessels and aircraft which are military maritime graves. This legislation is not directed at archaeological preservation but the MoD liaises with relevant authorities in the process of site designation. The act is explicit in indicating that a vessel (including aircraft) should not be moved or unearthed and that it should not be entered (Art 2; para 2) unless licensed to do so (Art. 4).

The latest incarnation of the Act, the Protection of Military Remains Act 1986 (Designation of Vessels and Controlled Sites) Order 2008, raises the number of vessels covered by the act by 10 (since 2006) to 46, with 23 of those pertaining to vessels in international waters (e.g. Malaysia, Falkland Islands, Denmark). In addition to these vessels there are 12 controlled sites – all of these reside in UK territorial waters.

Vessels designated under the PWA 1973 and PMRA 1986 are indicated in tabature and map form in their respective Regional Sea report.

In Northern Ireland, the Historic Monuments and Archaeological Objects (NI) Order 1995 (HMAO) provides for the protection of all archaeological sites and objects including those on the foreshore and the seabed. Northern Ireland also uses planning law to regulate archaeology. Government policy on planning, archaeology and the built heritage is presented in Planning Policy Statement 6 (Department of the Environment 1999). While the Planning Order (NI) 1991 has application only to the low water mark, the principles of Planning Policy Statement 6 can be extended to the seabed (Williams & McErlean 2002).

A3i.10.4 Proposed revision of the designation and protection of terrestrial, intertidal and marine archaeological sites

At the time of writing (October 2008), consultation on the content of new legislation for the designation and protection of the UK heritage resource is underway. Separate consultations are taking place for Scotland, and England and Wales, though the details of the proposals are broadly similar. The proposed Scottish legislation seeks to broadly parallel that for England, Wales and Northern Ireland in order to simplify administrative procedures. The Scottish Historic Environment Policy (SHEP) consultation (HS 2008) relates entirely to the marine heritage resource, whereas the Draft Heritage Protection Bill (Crown Copyright 2008) for England and Wales considers terrestrial, intertidal and marine designations. The marine component of the latter document also pertains to Northern Irish waters. In general the HS document proposes:

- Extended designation categories (e.g. vessels, aircraft, built structures, archaeological sites etc.)
- The identification of operations which might damage the historic environment and the provision of licensing control (disapplication is proposed for non-damaging activities)
- A consultation process for designations, with proposed sites gaining interim protection until designation is confirmed
- Voluntary agreements with landowners/others with a legal interest in the asset
- An appeal procedure against designations via public local enquiry
- Wide dissemination of designations (e.g. through PASTMAP, UKHO)

The Draft Heritage Protection Bill has the following main components:

- A single system of designation for England and Wales. This will incorporate those designations currently referred to as scheduled ancient monuments, listed buildings, battlefields or registered gardens or parks.
- Responsibilities of designating sites will pass from the DCMS to English Heritage (EH). In Wales, responsibilities will be maintained by Welsh ministers.
- EH and Welsh ministers will have to consult owners, local authorities and amenity societies on all cases being considered for designation.
- The relevant authority (EH, Welsh ministers) will have to maintain a publically accessible, online, Historic Environment Record (HER).
- 'Provisional registration' will be afforded to sites being considered for designation. Sites will be protected from the time consultation begins until they are designated or rejected.
- There is a new category of site which can be registered, 'a site comprising any thing or group of things that evidences previous human activity'.
- The bill introduces Marine Certificates of 'No Intention to Register' (like the previous terrestrial 'Certificates of Immunity' (COI) which apply for 5 years from issue).
- Heritage Asset Consent (HAC) is required for works resulting in demolition, damage or disturbance to a registered heritage structure.
- Marine Heritage Licenses are required where 'prohibited marine activities' (see section 187[2] of the DHPB) are to be carried out.
- A new appeal procedure for designation and licensing decisions is to be implemented.

Interim site protection, public dissemination of information, a mandatory register of sites and a licensing (and appeal) procedure are common to this document and the preceding Historic Scotland consultation on marine heritage protection. The implementation of this legislation has implications for marine developments including offshore windfarm (OWF) and oil and gas related activities. The latter is more likely to be affected where coastal or near coastal infrastructure is required within the 12nm limit, whereas the former may be influenced during all phases of construction and operation due to its requirement for shallower and therefore mostly coastal environments. Operations including cable- and pipe-lay and the use of pile foundations are destructive in their nature and are incompatible with a preference for *in situ* site preservation, specifically mentioned in the HS document.

The inclusion of the new site designation for non-structural remains described in the Draft Heritage Protection Bill as, 'a site comprising any thing or group of things that evidences previous human activity' or 'archaeological sites and elements of human-altered landscapes now inundated; scatters of artefacts', in the HS consultation document, may lead to an increase in the number of Palaeolithic and Mesolithic site registrations and other later remains not associated with a structure. Many archaeological finds from these early occupation periods of the UK continental shelf are known for the southern North Sea (Bunch *et al.* 2007), and were mainly recovered from trawling and dredging activities. Those in territorial waters may, if of suitable quality, attain designation.

A3i.11 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. The

potential of archaeological remains being disturbed must be considered on a project-specific level as this area of research is still developing.

The greatest risk to coastal sites is erosion. In Scotland a substantial (ca. 37%) proportion of sites are degrading due to natural destruction of the coastline, and this problem extends into England (Champion *et al.* 1997). Urban regeneration associated with the decline in heavy industry in northern England is also of some concern. 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 natural erosion, but these have their own associated problems, such as starving other areas of coast of sediment and therefore generating erosion elsewhere (Ashmore 2003b). The resulting situation is one which requires continual surveying of coastal sites or surveying at a suitable frequency so that the condition of sites might be monitored and any important artefacts recovered.

In relation to impacts from the offshore oil and gas industry and more recently offshore windfarm developments, Flemming (2004b) outlines a number of possible impacts:

- Coring of seabed to investigate pipe routes and foundation engineering for platforms
- Emplacement of platforms, concrete gravity, jacket or jack-up. Consider the total footprint of the platform, and associated support systems
- Permanent anchors for semi-submersible platforms
- Pile driving
- Drilling and running casing
- Pipe entrenching
- Coastal entrenching, terminals, docks, shoreside structures, jetties

Trenching for cable or pipelay is possibly the most destructive process as it is spatially the largest element of development, extending for 10s or 100s of km. Material ejected during this process is usually discarded, though it has been postulated that these deposits could be analysed by sediment recovery or by ROV video investigation (Flemming 2004b).

In the case of offshore wind farm (OWF) developments, Cowrie (2008), Wessex Archaeology (2007) and the Joint Nautical Archaeology Policy Committee (JNAPC) (2006) outline guidance for the assessment of impacts in relation to Cultural Heritage in the offshore area and at the coast. Sources of impact from OWF developments include:

- Construction, maintenance and decommissioning
- Intrusive site prospection (e.g. coring)
- Changes to scour patterns
- Vibration
- Appearance of development
- Physical damage to the area
- Altered usage patterns (leisure & tourism)

In addition to cable lay operations consistent with impact of the offshore oil and gas industry, the other primary impacts are that of emplacement of turbines on the seafloor and subsequent geomorphological impacts (e.g. scour). Wessex Archaeology (2007) point out that the impact of OWFs may be further reaching than the direct imposition of a monopile footprint or cable on a site, with scour from cables and structures, and changes to local current patterns and sediment movements all having possible knock-on effects for the wider

environment, including historic sites. Similarly, benthic fishing methods may disturb the seabed and damage exposed sites (Wessex Archaeology 2008d).

The visual impact of developments on the landscape/seascape (Wessex Archaeology 2007) and potential loss of interest and therefore reduced local revenue associated with historic features is also a consideration. Visual impacts may arise from both the offshore development and its coastal based infrastructure which might include a substation and pylons. Recent DTI (2005) and SNH (Scott *et al.* 2005) guidance is available for the consideration of landscape/seascape issues and is considered separately in Appendix 3c.

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 2008d).